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Preface

Ageing will be one of the major policy issues in the decades to come. Widespread is the growing awareness that the issue of ageing requires timely and adequate reactions in fiscal policies. On the brink of a new century, and now that public finances seem under control, policymakers in the Netherlands have the opportunity to look in the more distant future, and consider the consequences that ageing may have for the Dutch economy — and public finances in particular. This study provides a comprehensive analysis of the economic consequences of ageing in the Netherlands. It focuses on the government budget, but also considers the impact of ageing on important sectors as healthcare and the pension system.

This study has greatly benefited from the input of many people. As part of the preparation for this document, CPB organised several workshops on specific areas. Contributions by Joop de Beer (Statistics Netherlands) on demographic projections for the Netherlands, and Evert van Imhoff (Netherlands Interdisciplinary Demographic Institute, NIDI) on economic and socio-cultural impacts on demography and participation, are gratefully acknowledged. In addition to the main authors, many people inside and outside CPB contributed to this study. Arjan Lejour and Guido van Steen contributed to the international analysis in Chapter 2, Hans Roodenburg provided many valuable comments (and a box) on labour market and participation issues, and Adri den Ouden, who did an excellent job on the demographics, is the author of the appendix to Chapter 4. Ruud Okker and Gilbert van Hagen contributed in many ways to the analysis. Arie van der Giessen assisted with computational programming, and Ria van der Hoorn and Erwin Zijleman handled the layout. Finally, the study greatly benefited from the ideas and comments of CPB advisors, Lans Bovenberg and Sweder van Wijnbergen, and of the representatives of different ministries in our advisory committee.

Henk Don
Director

Chapter 1 Introduction

The demographic shift between generations due to ageing will have a considerable impact on society. In particular, it may put current arrangements for public pensions and healthcare under pressure. When the number of workers declines, who is going to pay for the taxes needed to finance government expenditures for the old? Is the burden of ageing going to be shifted to future generations, and will they be able and willing to pay for these taxes? These questions reflect the concern about ageing, and are central in this study on the consequences of ageing in the Netherlands.

Ageing will dramatically change the balance between young and old generations in the coming decades. In the Netherlands, the share of elderly persons (aged 65 years and older) in the total population will increase from 14% at present to 23% in 2040. This is due to a dramatic decline of fertility (baby bust) in the 1960s and 1970s, together with a steady increase in life expectancy. After 2040, the share of elderly people in the population will remain high.

This trend will have significant consequences for the government budget and social security. The share of public pensions (AOW) and healthcare in the government budget is expected to increase from 26% at present to 38% in 2040 as a result of the growing number of old people. This will put pressure on the government budget, and may lead to growing deficits and increasing public debt if no proper fiscal policies are installed in due course. A major issue is the impact of ageing on the intergenerational distribution of income. Who is going to pay for the costs of ageing? Will the burden be shifted to future generations, or will present generations also contribute to the cost of ageing by adjusting fiscal policies in a timely manner?

Sustainability of public finances is the main focus of the study. The central question is whether current public arrangements can be maintained in the future without the government running into financial problems, and without shifting the burden to future generations. More specifically, the study aims to do the following:

1. To assess the burden of ageing upon public finances in the Netherlands. Are current arrangements sustainable without having to raise taxes in the future? The study is comprehensive: it considers the impact of demography on the government budget, taking account of the age profile of public expenditures and (tax) revenues. It does this against the background of a stylised long-term path for the Dutch economy for the 21st century, focussing on demography, labour market participation, pensions and healthcare.
2. To explore ways to tackle the challenges imposed by the ageing phenomenon. Are future generations going to pay for the costs of pensions and care for the elderly, or is it possible to anticipate the situation by starting to save now? To what extent could and should other policies contribute? Is there scope for policies to increase participation? Special attention is paid to the pension system and healthcare.

3. To assess the impact of different policies on the distribution of income over generations.
4. To consider whether current arrangements for intergenerational risk sharing (i.e. pensions and healthcare) are at risk when the burden for future generation increases.
5. To assess the main uncertainties underlying the long-term projections, and their implications for policy. What is the best way to cope with these risks?

The focus on public finance implies a serious limitation in the scope of this study, as it is only a small facet of intergenerational relations. Transfers within the private sector, within households, and through knowledge and environmental stocks remain outside the scope of this study. Furthermore, this study looks forward only. Not analysed here are current generations' past net contributions made to the government. This restricts the analysis of the intergenerational distribution, as it is not possible to compare equity between current and future generations over their entire lifetimes.

The study is built up in three parts.

- Part I starts by sketching the problem of ageing in the Netherlands in a global context in Chapter 2. It is shown that ageing is a worldwide phenomenon, covering not only the OECD, but also the non-OECD countries. Ageing will significantly reduce per capita growth. The impact on the interest rate is ambiguous, however, as both investment and savings fall.
  Chapter 3 discusses long-term aspects of budgetary policies, and discusses the methodology for analysing the sustainability of public finance. It introduces the criteria for solvency and efficiency of the government budget. An important principle for efficiency is 'tax smoothing.' As the government has insufficient instruments to influence the intergenerational distribution, it might face a trade-off between efficiency and equity between generations. Pay-as-you-go arrangements play an important role in intergenerational risk sharing. These arrangements exist not only in public pensions, but also in healthcare and private (second-pillar) pensions, for example. Does ageing pose a risk for these arrangements?

- Part II constructs long-term projections for the government budget and analyses the consequences of ageing in Chapter 4. Using the age profile of public expenditure and long-term projections for government revenue, the study establishes under what conditions public finance is sustainable in the long run. It is shown that sustainability can be gained if policy in the Netherlands aims at a budget surplus for a longer period in order to reduce public debt and interest payments on public debt. In order to assess the robustness of these policy implications, Chapter 5 performs a sensitivity analysis for the major determinants of these projections, *i.e.* demography, participation, productivity growth, the interest rate, and healthcare costs.

- Finally, Part III considers alternative policies to cope with ageing in four important areas: budgetary policy, participation, healthcare and pensions. Chapter 6 considers alternative fiscal policies, and discusses their consequences for efficiency — as they deviate from tax smoothing — and their impact on the intergenerational distribution. Increasing labour participation can be an effective means to alleviate the burden of ageing. Options to do so are discussed for two major groups with relatively low participation: women and older persons (Chapter 7). Ageing does affect the pension system in several ways. An increase in life expectancy raises pension costs, and ageing changes the balance between generations, thus reducing the possibilities to absorb unanticipated shocks (Chapter 8). Healthcare can be restructured in many ways —all having their specific effect on future costs for government. Two variants of such a restructuring are considered (Chapter 9). Chapter 10 concludes.

This study reflects the growing awareness that ageing requires timely and adequate reactions in fiscal policies. For the Netherlands, the WRR (the Dutch Scientific Council for the government) has already performed a broad interdisciplinary study on ageing (WRR, 1999). Recently, both the European Union (EU) and the OECD started major projects to establish the budgetary consequences of ageing in their member countries. The present study may serve to provide background to the results for the Netherlands in these projects. There may be differences between the results presented here and in these international studies, due to methodological differences (see also the appendix to Chapter 7 for differences in demographic projections). As the EU and OECD studies aim at a wide coverage of countries, they necessarily have to compromise on ambition with regard to method and institutional detail. This study, therefore, also complements these international studies by focussing on the specific details of the ageing problem in the Netherlands.

This study builds on earlier work on generational accounts for the Netherlands by ter Rele (1998) and Bovenberg and ter Rele (1999, 2000), as well as on the long-term budgetary prospects by van Ewijk and ter Rele (1999). It largely follows the methodology developed in these earlier studies. This study, which is based on the most recent data available in the Summer of 2000, is wider in scope, and goes into more detail in a number of areas — healthcare, participation, and the pension system, in particular.

PART I SCOPE AND METHODOLOGY

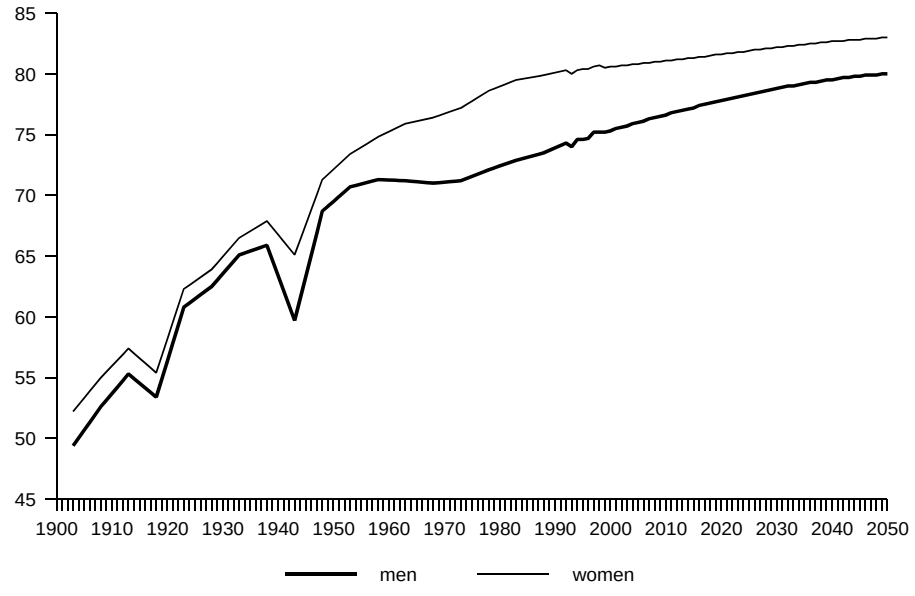
Chapter 2 Ageing: a global problem

This chapter sketches the problem of ageing in the Netherlands. It argues that ageing stems not only from the ageing of the baby-boom generations, but also from declining fertility rates and decreasing mortality rates. Ageing thus implies a permanently older population structure. This chapter also demonstrates that ageing is a world wide phenomenon, covering not only the OECD but also the non-OECD countries.

2.1 Ageing in the Netherlands

Several factors contributed to the ageing of the population in the last three decades. Important factors were the decline in fertility rates and the increase in life expectancy. The effect of these factors has been that the elderly dependency ratio, defined as the number of 65+ as a percentage of the 20- to 64-year olds, gradually increased from 19 percent in 1970 to its current level of 22 percent.

Figure 2.1 Life-expectancy at birth of men and women

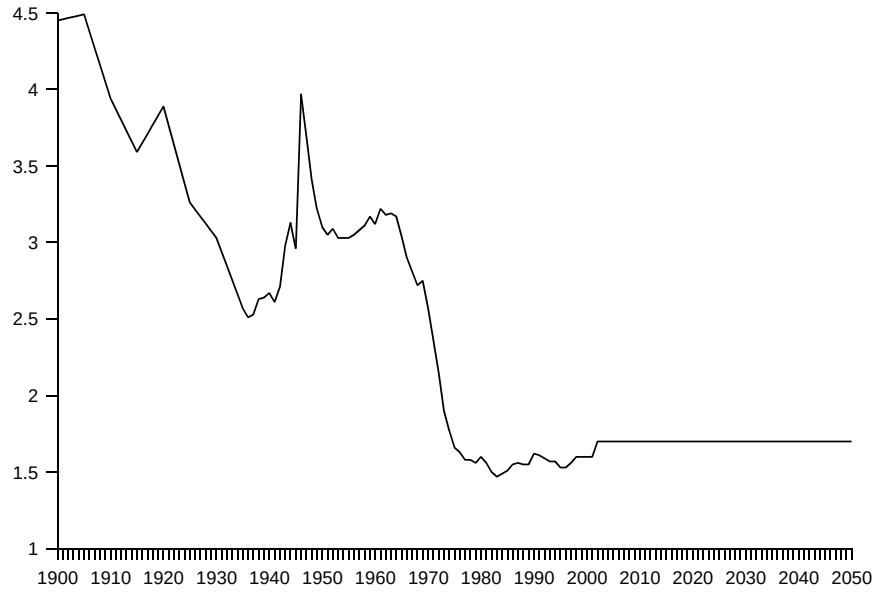


Source: Statistics Netherlands.

The increase in life expectancy, *i.e.* the fall in mortality rates, is the first factor contributing to the ageing process. Figure 2.1 shows life expectancy at birth of men and women. In 1900, life expectancy at birth in the Netherlands was 49 years for men and 52 years for women. However, high infant mortality rates in the beginning of the century depressed life expectancy at birth significantly. This follows from the life expectancy of a one year old. The life expectancy of a one-year-old man and women in 1900 was 60 and 62 years respectively. Thus, if one survived the first year, life expectancy rose by 11 years for a man and 10 years for a woman. Nowadays the effect of infant-mortality on life expectancy at birth is seriously diminished. Surviving the first entails an extra expected lifetime of less than 6 months.

In 2000 life expectancy at birth has gone up to respectively 75 and 81 years. Statistics Netherlands assumes between 2000 and 2050 a further increase to 80 years for men and 83 years for women. Striking is the strong increase for women during the last fifty years. Before World War II life expectancy of women was only 2 years higher than that of men, but after the war life expectancy of women showed a steep increase while the comparable increase for men was quite modest. By 1990, the difference in life-expectancy had grown to more than 6 years.

Figure 2.2 Total fertility rate in the Netherlands



Source: Statistics Netherlands.

Figure 2.2 shows the development of the total fertility rate in the Netherlands since 1900. It shows the drop in the fertility rate in the pre-war period, the baby-boom after World war II and the baby-bust starting in the sixties and lasting till today. And while in the average family the number of children fell from about 4 some hundred years ago to 1½ nowadays, also in the population at large the number of young people caring for the elderly is about to fall dramatically. This decline in fertility rates is the main factor contributing to the ageing of the population, and this process will speed up as soon as the baby-boom generation starts to retire.

For the coming decades, demographic forces will continue to affect the structure of the population. First of all, the occurred decline in fertility rates will continue to affect the age structure of the population for several decades. In addition, life expectancy is expected to keep increasing, due to a further decline of mortality rates. Moreover, the baby boom generations are now close to retirement. As a result, the elderly dependency ratio is expected to increase to a peak level of 43% around 2040. After 2040, it will decline as the baby boom generations pass away. This decline is relatively small and does not bring the elderly dependency ratio back to its original level; rather, it may stabilise at a level of around 40%.

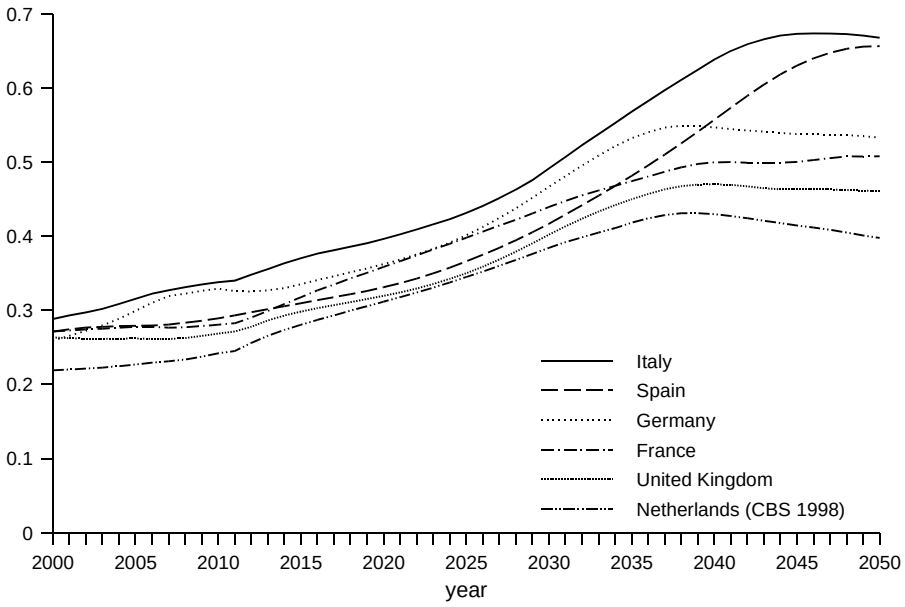
2.2 Ageing abroad

Population ageing is occurring not only in the Netherlands, but in many countries around the world. World-wide one can observe a trend of decreasing fertility rates, partly as a response to economic progress. In addition, economic progress enables countries to invest in health services and hygiene, which raises life expectancy. For some countries, among which the Netherlands, the retirement of the baby-boom generations – although transient – is also an important factor. The international aspects of ageing are important for at least two reasons. First of all, the fundamental challenges of funding social security and health care systems are very similar in societies with growing cohorts of older people, although specific demographic circumstances and details of related policies differ across countries. This enables us to compare the effects of ageing in various countries and to learn from the different policy options under investigation. A second reason is that countries participate in a globalising world. International linkages on goods, services, capital and labour markets may strengthen or weaken the ageing process in other countries.

Figure 2.3 illustrates the expected demographic transition in the five largest EU countries and the Netherlands: a sharp increase in the elderly dependency ratio. In some sense this dependency ratio is a misleading measure because more and more elderly people remain healthy and keep on working after their 65th, thus keeping their economic independence. Participation rates among older Japanese workers for example have risen between 1987 and 1995. Hence, changes in the elderly dependency ratio may sometimes

proxy only imperfectly for the participation effects of demographic changes which it is supposed to measure. As better alternatives seem to be lacking and in order to stay in

Figure 2.3 Elderly dependency ratios in selected EU-countries



Source: Eurostat (2000), but for The Netherlands: CBS (1998).

line with other studies on ageing however, we will stick to the use of the elderly dependency ratio in this study.

According to EU (1999) the population of the EU countries will have shrunk from 372 million in 1995 to 367 million in 2050. By then, the population structure will be completely different. The elderly dependency ratio will have risen from its current level of 27% to a level of 53% in 2050, as can be seen in Table 2.1. The variation between EU countries will also increase. Ireland's 19% ratio is nowadays the smallest in the EU. Sweden's 30% ratio is currently the highest. By the year 2050 the variation within the EU is expected to be between 40 and 67%. By then Italy will have the highest elderly dependency ratio and the Netherlands the lowest ratio.[1] Ageing also occurs rapidly in Spain, while it will be less pronounced in the United Kingdom.

The current relatively low percentage of persons aged 65 or over in the Netherlands can be explained by the fact that the post-war baby boom continued longer than in most

[1] Forecasts until the middle of the 21st century are subject to wide margins of error.

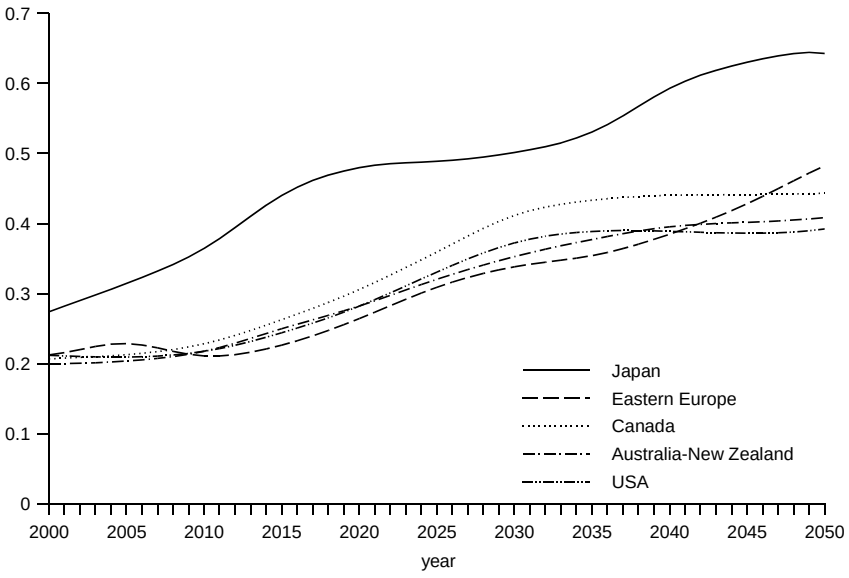
other countries.[2] In the period 2000-2035 the elderly dependency ratio in the Netherlands shows an increase comparable with developments in other countries. Afterwards the Dutch dependency ratio decreases somewhat, in line with the decline in Germany and the UK. One of the contributing factors is the age composition of immigration and emigration: immigrants are relatively young, while emigrants are relatively old (on average).

Table 2.1 Elderly dependency ratios in EU

	2000	2050		2000	2050
Belgium	0.28	0.50	Luxembourg	0.23	0.42
Denmark	0.24	0.42	Netherlands	0.22	0.40
Germany	0.26	0.53	Austria	0.25	0.55
Greece	0.28	0.59	Portugal	0.25	0.49
Spain	0.27	0.66	Finland	0.24	0.48
France	0.27	0.51	Sweden	0.30	0.46
Ireland	0.19	0.44	United Kingdom	0.26	0.46
Italy	0.29	0.67	EU-15	0.27	0.53

Source: Eurostat 2000, but for The Netherlands: CBS 1998

Figure 2.4 Elderly dependency ratios in other OECD-countries



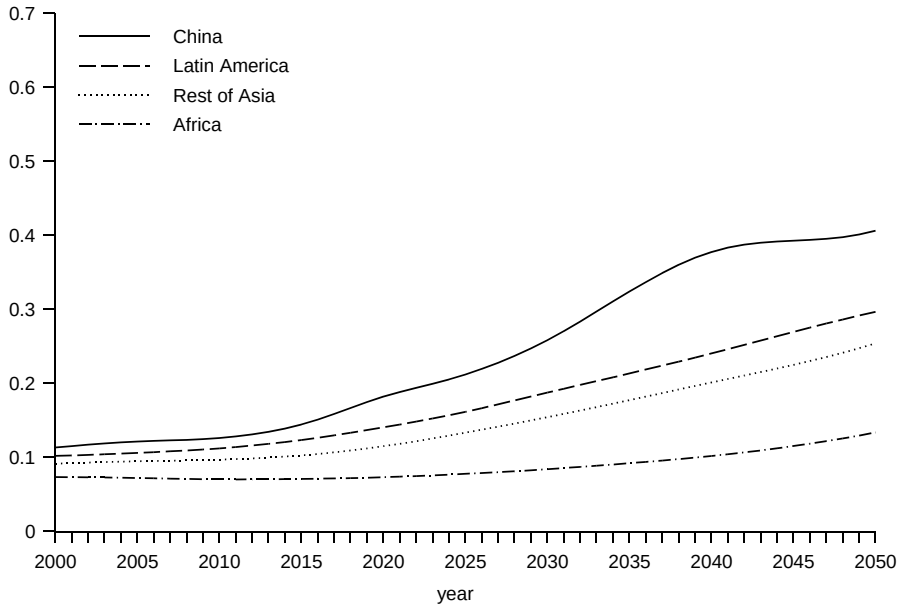
Source: UN (1998).

[2] See De Beer (1996).

Japan will also face serious consequences of ageing. In Figure 2.4, Japan's elderly dependency ratio can be seen to rise in a fast way, more or less comparable to what is expected to happen in Spain and Italy. The rise in the US elderly dependency ratio is more moderate. It lags approximately 30 years behind the European and Japanese ratios. The pace at which ageing takes place in Canada and in Australia - New Zealand is also relatively slow. It is in the range of what is observed in Denmark and Sweden. Moreover, the Canadian elderly dependency ratio seems to stabilise between 2030 and 2050. In this period the Eastern European ratios increase sharply.

For most non-OECD countries ageing will not become a serious problem until the second half of this century. Figure 2.5 shows the elderly dependency ratios for several non-OECD regions. In 2000 these ratios are low compared to what is observed in OECD countries.

Figure 2.5 Elderly dependency ratios in non-OECD-countries



Source: UN (1998).

In all regions the ratios will rise. The rise is modest in Africa, where the ratio will hardly exceed 10% in 2050. However, it is much more pronounced in China, where ageing will have become a serious problem in 2050. In the other regions the elderly dependency ratio will have reached a level that is common in most OECD countries now.

2.3 Consequences of ageing for participation and GDP

The OECD study of Turner *et al.* (1998) predicts that the increase in dependency ratios in the US, Europe and Japan will lower per capita GDP by approximately 10, 18 and 23% respectively in 2050 compared to a baseline in which dependency ratios remain at their current levels. The EU (1999) study reports similar results. The ranking of the GDP effects reflects the expected speed of ageing in the various regions. In Japan the process of ageing starts earlier than in Europe and the United States, as is shown in Figures 2.3 and 2.4.

Within Europe there are pronounced differences (EU 1999). On average ageing will lower annual per capita growth by about 0.4 percentage points until 2050. In Sweden and the United Kingdom the average effect is just about 0.3 points, whereas it is approximately 0.5 points in the Southern EU member states and in Ireland.

The reason for lower GDP growth per capita is that higher elderly dependency ratios imply a relative contraction of the labour force. The EU study clearly shows that GDP growth declines faster in countries that experience a sharper increase in elderly dependency ratios. A growth-accounting exercise also shows that the reduction in GDP growth is mainly caused by a reduced growth in labour inputs. This explains about 70% of the decline in GDP growth. The remainder of the decline stems from a reduced pace of capital accumulation.

Despite these effects, the impact of ageing upon other macroeconomic variables may be rather small. In particular, the effect upon the interest rate and the wage rate may be close to zero. A serious objection may be that ageing is a global phenomenon however. On the one hand, the world interest rate may decline due to smaller investment needs; on the other hand, it may increase as older people save less and an ageing population thus reduces the saving rate. Our benchmark assumption is that the world interest rate will remain unaffected. As the interest rate and wage rate are inversely related, the same holds true for the wage rate.

A different question concerns the impact of ageing for fiscal variables. In particular, the decline in labour market participation may reduce tax revenues, whereas the increase in the number of retirees may boost the expenditure on pensions and health care. It is this combination which has led many to question the sustainability of current fiscal arrangements. This question has been explored for a number of OECD countries. Most of these studies are generational accounting exercises. Auerbach, Kotlikoff and Leibfritz (1999) collect the main results of these generational accounting exercises constructed in 1996 and 1997. Most of the studies summarised find that current fiscal policies are unsustainable. Exceptions are Thailand, New Zealand and Sweden. Whether ageing makes Dutch fiscal institutions unsustainable, will be investigated thoroughly in the next chapters.

2.4 Policy responses

In the EU and OECD calculations of the macroeconomic effects of ageing it is assumed that governments do not take any policy action towards ageing. Policy action could reduce the negative consequences of ageing for economic growth. The EU and OECD studies assess the consequences of potential policy responses to a fall in per capita GDP growth rates. These responses are directed towards shifts in the government budget, toward labour market reforms, and toward productivity increases, respectively.

A government that does not allow an increasing deficit would either have to increase its tax base or cut expenses on other budgetary items. Because taxes in the OECD are considered relatively high anyway, both the EU and the OECD studies concentrate on curbing other government expenditures.

The labour market reforms discussed include a gradual increase in the effective retirement age. This will increase labour market participation and lead to lower pension costs. It is accompanied by other policies that increase labour market participation and reduce unemployment.

Regulatory and market reforms aim to improve efficiency and to increase factor productivity growth. Examples are increased openness and competition and macroeconomic stability.

None of the policy measures investigated completely compensates the reduction in GDP. Combinations of these policies may be more effective. EU (1999) presents simulations of combined policies that suggest a 0.5 point increase in average annual per capita growth. Using a similar kind of policy package the OECD study reports an annual increase in per capita GDP of 0.3, 0.6 and 0.7 percentage points for the US, Japan and the EU, respectively.

Table 2 Economic growth and real interest rates

	Average growth 1995-2050		Real interest rate		
			2000	2050	
policy	reference	policy		reference	policy
United States	1.1	1.4	5.0	5.5	4.2
European Union	1.3	2.0	5.0	4.9	3.5
Japan	1.1	1.7	5.0	5.4	3.8

source: Turner *et al.* (1998).

2.5 Saving, investment, and interest rates

The projected demographic changes affect savings and investment in different ways. First of all the decline in output growth due to a shrinking labour force will lower the

demand for capital and investment. As a result, both the marginal productivity of capital and the real interest rate will decrease. Turner *et al.* (1998) report that a 1% point per annum decrease in output growth will lead to a 1% point lower interest rate in 2050.

However, this is not the only effect of ageing. According to the life cycle hypothesis (Modigliani and Brumberg, 1954) ageing will in principle lead to dissaving. Savings in the OECD are expected to rise in the coming decade. From then, dissaving is expected to dominate, which *a priori* will push up interest rates. In countries where ageing is moderate, savings will probably rise for a longer period. Turner *et al.* (1998) assume that a 1 percentage point rise in the dependency ratio reduces private savings by 0.3 per cent.

A third effect is the change in the relative shares of world output. In the next decades the relative weight of the non OECD region will become larger. This applies to Asia in particular. The growth of the economies in the non OECD will demand much capital. These investments will to a large extent be financed through increased domestic savings. High economic growth and a slight shift in the population structure from young to middle-aged in these regions will contribute to this increase. Nonetheless, non-OECD countries will probably run into current account deficits, whereas the OECD saves more than it invests. As a result the latter region will accumulate net foreign assets.

A priori the resulting effect on the interest rate is ambiguous. EU (1999) does not provide a quantitative assessment. Turner *et al.* (1998) expect that the direct positive effect of ageing on the interest rates will slightly dominate the downward pressure in Japan and the United States, which is due to a decline in output growth. For Europe the interest rate decreases very slightly from 5.0% in 2000 to 4.9% in 2050. These differences within the OECD can be traced back to the development in savings and investment.

It is not clear whether these results for the interest rates are robust. For example Miles (1999) calculates that the interest rate in Europe will decrease from 5.2 % in 2000 to 4.9% in 2050.[3] He uses a dynamic OLG model for one region in which the interest rate is endogenous. The private savings rate in Europe decreases from 14.5% to 4.5% in that period. The figures in Turner *et al.* suggest a similar fall in the savings rate in Europe. Apparently the fall in investment is slightly more important in his model. Cutler *et al.* (1990) expect also that the effect of a declining output is more important. Their study uses a two country model of the USA *vs* the rest of the OECD. Beforehand Turner *et al.* (1998) notice that the relation between changes in the dependency rate and savings is not robust. Empirical estimates of this relation vary widely.

Thus, *ex-ante* both the effect of ageing on savings and the effect of ageing on interest rates can not easily be determined. This applies even more to the *ex-post* signs of savings and interest rates, *i.e.* after any policy measures have been taken into account. Much will depend on the changes in public and private savings. Are governments able

[3] This simulation assumes that the pension rate is constant in the simulation period.

to finance the increasing pension and health care costs through tax increases or by reductions in government expenditure? Policy measures, such as a change in the effective retirement age may also affect private savings. This could lead to an extra downward pressure on interest rates.

Turner *et al.* (1998) show that an OECD policy package including postponed retirement, government debt reduction, higher labour force participation, and higher total factor productivity could lower real interest rates by about 1.5% point in 2050 (see Table 2). Late retirement and debt reduction in particular contribute to this fall in interest rates.

2.6 International labour markets (migration)

A major effect of ageing is the decline in participation rates. It is heavily debated whether more international migration can offset this decline.[4] The answer depends on characteristics of the migrants at issue. It is also contingent on characteristics of the receiving country. If, for example, labour migration induces large flows of non-participating family members, the participation rate may even decrease. Moreover, a lack of skills could hamper the immigrants' integration in the labour market.

UN (2000) computes the size of the migration flows that are necessary to keep the elderly dependency ratios constant until 2050. The conclusion is that migration flows have to increase to much higher levels in the near future. Hence, migration may be ineffective in solving the ageing problem. CPB (2000) does not expect migration to affect participation rates in a significant way either. Chapter 5 of this study comments on the UN (2000) study.

2.7 Conclusions

Ageing will hit the OECD economies quite harshly in the coming decades. Productivity, investment, savings and interest rates may be affected in all countries although the intensity of the effects may differ among different countries. Ageing will occur more rapidly in Japan and Western Europe. Therefore the economic effects will be larger in these regions. GDP per capita may end up about 20% lower, compared to what it could have been if the demographic structure of the population would have remained unchanged. Policy responses as a reduction of other public expenditures, an increase of the effective retirement age, a higher labour market participation, a higher productivity and increased competition could offset the slowdown in economic growth and restore the unsustainability of public finances. International labour migration seems to be less effective as an instrument against the impact of the ageing problem.

[4] Borjas (1994) and Roodenburg (2000) provide a overview of this debate.

Chapter 3 How to measure sustainability of public finances?

This chapter discusses long term aspects of budgetary policies. It introduces the criteria for solvency and efficiency of the government budget, in particular the principle of 'tax smoothing'. As the government has insufficient instruments to influence the inter-generational distribution it faces a trade off between efficiency and equity between generations.

Pay as you go arrangements play an important role in intergenerational risk sharing. These arrangements exist in public pensions, but also in for example health care and private (second pillar) pensions. Is ageing a danger for these arrangements? Is there a need to reconsider these institutions?

3.1 Sustainability

The government budget has an important impact on the distribution of income between generations. Present social security institutions involve large transfers between generations, both from the old to the young, and from the young to the old. For example, expenditures on education can be regarded as a transfer from average tax payers to the younger generations, while public pensions and health care expenditures constitute a transfer to the older generations.

Ageing will change the balance between benefits and contributions of generations from the government sector. In general, transfers to the old will increase while those to the younger generations will stabilise or decline. In the Netherlands, ageing will cause public pensions (AOW) and health care expenditures to increase from 26 % of the present government budget to 38% in 2040, whereas the share of education expenditures will decrease from 10% in 2001 to 9% in 2040. This shift in the government budget obviously affects the net benefit of generations from the government budget.

The natural instrument influence the intergenerational distribution is debt policy. By timely raising taxes and reducing public debt, the government can compensate for the rising costs of ageing in the budget. The falling burden of debt service due to such a policy could avoid that taxes have to be raised in the future when ageing is at its peak.

The government can effectively influence the distribution of income over generations by its finance policy. As long as the government satisfies the long term solvency constraint it can vary the path of taxation over time, and thereby influence how the burden of taxation is distributed over generations. It cannot do this perfectly, however. As there are no age specific taxes, the government has an insufficient number of instruments to attain any desired intergenerational distribution of income. In particular, it is difficult to allocate the burden among currently living generations. There is no specific tax for 30 years old, 31 years old, etcetera. Consequently, the government may face a trade-off between efficiency and desired – intergenerational – income policies.

Solvency

This study focuses on sustainability of public finance. The central question is whether current fiscal and social security arrangements can be maintained in the future without the government running into financial problems. That is, the government cannot play a Ponzi game, and let its debt explode in the long run. Solvency requires that total liabilities, *i.e.* the present value of future expenditures plus present public debt, does no exceed the present value of future tax revenues. To put it formally, total tax revenues T (in present value) should be sufficient to finance total public liabilities L, which is defined as the sum of expenditures G (present value) and the initial stock of public debt D (which can have either sign). The intertemporal budget constraint, or solvency constraint, can thus be written as (at date t):

$$T_t \geq L_t \quad \left(= G_t + D_t\right)$$

Of course, sustainability is no problem when the burden would be shifted to future generations by a tax increase in some indefinite future, or when future government expenditure is curtailed to compensate for the costs of ageing.

Therefore, for a judgement of sustainability one should be more specific about future policy. A natural benchmark is to consider a policy that maintains the current fiscal arrangements. Sustainability thus gives an answer to the question: is it possible to keep up social security and government expenditure without running into financial problems, and thus having to raise taxes in the (distant) future? Or more briefly, sustainability is defined as solvency of government finances upon continuation of current fiscal arrangements. Thus we can define solvency and sustainability:

- **Solvency** of public finances requires that the present value of the governments' income is sufficient to cover total liabilities, $T_t \geq L_t$.
- **Sustainability** applies to current fiscal policy, and requires that public finances satisfy the solvency condition if current public arrangements would be continued for ever.

The solvency condition – or intertemporal government budget constraint – applies all possible time paths of fiscal policy. Sustainability is a more restrictive concept, as it refers to a specific path of taxes and revenues that follows from continuation of current fiscal arrangements and social security.

This concept of sustainability provides a useful indicator for the financial stance of fiscal policy from a long-term perspective. Obviously, it does not imply the optimality of such a policy. It only indicates whether present fiscal policy can be sustained in the future from a financial point of view. If not, fiscal policies will sooner or later have to adjusted.

Should public debt go to zero in the long run?

The solvency condition puts an upper bound to the development of the public debt ratio. In particular, solvency requires that the public debt ratio increases with less than the differential between the interest rate and the rate of economic growth. This 'no-ponzi game' condition has two implications.

- First, the solvency condition does not require the debt ratio ultimately to stabilise at a constant level, and certainly not at a zero level. Indeed, the debt ratio may proceed along an ever increasing path. The only restriction imposed by solvency is that it does not increase too fast. More precisely, it may increase as long as its discounted size goes to zero in the long run.
- Second, the level of the debt ratio in any particular year in the far future cannot be derived from final conditions. The level of the debt ratio in some future year also depends on the development of public expenditure till that year.

The intuition behind this 'indeterminateness' of the final debt is that the discounted weight of debt in the distant future is zero. So for current fiscal policy it does not really matter what happens in the very distant future.

If policy follows the tax smoothing principle (to be discussed below), and keeps tax rates constant over time, one can say more. Let us for example take a look at the case where public expenditure in terms of GDP increases for a number of years and then stabilises at the level achieved – the pattern that arises from ageing in the Netherlands – . It can be shown that - upon tax smoothing - the debt to GDP ratio declines during the first period (when expenditure is increasing), and thereafter stabilises when public expenditure is constant. The new equilibrium of the debt ratio depends among other things upon the initial debt ratio and the length of the first period with increasing expenditure.

The important message is that the time path of the public debt ratio features hysteresis: the level at which the debt ratio settles ultimately, cannot be determined without information on the period of transition. This framework thus does not generate a simple norm for the absolute size of public debt. In stead, it is the time path of debt that matters.

Constant fiscal policy

The concept of 'constant fiscal arrangements' in the definition of sustainability is not unambiguous. 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 quite different answers depending on the time horizon of the analysis. In the short run it is natural to follow the 'formal' fiscal rules. For a long-term analysis this makes little sense, however. The time horizon of current fiscal policy is far to short to take them as a basis for long term projections. Over a time

period of decades fiscal policies are endogenous, and subject to the discretion of future governments. The present government is unable to commit future governments. It makes therefore makes little sense to extend current fiscal rules indefinitely to the future. For example, extending current tax brackets to the year 2020 implies that almost all workers would be in the highest tax bracket purely as a result of income growth, yielding an enormous increase in tax revenue - even in the absence of an inflationary bias - . This obviously would make little sense in the context of a study of ageing.

Therefore we define a 'steady growth' scenario of future policy where all relevant – age specific – categories of government expenditure grow in proportion to productivity in the private sector. This applies to transfers and social security benefits as well, which is a natural assumption, as transfers are linked to wages, and wages grow at the same rate as productivity. This will be worked out more precisely in section 3.4 below, and Chapter 4, where we will also explain how ageing affects the growth of government expenditures.

Tax smoothing

On the revenue side sustainability is measured under the condition of constant tax rates. An important advantage of this concept of a constant tax rate is that it satisfies the principle of 'tax smoothing', which is a criterion for efficiency of taxation (Barro, 1979). Efficiency is defined here as the time path of taxes that minimises the welfare costs that arise from the distortionary character of taxation. Intertemporal efficiency requires uniform tax rates over time. Alternatively, (convex) collection costs of taxes may provide a rational for tax smoothing, as in Barro (1979). Essential is that the marginal welfare costs of taxation are constant over time (as a fraction of GDP). Then tax rates should be uniform as well.

An important feature of tax smoothing is that the level of public expenditure in a particular year is irrelevant for the optimal tax rate in that year. The height of the tax rate follows from the intertemporal government budget constraint. The tax rate should be such that public finances satisfies solvency constraint, that is, the present value of tax revenues should be equal to the liabilities of the government, *i.e.* the present value of future expenditure plus initial debt.

In an uncertain world this equality should hold for the expected values. Tax smoothing will then apply 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 ex post.

Some qualifications are in order:

- Note that the principle of tax smoothing, while efficient, is not necessarily optimal from a social point of view. Indeed, it does not necessarily imply intergenerational neutrality. Due to lack of instruments the government might face a trade off between

efficiency and equity. This may be a reason to deviate from tax smoothing. As will be argued below, this is not necessarily a problem when designing long-term policies. In a steady-growth environment tax smoothing may well coincide with "neutrality" with regard to the intergenerational distribution (see section 3.3 below).

- Whether the government deviates from tax smoothing depends on the costs and benefits. The benefits of tax smoothing depends on the relation between the tax rate and its distortionary effect. Recent analysis suggests that these benefits of tax smoothing may be limited (Cutler *et al.*, 1990). In chapter 6 a similar exercise is made for the Netherlands, and also finds limited welfare effects.
- Tax smoothing assumes that the marginal distortionary costs of taxation are constant over time. This needs not to be true in reality. For instance, increasing international mobility of the tax base may lead to rising marginal cost. This may be a reason for a declining path of tax rates. On the other hand, improving information technologies may lead to falling (marginal) costs, in particular as the collection cost of taxes decline.

Required adjustment of tax rate

Using this framework it is possible to determine the distance between the current path of fiscal policy and a sustainable path. The gap in solvability can be measured as the discrepancy in expected present value between taxes revenues and liabilities (expenditures plus debt), L_t - T_t. In this study we will use a more practical measure, viz. the required adjustment in (indirect) taxes that would be necessary to restore solvency. This measure is closely related to the gap in present value terms; in fact, it is the annuity of this gap using the growth adjusted interest rate. This can be written as (see the appendix):

$$required\ adjustment = (R_t - N_t)\frac{L_t - T_t}{GDP_t}$$

where R_t and N_t represent the long-term interest rate and growth rate. This annuity determines the permanent increase in taxes (% GDP) that is sufficient to cover the gap in solvency, taking into account that the tax base is expected to growth by N_t on average over time. This measure is intuitive, and moreover satisfies tax smoothing., as it implies an immediate and permanent adjustment in the tax rate.

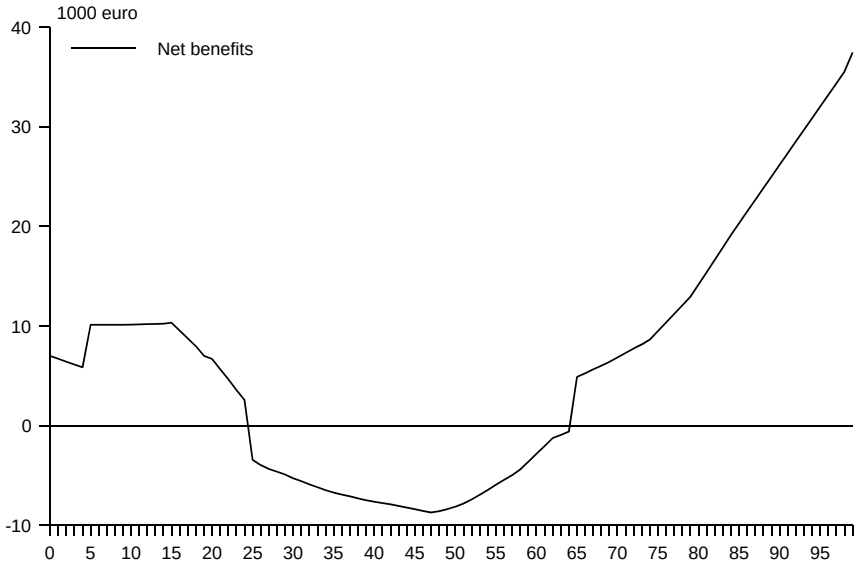
The focus on taxation rather than expenditures as the instrument to restore sustainability is natural in the present context which takes the time path of expenditure as given, and concentrates on the financing of the government budget. The choice is between future taxes and current taxes. The determination of – optimal – volume of government expenditures is quite a different issue, in which the cost of financing (the excess burden) is only one of the – many – determinants.

3.2 Intergenerational distribution

How the fiscal policies affect the intergenerational distribution can be established using the tools of Generational Accounting (GA). This method, which has been designed by Auerbach Gokhale, and Kotlikoff (1991), establishes the net benefit of generations from the government budget. The net benefit is measured as the benefits of government expenditures enjoyed by a generation minus taxes paid by this generation, both in present value terms. The method of GA has been extended for the Netherlands (Ter Rele (1998)), and provides a comprehensive basis for establishing the age-profile of government expenditures and revenues.

Generational accounts calculate the net benefit of that current generations of would receive from the government if current fiscal rules were continued. Therefore one extrapolates the age profile of net benefits, *i.e.* public expenditures (imputed to age groups) minus taxes, into the future. The shape of the age profile for each spending and revenue category is determined for the base year, and is assumed to remain constant over time. Figure 3.1 shows the age profile of the net benefit to the government budget. Overall, the young and the elderly benefit from the public finances, while the middle-aged are net contributors.

Figure 3.1 Age profiles of benefits, 1998



The age profiles can be combined with projections for the aggregates of each spending and tax component to determine the fiscal benefits and burden for each age category. The GA approach assume that all government expenditures are assigned to generations, even though a significant part of expenditures are general, and not age related.

Given the aggregate net fiscal benefit of current generations, the intertemporal government budget constraint (or solvency constraint) determines what is left for future generations. This follows from the intertemporal government budget constraint above ($T_t = G_t + D_t$). The net benefit of current generations (B^c) is equal the expenditures enjoyed received by these generations minus the taxes paid, hence

$$B_t^c = G_t^c - T_t^c$$

Similarly defining the net benefit of future generations as $B^f = G^f - T^f$, one obtains from the budget constraint

$$B_t^f + B_t^c + D_t = 0$$

That is, the sum of the net benefits and public debt must be zero. If there is a positive debt, this equality implies that the total net benefit is negative, and that the burden of debt is distributed over all current and future generations.

Intergenerational measures for sustainability

Generational accounting yields three important measures.

- The first one is the *level* of the net benefit for future generations B^f derived above. This benefit is usually expressed as the average benefit of future generations. It should be noticed that the level measure is very sensitive to the allocation of benefits over the life cycle, which is sometimes rather arbitrary.[1] (See the box 'Why doesn't fertility improve public finances?')
- The second measure is *generational neutrality*. This is measured by the difference in tax burden on current newborns (who are the youngest members of the current generations) and the tax burden on future generations. As they both apply to an entire lifetime, the tax burdens on these two generations are comparable.
  The difference between these two lifetime tax burdens yields a measure for the sustainability of public arrangements. If the burden of the newly born (which depends on current arrangements) coincides with the burden on future generations (which is determined residually from the government budget constraint), public

[1] It is not clear, for example, whether child allowances should be allocated to the parents or the children, and whether taxes on a household are borne by the parents alone or also by the children.

arrangements can regarded as sustainable. There is no need to change current fiscal policies to meet the solvency condition. However, if future generations face a larger tax burden than the newly born do, then current public arrangements are too 'generous' and will have to be adjusted in the future.

- Another way to measure the *sustainability* of the public arrangements is to determine the permanent and immediate change in some tax or transfer instrument that is required to make arrangements sustainable (i.e. to equalise the net fiscal burdens facing the newly born and future generations).

Notice that the GA criterion of intergenerational neutrality is only a very partial measure of the distributive effects. It only looks to the distribution between the newborn and the 'average' future generation. This limitation is usually motivated by difficulty of data collection for the past. It is hard to establish the life time benefit of currently living generations, as this would require lots of information on past fiscal policies. This limitation hampers the assessment of intergenerational equity, however. It is hard to assess the distributional aspects if all current generations are left outside the analysis. This again emphasises that one should be very cautious in using this framework for evaluation of the distributive effects of fiscal policies.

This study, like previous ones for the Netherlands (see *e.g.* Ter Rele (1998), and Bovenberg and Ter Rele (1999 and 2000)), points out that there is a net benefit to future generations (see the box on fertility). According to the intertemporal budget constraint this implies that the expected contribution of current generations is more than sufficient to pay for current public debt. Does this it mean that current generations pay 'too much' whereas future generations benefit? No, this absolute value is little informative. First, as pointed out above, the measure for the level of the net benefit of future generations is highly sensitive to the construction of the age profile. Furthermore, a net benefit for future generations, does not imply that this has been built up by current generations. Also current generations may be net beneficiaries over their life time. They could have 'inherited' a favourable position from previous generations, for example from the silent generation of the post war period. Also, there may have been windfall gains to the government (*e.g.* natural gas) which are not assigned to a particular generation.

Equivalence between measures of sustainability

What is the relationship between this measure of sustainability that follows from generational neutrality, and the measure of sustainability of fiscal policy, defined earlier? In a steady-growth environment where all relevant variables - at the micro level - grow in fixed proportions to each other, both measures are equivalent. More specifically, this is so if:

- the age profiles of net benefits from the government are constant over time; that is, all (age-specific) expenditure and income categories increase at the same rate, equal to productivity growth in the private sector.
- life expectancy is constant over generations.

These assumptions must hold for newborn and future generations only; current generations are not taken into account in this measure. Under these assumptions everything in the economy moves in fixed proportions (except aggregate variables that may change due to changing demographic composition). In these circumstances steady government policies also imply a steady distribution between future generations. Hence, the net benefit of the newly born will be equal to the net benefit of future generations.

The two requirements are not entirely satisfied in reality. Life expectancy increases, which causes an extra growth in expenditures on health care and public pensions. Furthermore, also the age profiles may change, for example if one category of expenditures (*e.g.* health) grows faster than other categories. Consequently, the net benefit of generations may change over time despite tax smoothing and sustainable public finance. In that case, tax smoothing would no longer coincide with generational neutrality.

For example, increasing life expectancy tends to raise the net benefit of future generations. If every next generation lives longer than the previous generation, they also benefit longer from government expenditures. The ensuing increase in expenditures puts an extra burden on the government budget, that - according to the efficiency criterion - should be smoothed over all generations. This implies that current generations pay for the extra expenditures enjoyed by future generations. Alternatively, intergenerational neutrality would require tax rates to increase over time in order to compensate for the lengthening of lifetimes. Both criteria no longer coincide.

Something similar could happen in case of Baumol effects on public expenditures. If productivity in the public sector lags behind productivity growth in the private sector, the demand for public consumption goods may increase vis-a-vis private consumption. This will increasingly burden the government budget as time moves on. Again, according to tax smoothing principle the burden is should be shared among all generations, while obviously future generations benefit most from this increased government consumption. Tax smoothing thus no longer is neutral from the point of view of intergenerational distribution.

3.3 Equity and efficiency

Intergenerational neutrality takes as criterion that generations benefit equally from the government (relative to their income). Applying this criterion any increase in expenditure should be matched with a tax increase such that net benefits remain equal across generations. In reality, governments lack generation-specific tax instruments.

Why doesn't higher fertility improve public finances?

Although ageing in the Netherlands is caused by a dramatic decline in fertility in the 1960s and 1970s, it is by no means obvious that increasing fertility would help to restore the sustainability of public finances. Calculations for the Netherlands in Chapter 5 of this study show that an increase in fertility is of no help at all for public finances in the Netherlands.

This somewhat surprising result points out that there is a big difference between ageing as a demographic phenomenon, and the economic consequences of ageing. Indeed, encouraging fertility would help to reduce the average age of population – as immigration may do, see chapter 5 –, but it happens be ineffecitve in restoring the sustainability of the government budget.

This result can be explained using the framework developed in this chapter. Whether or not, new children improve the financial position of the government depends on their net benefit of the government budget over their life time. This can be positive or negative. New children do not only pay taxes, but also receive education, enjoy from culture, and benefit from health care when they are old. The balance of contributions and benefits depends on the stance of public finances at the moment when the child is born. If new generations are net beneficiaries ($B^f > 0$) their contribution will be negative on balance. In this case new children cost more to the government than they contribute.
Future generations are net beneficiaries if the present value of taxes to be paid by currently living generations is – more than – sufficient to cover initial outstanding debt. In the Dutch case – under current fiscal rules – current generations are expected to contribute more to the government during their remaining life times than is needed to pay for total public debt, so that they leave a positive net benefit for future generations.

There are instruments that deal specifically with groups of generations, like the young or the elderly, but no instruments that focus on households born in a particular year. Obviously, the government can vary the tax instrument every year, but this does not resolve the problem either as each year a new generation is born. Therefore it is impossible to fully eliminate all undesired effects on the intergenerational distribution.

Furthermore, the government may face a trade-off between distributive objectives and the distortionary effects of taxation. In this study we avoid the issue of 'optimal distribution' over generations. We will take account of the distributional consequences,

however, and derive distributive consequences of alternative fiscal policies for current and future generations.

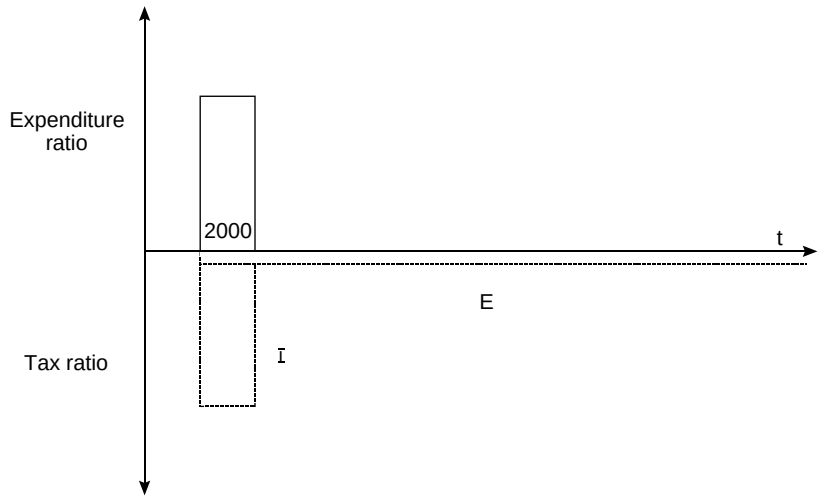
Policies will thus be evaluated using both criteria:
- efficiency
- generational neutrality

As discussed above, both criteria are generally consistent in a long-term context when focussing on constant fiscal policies. For evaluation of discretionary policy measures these criteria no longer coincide. This can be illustrated by the following examples.

A boost in government consumption

First consider a temporary boost in public expenditure. Assume that only current generations benefit, *e.g*. a temporary increase in health expenditures. How should this increase in expenditures be financed? Two alternatives stand out:
- According to the efficiency – tax smoothing – argument, this measure calls for an immediate and permanent increase in the level of taxation. Taxes increase by less than expenditure, so that debt will grow, and part of the burden is shifted to future generations. The net benefit of current generations increases, at the expense of future generations.
- Generational neutrality would imply a different time path for taxation. Here, the rise in expenditures should be fully financed by current taxes, and future generations are unaffected. In accounting terms the net benefit remains the same for all generations.

Figure 3.2 A temporary boost in public expenditure



Both alternatives are illustrated in figure 3.2. It is obvious that both criteria lead to very different conclusions regarding the time path of public finances. In the first case (labelled *E* in the figure) the financing is efficient, but not neutral with regard to intergenerational distribution. In the second case (labelled *I*) the policy is neutral, but now leads to efficiency losses.

Notice that in case of a permanent change in public expenditure, there is no such a conflict between the two criteria. Then both require taxes to be raised immediately and permanently, and in the same amount as expenditures increase. In this case the path of public debt remains unchanged. Each generation pays for its own increase in expenditure.

This difference in conclusions raises the question which approach is relevant when evaluating discretionary fiscal measures. In theory, as the government cannot commit future governments, the first approach is the relevant one. The current government determines its fiscal policy taking future fiscal policies as given. In that case there is a clear conflict between the two criteria. In practice, however, there seems to exist considerable hysteresis in fiscal institutions and social security arrangements. Then the two criteria may coincide.

Increase in government investment

Next consider a temporary increase in government investment. Assume that this investment yields a – non pecuniary – flow of public services to the private sector, starting at some particular date in the future. Again the two criteria do not match:

- Tax smoothing would require that the financial burden of investment is smoothed over all generations.
- According to intergenerational neutrality taxes should be borne by the generations that benefit from it.

Both criteria have in common that part of the financial burden of investment is shifted to the future. In the first case, taxes are increased immediately, but by less than required to finance investment, so that public debt increases. In the second case, taxation will be postponed until the project yields its services to the private sector. As the government cannot perfectly target its taxation to specific generations, it will be impossible to establish a time path of taxes that is fully neutral between generations. Moreover, it is not evident which generations will benefit; it could be the old, if the project leads to higher returns on private investment, it could also be the young generations, if it leads to higher wages. In the latter case, as government expenditures (including pensions) are linked to wages, also the older generations will again benefit.

It is obvious that government investment can have an important impact on the size and the distribution of present and future welfare. Therefore investment policies could in

principle be supportive to ageing policies. Its impact is however complex, and seems not very targeted to the intergenerational distribution. In this respect, the financing of the government budget still seems to be the natural instrument to achieve and maintain sustainability of public finances, and to avoid undesired effects on the intergenerational distribution.

Exogenous increase in productivity growth

Next consider an exogenous and permanent increase in productivity growth. Although, this certainly enhances welfare, it does not generally improve the sustainability of public finances. Again not only the government's revenues increases, but its expenditures as well. There may be a small net effect depending on the size and sign of public debt. Required adjustment changes by an amount equal to the annuity of public debt. This effect can, however, easily be dominated by other aspects of the government budget, as we will seen in chapter 5 for the Netherlands.

Two qualifications are in order:

- first, if the government has other preferences for the intergenerational distribution than implied by the neutrality criterion adopted here, *e.g.* a convex social welfare function, the higher productivity growth may be a reason to change fiscal policies in favour of current generations;
- second, this exercise extrapolates the initial public institutions. If these do not represent a desired equilibrium, productivity growth may have a beneficial impact during the transition path towards the equilibrium. More specific, if the government is in a process of reducing the size of government expenditure, the transition period may become easier and shorter if productivity growth goes up, thereby relieving public finances.

These examples show that it is generally very difficult to evaluate discretionary policies in terms of efficiency and equity. Such a policy analysis would clearly be beyond the scope of this study. The next chapters will focus on a long-term assessment of public finances, and on the consequences of ageing for the sustainability of current public arrangements. For such a long-term assessment the criteria of intertemporal efficiency (tax smoothing) and intergenerational neutrality offer a useful benchmark, and generally coincide.

3.4 Intergenerational risk sharing

Most discussions on ageing focus on the – possibly undesired – effects on the intergenerational distribution arising from the current pay-as-you-go systems in public pensions and health care. There is another dimension which is also very important. One of the rationals behind public pension systems is their contribution to risk sharing

between generations. Private markets are unable to provide this insurance, as there is no party that can act on behalf of future generations. The government can compensate for this market failure. Pay-as-you-go arrangements in public pensions and health care may therefore be interpreted as an implicit contract between generations. As it is easier for younger people to accommodate to shocks in income than for the old, this risk sharing enhances total welfare. Moreover, the type of shocks faced by young and old is generally not be the same, so that they can gain by pooling their risks.

Funded pension schemes are subject to considerable risks. Although risks of longevity can be pooled among the members of each generation, the financial risks cannot be diversified within one generation. In particular assets are subject to risks in the rate of return, whereas liabilities may be subject to macroeconomic shocks, *e.g.* if pensions are indexed to wages. This situation creates scope for risk sharing, as for younger generations human capital is their main – risky – asset. Both mandatory pension schemes, and the government can contribute to intergenerational risk sharing. Furthermore, the risks of funded pensions can be reduced – but not eliminated in the aggregate – by asset liability management (ALM).

An important question is if the balance for risk sharing is going to change as ageing causes the weight of older generations to increase relative to younger generations. It is obvious that the share of financial assets in the 'national' portfolio will grow relative to human capital. As a result the marginal welfare costs of financial risks tend to increase, so that it becomes more expensive for old generations to 'insure' their financial risks. To put it differently, as there are less members of - future - young generations to trade with, it will become more difficult to insure financial risks for the old, and the price of insurance goes up. This may be a reason to reconsider current arrangements, and leave more of the risks with the older generations. This could be done many different ways, both in fiscal policy (*e.g.* extra 'precautionary saving'), social security (*e.g.* less PAYG), and in private pension schemes (*e.g.* shifting from defined benefit to defined contribution schemes).

However, great caution is in order. First, little is known about the size of this effect. Nor do we know whether the initial situation was optimal. Furthermore, there are many other factors that affect the cost en benefits of intergenerational risk sharing as well. Therefore, one should be very careful to put the system of intergenerational risk sharing at risk. This could happen if the burden of ageing is shifted too much to one of the parties, *i.e.* the young generations. This again emphasises how important it is to avoid undesired effects of ageing on the intergenerational distribution by adequate fiscal policy.

3.5 Long term projections

Analysis of the sustainability of public finances, and consequences of ageing, requires projections of expenditures and revenues over a very long term time horizon, until far in the 21th century. These projections are inevitably sketchy, and serve as a benchmark rather than as full fledged prediction of the actual time path of economic growth. There are huge uncertainties around this path, and exploration of these uncertainties is at least as important as the baseline projection itself.

Steady state

The long term projections are based on a 'steady growth' scenario. Both the interest rate and the rate of productivity growth are exogenous and constant. Wages – which are age-specific – grow at this same rate as well. Also for age specific government expenditures it is natural to assume that they grow in line with the rest of the economy. In the long run the level of government expenditures is endogenous, and will follow general preferences of society, or – in a more political approach – the preferences of voters. The steady state features constant shares of private consumption and 'public consumption' at the micro level of households. Such a steady state could be based on constant ('homothetic') preferences, uniform productivity growth in all sectors (private and public), and a constant excess burden of taxation.

Each of these assumption may not be true in reality.

- *homothetic preferences* imply the shares of different goods in total consumption are constant if income increases. There are indications, however, that some public consumption goods (in particular health care) may have an income elasticity greater than one, according to which health care would take a steadily increasing share in total consumption.

- *Baumol effect*: The share of public expenditures may also increase when productivity growth in the – typically labour intensive – public sector lags behind productivity growth in the private sector. This 'Baumol effect' could have a pervasive effect on the sustainability of public finances. For example, calculations for the Netherlands (see chapter 6) show that an additional rise in the share of government expenditures in GDP by 5% in 2020 would burden the budget by an additional 2.9 % of GDP (annuity). It is not clear, however, that this effect is likely to happen. Also in the private sector the labour intensive sectors (services) become more and more important, so that the technological characteristics of private and public production converges. Furthermore, new - information - technologies may enhance opportunities for private provision of goods that are traditionally provided by the public sector (*e.g.* infrastructure, health care).

- *excess burden*: When the marginal cost of taxation changes over time, this may also have an – indirect – effect the desired mix between public and private consumption. In principle the time-dependency of excess burden can, and should be accommodated adjusting the time path of taxation. However, this may not be fully possible due to distributive concerns. For instance, rising marginal cost of taxation – in case of increasing international mobility – would imply that the burden of taxation should be shifted to current generations. This is because taxation is cheaper now than in the future. This might be undesirable from an equity point of view. Therefore, in such a constrained optimum, it may also be worth reconsidering the time path of government expenditure, in particular lowering expenditure when the excess burden is high.

These are some important qualifications that should be borne in mind when interpreting the analysis of sustainability of Dutch public finances, and the impact of ageing the government budget, in the chapters that follow.

Appendix

Solvency and sustainability

Government policies are sustainable if current policies are continued forever without the government running into financial problems. That is, the projected time path of government income and outlays should satisfy the solvency constraint. To put it formally, define total public liabilities L, as the discounted sum of current and future public expenditure, g, plus the initial stock of public debt, D (which can have either sign):

$$L_t = \sum_{i=t}^{\infty} \prod_{j=t}^{i-1} (1 + r_j)^{-1} g_i + D_t$$

where r denotes the relevant interest rate.
To finance total expenditure, the government can levy taxes and social security contributions (we use the terms interchangeably, as the two are equivalent in the context of this study). Under the condition that current policies are continued in the infinite future, the present value of total tax receipts (T) is given by the discounted sum of current and future tax receipts,

$$T_t = \sum_h \tau_t^h \sum_{i=t}^{\infty} \prod_{j=t}^{i-1} (1 + r_j)^{-1} Y_i^h$$

where τ^h denotes the h-th tax rate and Y^h denotes the corresponding tax base. This expression for total tax receipts recognises that the government can choose between different tax instruments, levied on different tax bases. Using these concepts we can define solvency and sustainability:

- **Solvency** of public finances requires that the present value of the governments' income is sufficient to cover total liabilities, $T_t \geq L_t$.

- **Sustainability** applies to current fiscal policy, and requires that public finances satisfy the solvency condition if current public arrangements would be continued for ever.

The solvency condition – or intertemporal government budget constraint – applies to all possible time paths of fiscal policy. Sustainability is a more restrictive concept, as it refers to a specific path of taxes and revenues that follows from continuation of current fiscal arrangements and social security. The precise definition of this time path is far from trivial. In the simple case, without age specific expenditures it can be defined as a policy where tax rates τ are constant over time, and expenditures grow by the general rate of productivity growth. If national product (measured by gross domestic product, GDP) grows by this same rate, this would be equivalent to constant fractions of government expenditures to GDP.

Measure of sustainability

If the present value of tax revenues falls short of liabilities, $T_t < L_t$, reforms of government policies are inevitable. The size of this difference could be regarded as a measure of 'sustainability', or as the gap in solvency between the projected path and a sustainable path. The size of this gap determines the extent by which current policies should be changed to restore sustainability. It will be clear that solvency can be achieved in numerous ways. In this study we adopt one particular measure, viz. a one-time change in the rate of indirect taxes. This provides a simple indicator that may serve as a benchmark for the size of the required policy adjustment. It is a fairly general measure with smooth effects on the intergenerational distribution. It does not necessarily feature a preferred, or optimal policy response, however.

The required adjustment in the tax rate should be such that the change in tax revenue DT_τ equals the gap in sustainability, $T_\tau + DT_\tau = L_t$. Then the tax rate for indirect taxes $\tau^{indirect}$ should be change according to

$$\Delta\tau_t^{indirect} \sum_{i=t}^{\infty} \prod_{j=t}^{i-1} (1 + r_j)^{-1} Y_i^{indirect} = DT_t = L_t - T_t$$

where $Y^{indirect}$ features the tax base of indirect taxes.

Writing the required adjustment as a fraction of GDP in the initial year (t) we obtain

$$required\ adjustment = \frac{\Delta\tau_t^{indirect} Y_t^{indirect}}{GDP_t} =$$

$$\sum_{i=t}^{\infty} \prod_{j=t}^{i-1} \frac{(1+r_j)}{(1+n_j)} \frac{L_t - T_t}{GDP_t} \approx (R_t - N_t) \frac{L_t - T_t}{GDP_t}$$

where n_j stands for the growth of the tax base in year j, and R_t and N_t for the (geometric) mean of the interest rate and the growth rate. The last term in this expression shows that the required change in taxes (% GDP) can be interpreted as the annuity of the gap in solvency. The annuity determines the permanent increase in tax rate that would be sufficient to make public finances sustainable, taking into account that the tax base is expected to growth by N_t on average over time. The suffix t indicates that the expectation is made in year t.

PART II BUDGETARY CONSEQUENCES OF AGEING

Chapter 4 Long-term projections for the government budget

This chapter analyses the long-term implications of ageing for the government budget. Using the age profiles of public expenditure and government revenue, we analyse whether public policies are sustainable in the long run. After a brief discussion of the methodology and underlying assumptions, the chapter examines long-term sustainability of the government budget. It is argued that policy should aim at a budget surplus for a longer period in order to reduce government debt and interest payments on government debt.

4.1 The assumptions in the base-case scenario

The base-case scenario is the result of many assumptions. It incorporates the information about future budgets that was available in June 2000. The extrapolations in this chapter are based on the projected budget for 2001. The base-case scenario also takes account of the lags involved in the incorporation of the new tax system in 2001.

Government expenditures

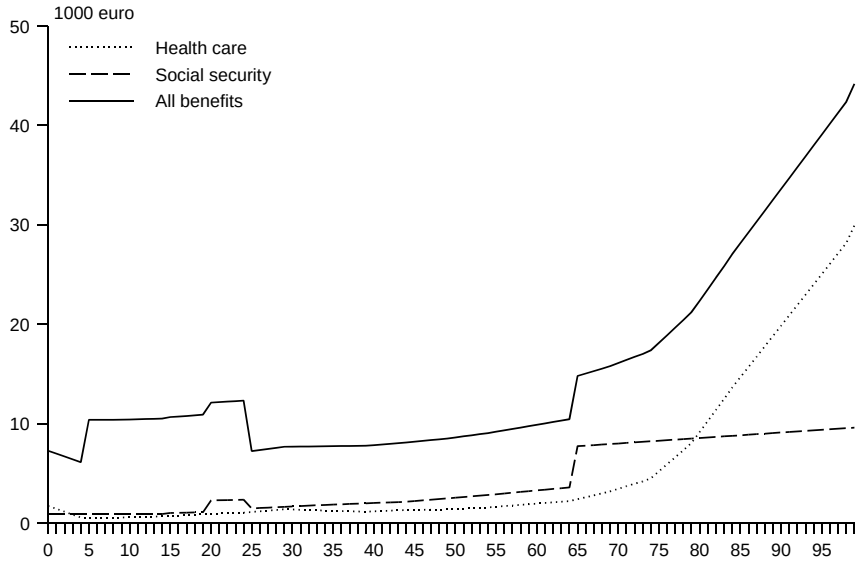
We distinguish three types of expenditures. The first category consists of the expenditures of which the benefits can be attributed to beneficiaries. This category consists of expenditures on Social Security, Healthcare and Education, and totals about 22% of GDP. For this category, future expenditures 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. This form of extrapolation is considered to be a reasonable approximation of present public arrangements. This entails that, apart from productivity, aggregate future expenditures of this category will depend on both the growth and the change of composition of the population.

The extrapolation of disability benefits deviates from this procedure. To derive the future numbers of beneficiaries, we use the present age-specific probabilities of flowing in and out of this scheme. A special section later in the chapter will discuss this. The resulting numbers are translated into expenditures by assuming an age-specific benefit increase that equals the productivity increase. Furthermore, we assume a that the higher net-inflow leads to a slightly smaller demand for unemployment benefits and social assistance.

The extrapolation of expenditure on healthcare also follows an extended procedure. This will be discussed later.

The second category consists of the expenditures which can not be attributed to beneficiaries. This category consists of expenditures on Defence, General government, Transfers abroad and Subsidies and amounts to around 19% of GDP. For these expenditures we assume a 'flat' age profile, entailing an equal benefit for each individual, and growth that corresponds to that of GDP.
Figure 4.1 reveals the age profile of benefits from the government. It shows that benefits generally rise with age. The two main components of this rise are social security and healthcare. Benefits from social security rise with age mainly due to public pensions (AOW), which are paid only to citizens over the age of 65, and disability benefits, which increase with age for those younger than 65 years. Healthcare 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.

Figure 4.1 Age profiles of benefits, 1998



Healthcare expenditures

The extrapolation of healthcare expenditures is analogous to the way described above for the expenditures with attributable benefits (the first category), but deviates from it by taking account of a number of additional influences.

The first of these influences is that the extra years that result from the lengthening of life are not necessarily years spent in bad health. Indeed, evidence suggests that a substantial part of medical expenditure occurs during the last year of people's lives and

relates to the process of dying. Abstracting from this feature of medical expenditure may seriously bias projections of the impact of demographic developments upon healthcare expenditure (Zweifel *et al*. (1999)). We take account of this by splitting up the age profile of healthcare expenditures into a profile that reflects the age-specific costs and a profile of death-related costs. The first is assumed to be constant in time, just like the age profiles of non-medical expenditure. The second reflects the age profile of mortality rates (expenditures on mortality are assumed equal for all age groups) and shifts in time in line with the changes in mortality rates (see the box on page 45).

The second influence is based on the notion that the growth of demand for institutionalised healthcare in the coming decades might be reduced because of declining differences in life expectancy between males and females. Demand for health care by the elderly tends to decrease if fewer individuals are single. In the projections of Statistics Netherlands, life expectancy for males is 75.5 years in 2001; for females it is 80.6 years. In the projections, this difference of about five years shrinks to around three years in 2050, and 2.5 years in 2100. To determine the impact of this factor on demand for institutionalised healthcare, we use the results of Lakdawalla and Philipson (1999).

Several publications point out that healthcare is a luxury good and might therefore have an income elasticity that exceeds unity. Other studies stress the significance of technological progress in healthcare. It therefore becomes plausible that the per capita growth rate of these expenditures will exceed the annual growth rate of labour productivity. This consideration is reinforced by the present tendency of wages in the healthcare sector to fall behind those in other sectors, with the likely consequences of a catch-up situation. In spite of this, the deviation in growth may not continue. Income elasticities might be lower at higher levels of consumption, the technological progress in healthcare may become smaller in the future due to restrictive government policies abroad, and wages might cease growing at such a high rate once parity is achieved with the other sectors of the economy. Taking account of all these considerations, we assume an additional increase of health care expenditures of 0.4% annually until 2020.

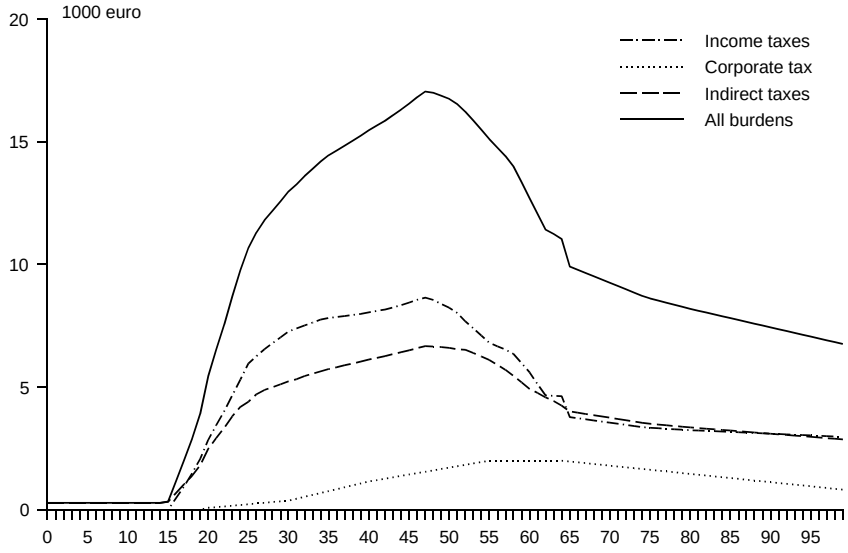
Government revenues

Government revenues consist of direct taxes, social security premiums, indirect taxes, corporate taxes and revenues from government assets (including gas). The growth of direct taxes and social security premiums,[1] as well as indirect taxes, is based on the age profile of taxpayers and the (age-specific) rise of labour productivity. Figure 4.2 shows how the age profiles of these taxes vary with age. Until the age of about 50, labour incomes (and hence tax revenues from these incomes) rise with age, explaining the upward slope in the tax profile. Beyond the age of 50, tax payments fall, due to a

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

gradually decreasing participation of the labour force. The declining labour incomes are not fully offset by various forms of pension incomes, which are subject to income tax. Accordingly, both income taxes and indirect taxes fall with age.

Figure 4.2 Age profiles of burdens, 1998



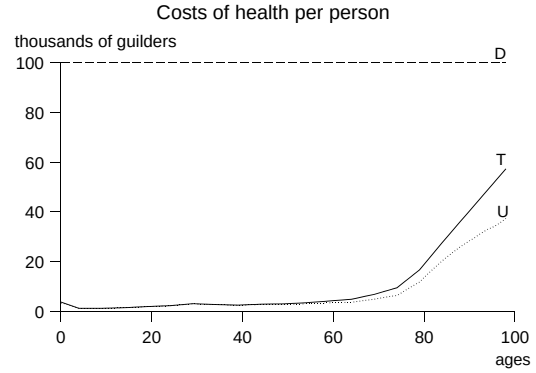
Our model distinguishes direct and indirect taxes from various sources[2], e.g. taxes paid from labour income and from pension income. These components are extrapolated separately. This enables us to take account of the specific impact of a number of economic trends. One of these trends is the rise of labour participation (see subsection later in the chapter). This factor increases aggregate labour income and thereby the tax base. Another trend is the large increase of pension incomes (see subsection later in the chapter). Next, there are two factors that will exert a moderate mitigating effect on future taxes paid by individuals. The first is that future tax-deductible pension contribution rates will have to rise, thereby reducing the tax base. The second is that the age profile of taxes is expected to flatten in the next two decades. Wages currently rise rather sharply with age. As market forces are increasingly linking wages to productivity, and the ageing of the labour force renders younger workers more scarce relative to older

[2] These sources are labour income, pension income (first plus second pillar), social security other than public pensions, third pillar pensions and early retirement benefits (VUT), and income from capital. In addition to this, indirect taxes also consist of taxes paid on investments.

Demography and medical expenditure

The figure illustrates our methodology. The line T displays the age profile of per capita health care expenditure. This age profile weighs two underlying age profiles. The first is the age profile that refers to that part of medical expenditure that relates to death (D); the second is the age profile of all other types of medical expenditure (U). The two underlying age profiles are aggregated using as weights age-specific mortality rates. Unfortunately, no solid data are available that allow us to split medical expenditures into these two components. We assume the age profile of death-related expenditure to be flat and take f100,000.- as our estimate of medical expenditure per dying person. This is in line with WRR (1997). The age profile of medical expenditure unrelated to death can easily be calculated by combining the two other age profiles.

In our projections of the future development of healthcare expenditures, we work the other way around. In particular, we calculate total medical expenditures as the sum of death-related medical expenditures and expenditures unrelated to death. The figure illustrates this. Both the lines U and D are taken as given; the line T shifts downward through time, however, on account of declining mortality rates. The figure also clarifies why the impact of ageing under our approach is more moderate than under the standard approach. This is because the decline in mortality rates that accompanies ageing decreases the costly share of the part of the population that is dying.



workers, the relative wage of older workers is expected to be reduced. This development is reinforced by the increased participation of the elderly. This dampens the rise of tax revenues due to the change in the composition of the labour force towards older workers with higher wages.

The growth rate of corporate tax revenues is set equal to that of GDP. This reflects the assumption of a constant labour-to-GDP ratio, which results from the free in- and outflow of capital in a small open economy. In turn, GDP growth is linked to the rise of aggregate labour supply and productivity.

The projection of revenues from natural resources (gas) is based on the *Plan van de gasafzet 2000* and on own insights. We will assume that the other revenues from capital grow in line with GDP, which follows the methodology we pursue. This implies a need for a growing stock of financial assets. As the EMU definition of the budget balance does not include expenditure on financial asset purchases, this implies that the growth of government debt in nominal terms is larger than is indicated by the deficit according to the EMU definition, or that debt redemption by government is smaller than the surplus.

Figure 4.3 Age profile of net benefits

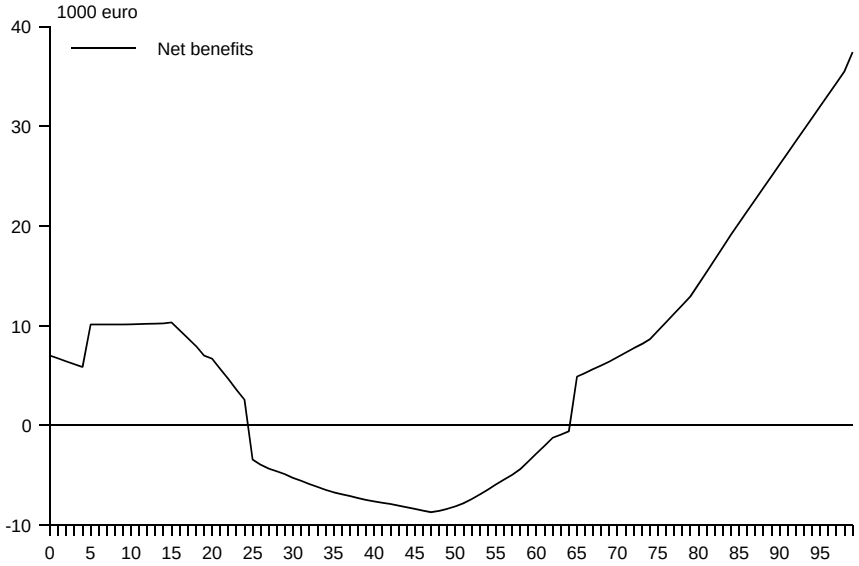


Figure 4.3 combines the expenditure and revenue side of the budget and shows the age profile of the (average) net benefit from government, which is defined as benefits minus burdens. It turns out that the young and the elderly are net beneficiaries from the government. The middle-aged are net contributors.

Labour productivity

Labour productivity in full-time equivalents is assumed to grow at an annual rate of 1.75%. This applies to age-specific growth, which is the productivity of an individual of a certain age. The corresponding aggregate labour productivity increase may deviate from this rate. Because productivity rises with age, an increase of the average age of the working population implies that the aggregate productivity increase can be slightly higher than 1.75%.

Demography

The baseline projection employs the most recent base-case projection of Statistics Netherlands. This incorporates the insights into the development of fertility, mortality rates and immigration patterns (see also chapter 2). Table 4.1 provides an overview of this development. It shows that 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 22.1% in 2000 to 42.7% in 2040, and will show only a small decline after that. It will stabilise at a more or less constant level of around 40% after 2040. The total population will show a growth of just over 17 million in 2020, and roughly remain constant after 2020. This demographic scenario assumes that the fertility rate is about 1.7 over the whole period, that net immigration decreases from its present level of 38 thousand to 22 thousand at the end of the century and that during the course of the next 100 years, life expectancy rises from its present level of 75.3 years to 81.0 years for males and from 80.6 years to 83.6 years for females.

Table 4.1 Population and its composition in 2000-2080[1]

	2000	2020	2040	2060	2080
Age group	*thousands*				
0-19	3885	3792	3883	3797	3799
20-64	9881	10104	9473	9578	9534
65+	2176	3213	4048	3719	3774
Total	15943	17109	17404	17093	17108
Elderly dependency ratio	22.1%	31.8%	42.7%	38.8%	39.6%

[1]The data apply to the end of the year.

Interest rate, pension fund returns and inflation

The interest rate on riskless debt is the relevant concept for projecting future government interest payments and returns on risk-free assets. This rate is assumed to be constant in time – at 4% in real terms. The relevant concept for the returns on pension fund assets, however, should also include the (projected) returns on equity. We will

assume a return on equity of 8.5% in real terms, implying an equity premium of 4.5%.[3] The share of equity in pension fund assets is set at 40%.[4] This entails a pension fund return of 5.75%. The assumed rate of inflation is 2%.

Note that the equity premium compensates for the risk of investing in equity. Raising the share of equity in pension fund portfolios is thus not a free lunch: although it increases the average return on the pension fund's portfolio, this comes at the price of an increased variability of portfolio returns.

The impact of the business cycle

As mentioned above, we use the projected budget for 2001 as the base year from which to extrapolate future government budgets. This year, however, is not cyclically neutral. GDP is higher, the budget balance more favourable, and unemployment lower than in a neutral year. The magnitude of the cyclical component in GDP is difficult to determine. Measurements of this impact show very divergent results.[5] Our calculations assume the average of these results. This implies an output gap of 2.3%. The corresponding cyclical impact on the budget deficit, which has its effect on tax revenues and unemployment benefits, is 1.6% of GDP. We impute a gradual return to structural levels on both the expenditure and the revenue side of the budget by reducing the growth of tax revenues and increasing that of unemployment benefits over a period of nine years.

Additionally, in order to be in line with the present trend-based fiscal policy, we assume that the development of total government expenditure will not be influenced by this cyclical factor.

Labour participation

In the last two decades, labour force participation has increased markedly. In coming years this trend is expected to continue, although at a somewhat lower rate. Participation is expected to rise by about 5 to 6%-points.[6] Measured in full-time equivalents, the rise will be less, mainly due to a higher incidence of part-time work.

[3] This figure is derived from Eichholtz and Koedijk (2000).

[4] This is in line with data of de Rijck (1996) and ABP (1999).

[5] These various ways of measuring the output gap are discussed in CPB (2000).

[6] The projection for labour force participation is based on the 'European Coordination' scenario (see CBS/CPB 1997). The main difference between the 'European Coordination' scenario and the projection is that the former assumes new policies concerning disability insurance, early retirement schemes and childcare being implemented, while the latter only takes presently implemented policies into account. We have lowered the labour force participation rates by the effects of these assumed, not implemented policies. This results in the growth rate of the participation rate in the projection being about 3½% lower than in the 'European Coordination' scenario.

Table 4.2 Decomposition of the change in labour force participation (age 20 to 64)

	2001 - 2020	2001 - 2040	2001 - 2060	2001 - 2080
	change in %-points			
Level in 2001	72	72	72	72
Ageing	– 4	– 2	– 3	– 3
Male participation	0	0	0	0
Female participation	9	9	9	9
Total change	5	6	5	6
Level in final year	77	78	77	78

The principal determinants of the projected development of participation are the positive influence of a continuing rise in female participation rates and the negative influence of ageing on the potential labour force (see table 4.2). Age-specific participation rates are assumed to be constant after 2020, given their already high levels at that point in time. From then on, only the composition of the population has an effect on the total participation rate.

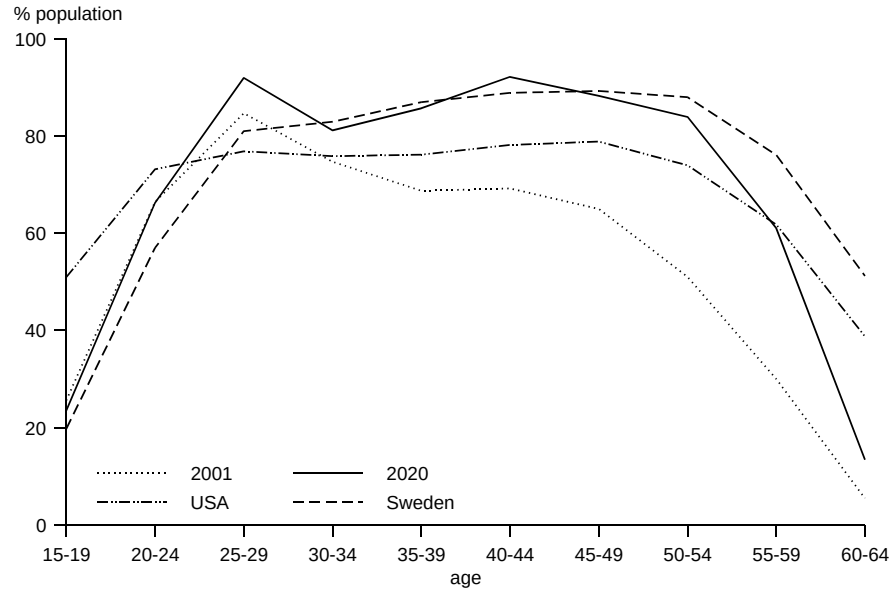
The ageing of the potential labour force dampens average participation rates. The reason is that older persons work less than younger persons. Especially in the age groups over fifty-five, participation drops significantly. Until 2020, the share of persons aged 55 to 64 in the potential labour force increases from 15% to 21% in 2020, thereafter levelling out at around 20%.

On balance, men make no contribution to the growth in participation. Age-specific participation rates remain at a relatively high level. The notable exception is the participation of older men, which stays relatively low. A modest increase is foreseen though, as a consequence of present policies to curb the number of disability claimants and the planned transformation of early retirement schemes into programmes for flexible retirement in some collective labour agreements.

Female participation rates will continue to go up under the influence of trends of emancipation and individualisation. Increases are mainly located among women over thirty-five (see figure 4.4). These women already participate more than the older cohorts when they were young. For instance, the participation rate of women aged 30 to 34 rose during the last decade by 20%-points. It is expected that these cohorts continue to work more in the coming years. By 2020, female participation rates reach the high levels currently seen in the US and Sweden.

In the coming years the share of ethnic minorities in the total population is expected to grow considerably: from 9% to about 15% in 2020. Since labour force participation of minority groups is relatively low, this has a negative influence on the overall participation rate (lower male and female participation in terms of table 4.2). No account is taken of the further expected rise of the share of ethnic minorities after 2020. After that year, age- and sex-specific participation rates are assumed to be constant.

Figure 4.4 Participation rates of women



Source: Bureau of Labor Statistics and Eurostat

By 2020, the employment rate in full-time equivalents is expected to rise by 1½%-points, and by 2%-points by 2060 and 2080. This implies a smaller rate of growth than that of labour force participation. The main reason is the strong increase in female participation. Since many women work in part-time jobs, this reduces the average working week relative to that in full-time equivalents. A small part of the difference can be explained by a rise in the unemployment rate to a structural level of 4% in the first nine years.

Finally, we project that the standard working week in 2020 will be reduced by about 6%, implying a decline in employment as measured in hours. As the assumed labour productivity increase of 1.75% applies to a full-time job, productivity per hour rises somewhat more.

Disability and early retirement

The development of labour force participation — especially of older persons — is directly related to the use of disability insurance and early retirement schemes. Taking account of currently known policies to reduce the attractiveness of these programmes, the number of people on disability and early retirement is expected to grow rapidly during upcoming decades (see table 4.3).

Table 4.3 Persons on disability insurance and early retirement schemes

	2001	2020	2040	2060	2080
	thousand persons				
Disability insurance	944	1250	1225	1250	1225
Early retirement schemes	190	275	225	250	250
	% labour force				
Disability insurance	12¾	15½	16	16¼	16¼
Early retirement schemes	2½	3½	3	3¼	3¼

The number of people claiming disability benefits is expected to increase to 1¼ million in 2020. About a quarter of this number can be explained by the ageing of the work-force, raising the number of older workers with a higher risk of flowing into these schemes. Increased employment contributes by raising the number of insured. Almost half of the increase is due to past employment growth of women, in particular, since it takes quite some time for the stock of disabled to adjust to the resulting higher inflow-rates. The remainder is largely caused by an increase in the number of 'young disabled', a programme for young people who are disabled before the start of their careers. Since this is a relatively new programme, it will still take a couple of years for the stock to mature. After 2020, the number of disabled persons remains roughly constant on balance. On the one hand there is some carrying over of past employment growth; on the other hand, the work force is getting relatively younger again.

The use of early retirement programmes will grow from 190 to 275 thousand persons in 2020. The reason is that ageing increases the number of persons that are able to make use of these programmes. Account is taken of the future effect of current arrangements to transform early retirement schemes into more actuarially fair programmes for flexible retirement in some collective labour agreements. After 2020, the number of people on early retirement programmes will decline somewhat, due to a decreasing number of older workers.

The supplementary pensions

In upcoming decades, supplementary pension expenditures will rise steeply, as compared to the total wage sum. Three factors account for this rise. First is the relative doubling of the number of retirees. Second is the past increase in participation levels,

translating itself gradually into higher supplementary pension levels. And third is the recent addition of early retirement provisions to the supplementary pension schemes, adding gradually to supplementary pension expenditure as well.

The supplementary pensions in the Netherlands are almost entirely of the defined-benefit type. In the baseline scenario, pensions are indexed to wages, which is the common rule in periods in which the financial position of the funds is sound (Verzekeringskamer 2000). Furthermore, note that the assumption of unchanged policies implies that the defined-benefit schemes are maintained.

Contribution rates are based on expectations of rates of return, mortality rates and wage growth, as well as on the financial position of the funds. The actual contribution rate consists of two parts, a basic rate and a surcharge. The basic rate is the result of a confrontation between the discounted value of the projected accrual of pension rights and the discounted value of projected future wages. In the baseline scenario, the actual rate of return is 5.75% and the actual rate of wage growth is 1.75%. These figures are tantamount to a technical interest rate of 4%. In practice, a positive or negative surcharge can be added to the basic contribution, depending on whether the assets either fall short of or exceed liabilities. However, in the baseline scenario expected rates of return, rates of wage growth and mortality rates come true. Therefore, there is (almost) no surcharge in this scenario.

Table 4.4 Pension contributions and supplementary pensions in the baseline

		2001	2020	2040	2060	2080
Contributions	(% of wages)	6.8	6.8	7.2	8.0	8.9
Pensions	(% of wages)	9.1	14.7	26.2	27.1	27.6
Pensions	(% of GDP)	4.1	7.3	12.9	13.4	13.6
Pension result	(% of final wage)	38.1	42.4	50.2	53.9	54.0
Pension fund assets	(% of GDP)	121	172	195	181	169

Table 4.4 shows the development of the supplementary pension finances. The contribution level rises slightly because the projected increase of life expectancy is not matched by a rising retirement age. Pension expenditure levels rise steeply, then stabilise, because of the reasons given before. The pension result, i.e. the ratio between the total pension income and previous wage income for an average person of 65 years old, is only affected by the increased participation rates. This results from the increased accumulated pension rights in the supplementary pension schemes. Finally, the stock of pension funds' assets will still exhibit a strong increase during the decades to come.

In the Netherlands pension contributions are deductible from personal income taxation, and the returns that accrue to pension funds are exempt from taxation. Pension incomes, however, are subject to income tax.

4.2 Future public finances under base-case assumptions

This section will first explore how future budgets develop under the assumptions that were described in the previous section, and whether the policies remain unchanged. Then we will provide an example of a sustainable policy.

Table 4.5 Future budgets with no policy adjustment

	2001	2010	2020	2040	2060	2080
	% GDP					
Expenditures						
Social Security	10.9	12.4	13.9	15.9	15.3	15.4
- public pensions	4.7	5.4	6.8	9.0	8.3	8.5
- disability benefits	2.7	3.3	3.6	3.4	3.5	3.5
- unemployment benefits	1.5	1.7	1.6	1.6	1.6	1.6
- other	2.0	2.0	1.9	1.9	1.9	1.9
Healthcare	7.0	7.7	8.6	10.6	10.3	10.2
Education	4.4	4.6	4.4	4.6	4.5	4.6
Other primary expenditures	19.1	19.5	19.5	19.5	19.5	19.5
Interest payments	3.5	2.1	1.7	2.9	5.5	8.8
Total	44.9	46.3	48.0	53.5	55.2	58.6
Revenues						
Income tax + social security contributions	20.7	21.7	22.5	24.2	24.1	23.8
-of which from pension income	1.8	2.1	2.9	4.9	4.9	4.9
Indirect taxes, other taxes and non-tax revenues	19.2	19.5	20.0	21.2	21.2	21.2
- of which from pension income	1.5	1.7	2.3	3.5	3.5	3.5
Corporate tax	3.6	3.2	3.2	3.2	3.2	3.2
Revenues from assets, including gas	2.4	2.2	2.0	1.6	1.4	1.4
Total	45.8	46.5	47.7	50.2	49.8	49.6
Budget balance (EMU definition)	0.9	0.2	– 0.4	– 3.4	– 5.3	– 9.0
Primary balance	4.4	2.3	1.3	– 0.5	0.2	– 0.2
Government debt (EMU definition)	54	36	28	51	98	157
Net government wealth	27	42	45	18	-31	-90

Future budgets if policies remain unchanged

Table 4.5 shows the development of future government budgets for the period 2001-2080 if policies remain unchanged. Figure 4.6.a provides the corresponding course of the budget balance and the primary balance, and figure 4.6.b shows that of government debt and net government wealth (see the box for a description of these measures). Also in the case that policies remain unchanged, public finances will show a budget surplus over a long period of time. This surplus is not used for lower taxes or extra expenditure. Figure 4.6.a shows that it will turn into a deficit not before 2016. Government debt is reduced substantially in this period.

Measures for the government asset position

Net government wealth is defined here as the sum of the public physical capital stock, financial assets and the present value of the future stream of revenues from gas, ground rents and central bank profits, minus gross government debt. Because this measure incorporates government assets, its level is a more comprehensive and informative measure of government wealth than government debt. The same applies to the changes in these concepts. Still, (gross) debt is the more commonly used concept, for instance in the EMU admission criteria. This is probably due to the fact that the value of the assets is uncertain in many cases.

When using government debt as a measure, it must be noted that its extrapolation requires an assumption on the size of future financial asset purchases. As we have described in this chapter, we assume that financial assets grow in line with GDP. However, it is also possible to assume that the government decides differently, for instance not to increase its stock of financial assets. This would also entail smaller future debts. The effect of this change of assumption increases over time. Starting from an equal debt position in 2001, it amounts to 6% of GDP in 2020, 9% in 2040, 10 % in 2060, and levels off at around 11% of GDP in 2080. Accordingly, interest payments and revenues will also be lower.

Due to the impact of ageing, however, expenditures on public pensions and healthcare will rise sharply. Public pensions rise from a level of 4.7% of GDP in 2001 to a level of 9.0% of GDP in 2040. This amounts to a growth rate for public pensions of 3.4% per year in real terms. The ratio of health care to GDP rises from 7.0% in 2001 to 10.6% in 2040. The corresponding annual real growth rate equals 2.8%. The growth of public pensions can be decomposed into the factors demography and productivity growth. The contribution of these two factors amounts to 1.65 and 1.75 percentage points respectively. For health care, a decomposition can be made into demography, productivity growth and other factors. The corresponding figures are 0.85, 1.75 and 0.2 percentage points respectively. That the impact of demography upon health care is lower than upon public pensions is due to the correction for death-related costs and the declining differential life expectancy between men and women.

Also, revenues from assets will decrease, due to dwindling revenues from gas resources. These burdening factors are partially offset by the increasing tax revenues from pension incomes. Pension incomes from the first and second pillars rise from the present level of 8.8% of GDP (of which 4.7% from public pensions and 4.1% (see table

Figure 4.6.a Budget balance and primary balance under current policies

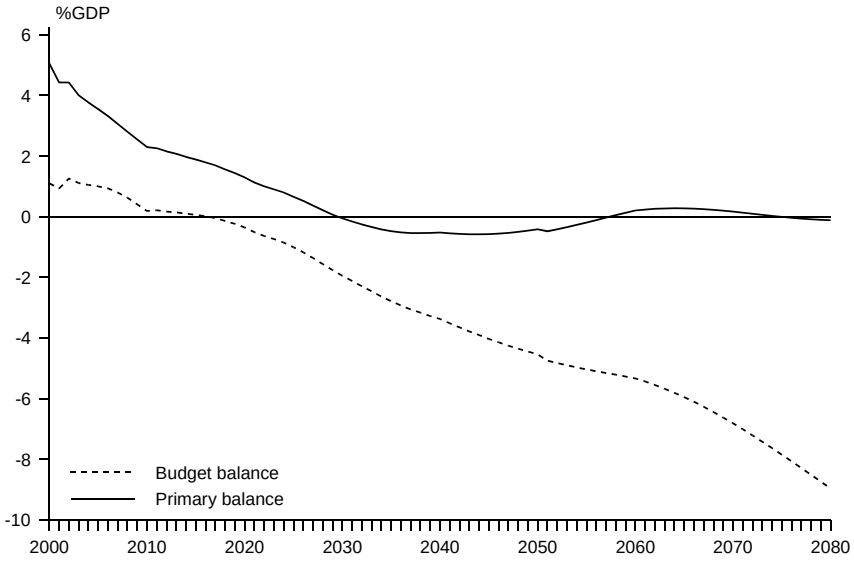
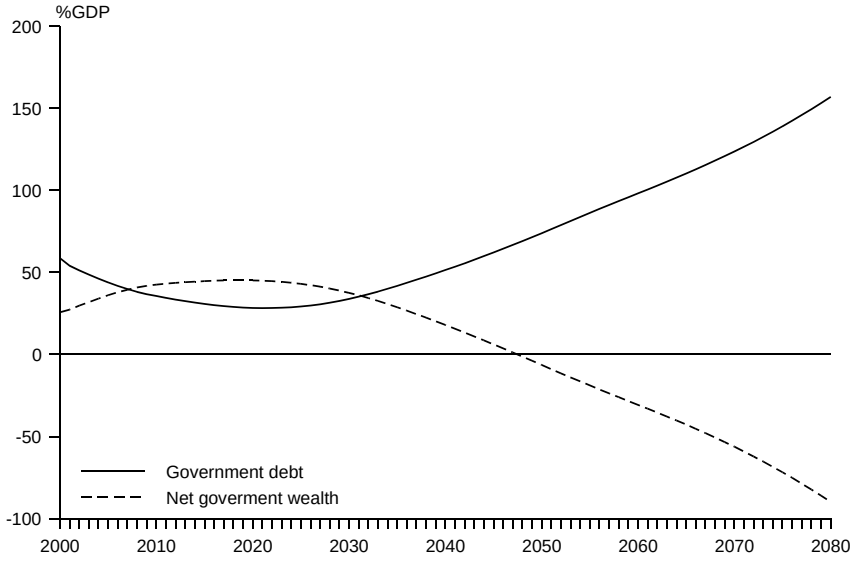


Figure 4.6.b Gross debt and Net government wealth under current policies



4.4) from private pensions) to a total of 21.9% of GDP in 2040 (9.0% from public pensions and 12.9% from private pensions). In this period, tax revenues from this source will increase by 5.1%-points (from 3.3% of GDP to 8.4%). On balance, however, these factors burden government finances. This is reflected in a decrease of the primary balance which, in the long run, turns out to outweigh the alleviating effect of the present fiscal surpluses on interest payments. This triggers a mechanism of increasing debts, interest payments and deficits. Eventually, current policies will become unsustainable, as is clearly demonstrated by the course of these variables in the long run. The sharp decrease of net government wealth reflects the increase of government debt.

Table 4.6 Future budgets with a sustainable policy

	2001	2010	2020	2040	2060	2080
	% GDP					
Expenditures						
Social Security	10.9	12.4	13.9	15.9	15.3	15.4
- public pensions	4.7	5.4	6.8	9.0	8.3	8.5
- disability benefits	2.7	3.3	3.6	3.4	3.5	3.5
- unemployment benefits	1.5	1.7	1.6	1.6	1.6	1.6
- other	2.0	2.0	1.9	1.9	1.9	1.9
Healthcare	7.0	7.7	8.6	10.6	10.3	10.2
Education	4.4	4.6	4.4	4.6	4.5	4.6
Other primary expenditures	19.1	19.5	19.5	19.5	19.5	19.5
Interest payments	3.5	1.7	0.8	0.4	0.8	0.6
Total	44.9	46.0	47.2	51.0	50.4	50.3
Revenues						
Income tax + social security contributions	20.7	21.7	22.5	24.2	24.1	23.8
-of which from pension income	1.8	2.1	2.9	4.9	4.9	4.9
Indirect taxes, other taxes and non-tax revenues	19.8	20.1	20.7	21.9	21.9	21.9
- of which from pension income	1.5	1.7	2.3	3.5	3.5	3.5
Corporate tax	3.6	3.2	3.2	3.2	3.2	3.2
Revenues from assets, including gas	2.4	2.2	2.0	1.6	1.4	1.4
Total	46.5	47.2	48.4	50.9	50.5	50.4
Budget balance (EMU definition)	1.6	1.2	1.2	– 0.2	0.1	0.0
Primary balance	5.1	2.9	2.0	0.2	0.9	0.6
Government debt (EMU definition)	54	28	12	8	13	10
Net government wealth	27	50	61	62	54	57

An example of sustainable public finances

Table 4.6 and figures 4.7.a and 4.7.b reveal how public finances develop when indirect taxes are raised in 2001 by exactly enough to ensure sustainability of public arrangements. It turns out that this requires a relatively mild increase of indirect taxes,

Figure 4.7.a Budget balances and primary balances under a sustainable policy

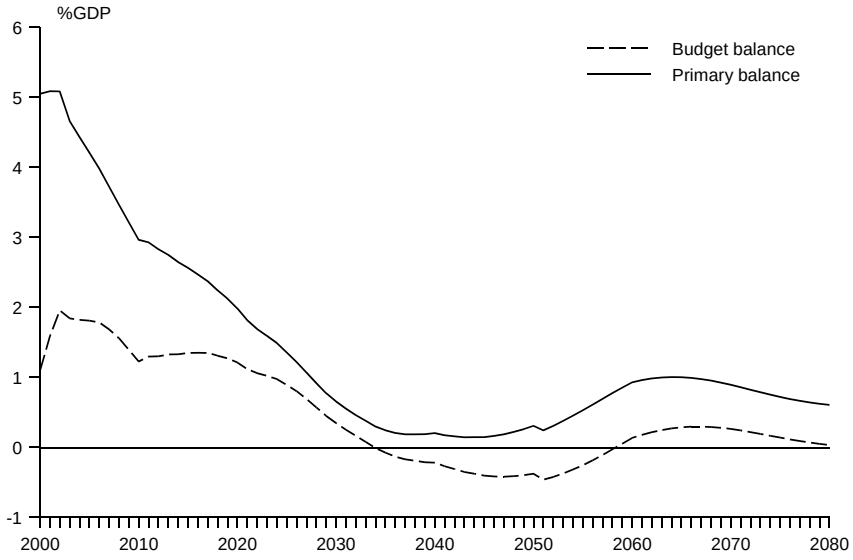
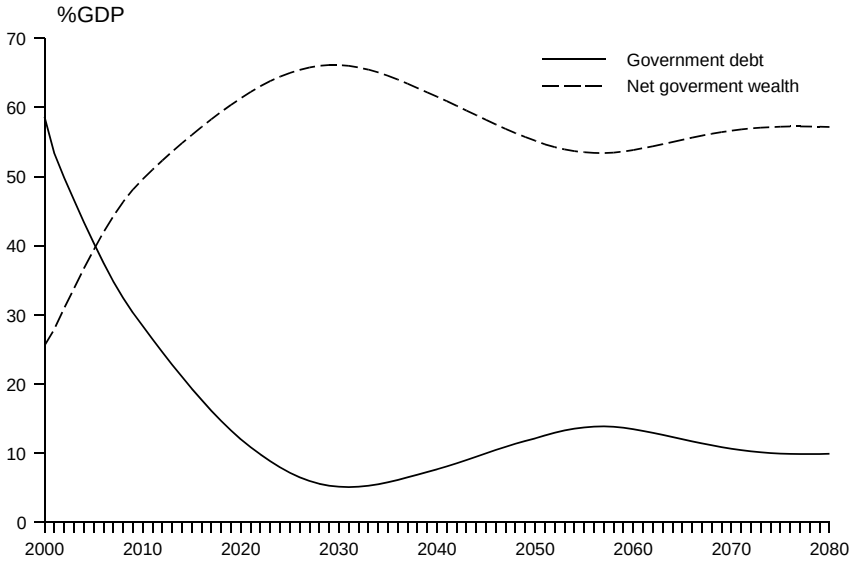


Figure 4.7.b Gross debts and Net government wealth under a sustainable policy



namely one of 0.7% of GDP. Tables 4.5 and 4.6 differ from each other only in tax revenues and the dynamics of fiscal balances, debts and interest payments. In the sustainable path the surpluses are of such a magnitude that the reduction of government debt and of interest payments counterbalance the increasing net costs of ageing for the government and the dwindling revenues from gas. Between 2001 and 2040, government debt is nearly redeemed, and net government wealth rises from its present level of 27% to around 62%. The fiscal surpluses will turn into a (small) deficit in the period in which the elderly dependency ratio is at its peak level. When this ratio reaches its steady-state level of around 40% after 2040, the budget is roughly balanced.

The public pensions savings fund (AOW-spaarfonds)

A few years ago the government established a savings fund that has the purpose of earmarking part of the debt reduction and savings on interest payments for financing the future rise of public pensions. This fund is not presented in this paper. The reason for this is that its existence only brings about a rearrangement of the measurement of public sector assets and liabilities and the growth therein. It does not change the governments net wealth, or its fiscal position, and therefore has no impact on the basic results of our analysis.

The rearrangement is essentially as follows. The government establishes a fund, which invests in government debt. This fund accumulates its assets via two channels: contributions from the government and the yields on its assets. However, both channels of asset accumulation also involve an equal cost for the government in the form of the contribution itself and the higher interest payments which are due to the smaller debt reduction compared to the case in which the fund was not established. Therefore, the funds assets are counterbalanced by an increase of government debt of the same magnitude. Our presentation of the governments debt and fiscal position, however, conforms to the EMU-definitions. According to the rules of the Maastricht Treaty, intra public sector deposits/revenues and debt/liability positions cancel out.

A comparison with earlier publications

The size of the required adjustment of 0.7% of GDP nearly equals its equivalent in CPB (1997) and ter Rele (1998) and even coincides with it in Van Ewijk and ter Rele (1999) and Bovenberg and ter Rele (1999 and 2000). However, this is not as obvious as it may seem since the situation in the base year and some major assumptions about future developments have changed. These changes do have a large effect on the course of the sustainable budget balance. The reason for this is threefold. The first is that the projected budget balance in the base year is now significantly higher. For a large part, this is due to a more favourable economic development in recent years and higher growth forecasts for the near future. The second difference with the earlier publications is that this more favourable starting point is offset by less beneficial developments than previously anticipated between 2001 and 2020. Assumptions about the rise of labour participation are now lower, with the corresponding detrimental effect on the tax base, and projections about the growth of disability claimants higher. Moreover, the present fiscal balance is, in our estimations, biased by favourable business cycle conditions.

In combination, these two factors lead to a course of the budget balance which is 'flatter' in the first two decades than in earlier publications. Starting from a fiscal surplus it is now sufficient to roughly maintain this position in order to achieve the reduction of public debt that is required to absorb the future costs of ageing. In net terms, these future costs are not as high as they were in the earlier publications, and accordingly the required debt reduction and average fiscal surpluses not as sizable, because of a third factor that exerts its influence after 2020. This is the fact that the growth of second pillar pensions is now projected to be higher, resulting in a more substantial alleviating effect for public finances through the direct and indirect taxes that are paid out of these pensions. Due to this factor, the sustainable budget balance does not decline as much after 2020 as it did.

Qualification

The above analysis still neglects any behavioural responses of the private sector to the tax increase. It is well-established that higher tax rates have a negative impact on economic activity in the long run. According to the CPB model JADE (CPB (1997)) an ex ante increase of indirect taxation by 1% of GDP results in an ex post reduction of the deficit in the long term by 0.7% of GDP, implying a 'leakage' due to a decreasing tax base by 30%. The main channel of this leakage is through the impact of the tax wedge on employment, and thereby on national income. Using this leakage factor, we might derive the multiplication factor that links the required size of the adjustment to the tax rise. This multiplication factor would be $1/(1 - 0.3) = 1.4$, implying that in the base case taxes should be raised by 1% of GDP rather than 0.7% mentioned above.

Effects of a later policy adjustment

Table 4.6 and figure 4.7 reveal the consequences for government finances if public arrangements are made sustainable in 2001. Table 4.7 shows the course of the budget balances and government debt levels if sustainability is achieved by a later adjustment of indirect tax rates. Postponing the adjustment to 2020 turns out to raise the size of the required tax increase from 0.7% of GDP to 1.0% of GDP. Postponing the adjustment until 2040 increases the necessary rise to even 1.7% of GDP. Later adjustments also have the effect that sustainability can only be achieved at lower budget balances and higher levels of government debt. This reflects the fact that a larger part of the burden of the adjustment is shifted to later years and future generations.

Table 4.7 Budget balances and government debt levels with alternative dates of adjusting tax rates

		2001	2020	2040	2060	2080
	%GDP					
	Required adjustment	*Budget balance*				
-adjustment in 2001	0.7	1.6	1.2	– 0.2	1.0	0.0
-adjustment in 2020	1.0	0.9	0.7	– 0.8	– 0.4	– 0.5
-adjustment in 2040	1.7	0.9	– 0.4	– 1.7	– 1.3	– 1.3
	Required adjustment	*Government debt*				
-adjustment in 2001	0.7	54	12	8	13	10
-adjustment in 2020	1.0	54	27	23	29	24
-adjustment in 2040	1.7	54	28	49	54	49

4.3 The effect on generations

The data that underlie the present and future public budgets can be rearranged in such a way that we can calculate how generations are affected by government policies. The focus is then explicitly on the issue of intergenerational distribution. To accomplish this, we apply a methodology that is known as Generational Accounting. This methodology calculates the average net lifetime benefit from the government of a member of a generation over his or her remaining lifetime. It does this by adding up remaining-lifetime benefits from public expenditure, and subtracting remaining-lifetime burdens from taxation— both in present-value terms. The calculations are carried out for all presently living generations and for the average unborn generation. For the unborn, net benefits are adjusted for the rise of lifetime income. The methodology of Generational Accounting is explained extensively in ter Rele (1998) and in Bovenberg and ter Rele (1999 and 2000).

Table 4.8 Generational accounts

Age in 1998	Net benefit with current policies	Effect of adjusting policies in		
		2001	2020	2040
	thousands of euros			
unborn generations	44.2	8.3	5.6	2.6
0	58.8	– 5.2	– 7.2	– 5.6
20	– 121.9	– 6.9	– 5.2	– 2.1
40	– 73.5	– 4.7	– 1.8	– 0.4
60	102.7	– 1.7	– 0.4	0
80	128.9	– 0.5	0	0

Table 4.8 (column 2) shows the net lifetime benefits for a selection of generations if policies remain unchanged for the presently living generations, and the burden of the required adjustment is fully absorbed by the unborn generations. The pattern of these remaining-lifetime benefits of the presently living generations is a reflection of the age profile of net benefits that was shown in figure 4.3. As explained in chapter 3, a key variable in Generational Accounting is formed by the difference in net lifetime benefit between the zero-year olds and the unborn generation. Under current policies, the net lifetime benefit of the newly born exceeds that of future generations by 14.6 thousand euros. Accordingly, public arrangements are too ‘generous’ and will have to be adjusted in the future to close this gap.

In columns 3, 4 and 5 we explore how the generations are affected by implementation of the required adjustments on the three alternative dates discussed in the previous section, namely in 2001, 2020 and 2040. These columns show that implementing a sustainable system has the expected effect of benefiting the unborn (by 8.3 thousand

euros if implemented in 2001) and burdening the present generations, because the latter must then bear part of the cost of the adjustment. The later the adjustment is implemented, the smaller these effects generally become.

4.4 Sketching future shifts in economic aggregates

The sections above have described the changes in public finances that are expected to take place during upcoming decades. This section sketches the environment in which these changes take place by providing an outline of changes in the composition of the economy. Table 4.9 provides an extrapolation of the major economic aggregates between 2000 and 2060 in a scenario with sustainable public finances. It reveals that the ageing population and the accompanying rise of pension incomes will lead to a sharp increase of consumption relative to domestic production (GDP), the latter being assumed to grow in line with productivity and labour supply. Between 2000 and 2040, these rising pension incomes will boost private consumption from its present level of 50% of GDP to 59%. Government consumption in this period rises from 23% to 27% of GDP through growing demand for healthcare. In contrast, investments are projected to decline due to the slower growth of the economy that results from the decreasing labour supply. On balance, domestic spending will increase at a far higher rate than domestic production (GDP). Consequently, the trade balance which presently shows a surplus of 5% turns into a deficit of 6% in 2040. After 2040, the changes are small.

Can we finance these large future trade deficits? This translates into the question whether the present net foreign asset position and the large trade surpluses in the next decades will generate sufficient wealth and future revenues from assets. The middle part of table 4.9 answers this question.[7] It shows that, in 2020, the present more-or-less-neutral net financial asset position will have turned into a surplus of 97% of GDP, generating a net income from foreign assets of 7% of GDP. In 2040 these figures will even have increased to 178% and 10%, respectively. This rise of net income from foreign assets more than compensates for the sharp decline of the trade surplus.[8] After 2040, the net foreign asset position shows explosive growth. In 2060, it amounts to 301% of GDP. Accordingly, national income grows at a higher pace than GDP. This indicates that, under the assumptions made here, the present saving behaviour in the Netherlands leads to a level of national wealth creation that exceeds the requirements to compensate for the decline of production relative to consumption. The explosive

[7] These calculations are carried out by using a model that was presented in Kusters (1997). We assumed that foreign assets and foreign liabilities generate the same yield, that the yield on riskless assets and the equity premium are equal to those of pension funds, and that the composition of future investments equals the present composition.

[8] The fact that the growth of net income from foreign assets does not fully coincide with that of net foreign assets is due to compositional effects.

growth of net foreign assets entails that consumption will eventually have to be higher than assumed in these extrapolations. Also, please note that this extrapolation implicitly assumes that, on aggregate, other countries will not follow this policy of foreign asset formation, as the global balance of payment sum must equal zero.

Table 4.9 Economic aggregates in 2000-2060

	2000	2020	2040	2060
	%GDP			
Cost components of GDP				
Labour income	51	51	50	50
Operating surplus	22	22	22	21
Indirect taxes minus subsidies	12	13	14	14
Consumption of capital	14	14	14	14
GDP	100	100	100	100
GDP (2000=100)	100	147	195	281
GDP, average 20-year growth(%)		2	15	17
Spending categories				
Private consumption	50	54	59	59
Government consumption	23	24	27	26
Investments	23	20	20	20
Domestic spending	95	98	106	105
Trade balance	5	2	– 6	– 5
Net income from foreign assets	1	7	10	11
Net foreign assets	2	97	178	301
Balance of payments	6	8	3	6
National income (gross)	101	107	110	111
pension contributions (minus)	3	3	4	4
private pension income (plus)	4	7	13	13
public pension income (plus)	5	7	9	8
Net effect on tax base	6	11	18	17

Another important shift that will take place in the coming decades is the rise of the tax base and of tax revenues relative to GDP. The increase of domestic spending, from 95% of GDP in 2000 to 106% in 2040, is one of the contributing factors by raising indirect taxes. Direct taxes will also increase more than GDP, due to the combined effect of the rising number of pensioners and the tax treatment of pension savings. In the Netherlands, pension contributions are deductible from personal income taxation, and the returns that accrue to pension funds are exempt from taxation. Pension incomes, however, are subject to income tax. This combined effect on the tax base is displayed in the lower part of table 4.9. There, we also take account of the rise of public pensions – a rise that is made possible by government saving (see section 4.2). In net terms, these

factors lead to a substantial increase of the tax base. The net contribution to the tax base of 6% of GDP in 2000 rises to 18% of GDP in 2040, and then roughly remains at that level.

Appendix Comparison of population forecasts by Statistics Netherlands (1998, medium variant) and by Eurostat (2000, baseline scenario)

In the Eurostat forecast, almost all demographic assumptions are higher than in the forecast of Statistics Netherlands (SN) (see table 1). Eurostat assumes a higher total fertility rate (TFR), a higher life expectancy at birth for both males and females, and from 2010 onwards a higher net migration.

Table 1 Comparison of population forecast by Eurostat and Statistics Netherlands[1]

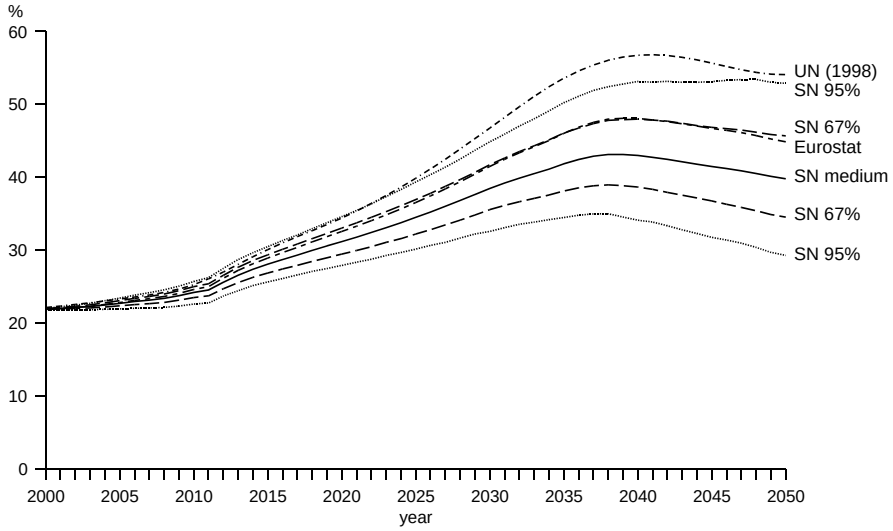
	2000	2010	2020	2030	2040	2050
Baseline scenario Eurostat 2000						
-Total Fertility Rate	1.7	1.8	1.8	1.8	1.8	1.8
-Life expectancy males (year)	75.5	77.0	78.2	79.2	79.8	80.0
-Life expectancy females (year)	80.9	82.0	83.1	84.1	84.7	85.0
-Net migration (thousands)	33.4	35.0	35.0	35.0	35.0	35.0
-Population (billions)	15.9	16.7	17.3	17.7	17.9	17.7
-Ratio 65+ / 20-64 (%)	21.9	24.6	32.6	41.5	48.1	44.9
Medium variant SN1998						
-Total Fertility Rate	1.6	1.7	1.7	1.7	1.7	1.7
-Life expectancy males (year)	75.3	76.6	77.8	78.8	79.5	80.0
-Life expectancy females (year)	80.6	81.0	81.6	82.1	82.6	83.0
-Net migration (thousands)	37.9	33.4	28.2	25.2	23.6	22.3
-Population (millions)	15.8	16.6	17.1	17.4	17.4	17.2
-Ratio 65+ / 0-64 (%)	21.9	24.2	31.2	38.5	43.0	39.8
Difference Eurostat - SN						
-Total Fertility Rate	0.1	0.1	0.1	0.1	0.1	0.1
-Life expectancy males (year)	0.2	0.3	0.4	0.4	0.3	0.0
-Life expectancy females (year)	0.3	1.0	1.5	1.9	2.1	2.0
-Net migration (thousands)	– 4.6	1.6	6.8	9.8	11.4	12.7
-Population (billions)	0.0	0.1	0.2	0.3	0.4	0.4
-Ratio 65+ / 20-64 (%)	0.0	0.4	1.4	3.0	5.1	5.1

[1]The data apply to the beginning of the year.

As a result, the population growth is higher in the Eurostat forecast, but strangely enough only until 2045. The reason for this surprising development after 2045 can be attributed to the use of emigration rates in the forecast of SN, instead of emigration

numbers in the forecast of Eurostat. Because of these emigration rates, the age distribution of the emigration changes with the age distribution of the total population. This has two consequences for the population. First of all, it leads to smaller emigration numbers for young people, and consequently to more people in the reproductive ages, and therefore to more births. This compensates for the lower total fertility. Second, it leads to higher emigration numbers for older people and consequently to a lower number of deaths. In 2040, this effect rises above the effect of the lower life expectancy at birth.

Figure 1 *Old-age dependency ratio for the Netherlands, according to SN (medium variant, 67% and 95% forecast intervals), Eurostat (baseline scenario) and the UN (medium variant)*



An important demographic figure with respect to aging is the old-age dependency ratio: the number of persons aged 65 years or more as a percentage of the number of persons aged 20-64 years. Eurostat predicts higher numbers for this ratio than does SN, up to a maximal difference of 5.2 percentage points in 2045 (see figure 1). However, this doesn't automatically mean that the greying effect of the higher life expectancy is stronger than the rejuvenating effect of the higher fertility and higher migration. The previously mentioned introduction of emigration rates in the forecast of SN plays an important role here too. It leads to a slower ageing in the forecast of SN.

Which forecast is 'better'? All the demographic assumptions of Eurostat stay within the 95% confidence interval of those made by SN. The old-age dependency ratio of Eurostat

is just within the 67% confidence interval of SN. The old-age dependency ratio of the UN forecast, however, is well outside the 95% confidence interval of SN, so this forecast was not used for the Netherlands.

An argument in favour of the forecast by Eurostat is that it is more recent. It contains the demographic developments between 1998 and 2000, and uses the most recent assumptions. There are three arguments in favour of the forecast by SN. First, it uses more advanced methods (such as emigration rates instead of emigration numbers). Second, it provides information about confidence intervals. Third, it covers up to the year 2100, rather than 2050.

Chapter 5 Sensitivity analysis

The projections that were performed in the baseline make many assumptions about the future. This chapter explores the sensitivity of the results for the most important of these assumptions. This is an important test for the robustness of the results of the previous chapter. Furthermore, it may also provide useful insights into the causes of the ageing problem and the potential effectiveness of different types of policy measures. This chapter also explores a worst-case scenario.

5.1 Changes in assumptions

For each variant in the sensitivity analysis we will first determine the required adjustment of indirect taxes that is required to attain sustainability. The measure that will be used to express the impact of a change in an assumption (*e.g.* the interest rate or the demographic development) is the *difference* between this adjustment and the adjustment that was measured under the baseline assumptions. Table 5.1 presents the results for the sensitivity analyses. To give the analysis the character of a risk assessment, we chose the sign of most changes of assumptions so that they lead to higher required adjustments. The probability of a change of assumption with the opposite sign, however, may be considered equally large. In this case the effect on the required adjustment has also the opposite sign and is (roughly) of the same magnitude.

Table 5.1 Sensitivity analyses

Change of assumption	Required adjustment of indirect taxes	Difference of adjustment with baseline
	% GDP	
Interest rates and growth		
1) 1% lower pension fund return (*i.e.* 1% lower equity premium)	1.6	+ 0.9
2) 1% lower pension fund return and 1% lower interest rate	1.7	+ 1.0
3) 0.5% higher productivity growth	1.2	+ 0.5
Demographics		
4) Life expectancy: 1 year higher	1.3	+ 0.6
5) Fertility: 10% higher	0.7	+0.04
Labour participation		
6) Females: 5%-points lower	1.3	+0.6
7) Elderly (55-64 year olds): 5% points lower	0.9	+0.3
Extra costs		
8) Healthcare: 0.2% higher growth rate until 2020	0.8	+0.2
9) Baumol: Expenditures 1% of GDP higher in 2040	1.3	+ 0.6
Cyclical impact		
10) Assuming cyclical neutrality in 2001	– 0.7	– 1.4

Interest rates, pension fund returns and productivity growth

The first variant assumes a 1% lower real return of pension funds on their investments (4.75% instead of 5.75%). The real interest rate on risk-free assets, which is applied to government debt, remains at 4%. Calculations with the CPB pension model show that pension funds in this case will have to increase pension contributions drastically in order to meet future pension obligations. We assume that this process of adjustment will be spread out over ten years.[9] The tax deductibility of these contributions leads to lower tax revenues, and thus increases the required adjustment of indirect taxes to arrive at sustainability. Table 5.1 shows that this increase amounts to 0.9% of GDP.

The second variant assumes not only a 1% lower pension fund return, but also a 1% lower real interest rate on government debt and assets (3% instead of 4%). It turns out that this leads to an adjustment that is 1.0% higher than in the baseline. It is also 0.1% higher than in the previous variant. The major reason for this is that at low interest rates an immediate increase in taxation has a relatively small effect on curbing fiscal imbalances by reducing debt service.

The third variant of table 5.1 shows a highly counterintuitive result: higher productivity growth does not narrow, but widen the gap with a sustainable system. In particular, our sustainability measure increases by 0.5% of GDP. Two factors determine this result. First, our assumption on the unitary income elasticity of public expenditure implies that public expenditure grows as fast as the tax base and tax revenues. Second, the majority of Dutch pensions are based on final wages. A higher rate of productivity growth implies that the final wage rate and thus the level of pension income rises relative to the average wage rate. This requires a higher pension contribution rate. As pension contributions are deductible from the income tax, this reduces tax revenues. Consequently, a higher increase of indirect taxation is needed to restore sustainability.

As we assume primary government expenditures to be linked to productivity (see section 4.1), the increase of the tax base and revenues is cancelled out by the increase of expenditures.

Demography

Table 5.1 shows also the results of two deviations from the baseline demographic assumptions. The first demographic variant (the fourth in total) contains the results in a scenario that assumes an extension of life expectancy by one year. Two factors contribute to the result that indirect taxes have to be raised by 0.6% more than in the

[9] The decline in the rate of return to 4.75% necessitates a decline of the technical interest rate applied to pension funds to 3%. If this were to be implemented immediately, pension contributions would increase drastically. In order to smooth pension contribution fluctuations, it is assumed that the technical interest rate is decreased to 3% in a period of ten years.

baseline to achieve sustainability. The first is that a higher level of government saving is needed to meet the higher future costs of public pensions and healthcare. The second reason is that pension funds will have to levy higher pension contributions to meet future pensions, since the latter have to be paid over a longer period. Although this also implies additional tax revenues, note that these are taxed at a lower rate of income tax than the rate at which pension contributions can be deducted.

The second demographic variant shows that a 10% higher fertility rate does not alleviate public finances. It even slightly increases the required tax adjustment. To some readers, this result might be somewhat surprising, as the ageing of the population, and thereby the problem of maintaining present public arrangements, is actually mainly a result of the decline of fertility over the last few decades. How do we explain this apparent contradiction between the effect of fertility in the future and its effect in the past?

The reason for the unfavourable impact of higher future fertility is simply that, as demonstrated in table 4.8, newly borns, *i.e.* zero year olds, enjoy a positive net benefit from the government. In other words, they burden public finances. In present-value terms, the additional tax revenues that result from increased future labour supply are more than cancelled out by the higher expenditure. This result follows from the pattern of benefits and burdens (the age profile), which present policies generate over a whole lifetime. The extra net costs for government of an additional newborn, however, are not as high as the net benefit for zero year olds in table 4.8 indicates because of the methodology we use to extrapolate part of government expenditure (the second category expenditures (see chapter 4.1)). It turns out that linking these budget items to GDP generates a lower expenditure (in present value terms) than when the extrapolation of these items is based on their age profile in the base years.

The effect of the past decline in fertility is different. It involves a change in the future distribution of the population ‘over the age profile’ by increasing the ratio of net beneficiaries from the government (the elderly) to net contributors (the middle-aged).

Higher fertility has almost no effect on the (tax deductible) pension contributions. On the one hand, more people build up pensions; on the other hand, the pension contribution also increases. These two opposing forces cancel, leaving public finances unaffected.

Changes in immigation are not explored here. The reason for this is that the economic characteristics of immigrants (such as participation) differ from that of the rest of the population. The measurement of the effects of immigration would therefore require a separate analysis (see also the box on replacement migration).

Replacement Migration

In a recent study[1] the United Nations came to the following conclusion: '...if retirement ages remain essentially where they are today, increasing the size of the working-age population through international migration is the only option in the short- to medium term to reduce the declines in the potential support ratio.' The argument is merely of a demographic nature, and no economic considerations are provided to support the conclusion. This calls for some comments:

- *If activity rates of immigrants were equal to those of natives, immigration might help to alleviate the ageing problem: calculations show that in the Netherlands a yearly increase in immigration by 0.05 per cent of the population would under this assumption give room for a tax reduction of 0.5 percent of GDP. However, immigrants from Third World countries tend to display much lower activity rates and a much higher dependency on benefits as compared to natives. So, immigration might just aggravate rather than alleviate the ageing problem.*
- *Replacement migration would imply a considerable increase in the size of the population. In order to keep the potential support ratio on the present level, the EU population would even have to triple over the next 50 years; beyond that horizon, the increase would have to continue. What this means in terms of congestion costs can only be hazarded. Three quarters of the population would consist of immigrants and their descendants. With immigrants comprising a share of less than 10% now, their integration has already proven to be a difficult task.*
- *Options other than raising the retirement age or replacement migration are mentioned in the report, but play no role in the investigation. Especially an increase in activity rates, preferably together with a decrease of the number of beneficiaries under 65, seems to be the number one priority in many countries facing the ageing problem.*

[1] *United Nations (2000).*

Lower labour participation

It is likely that the labour force participation of women will continue to grow. The rate at which this will happen, however, is subject to uncertainty. In order to illustrate this uncertainty, we assume a lower rate of growth, resulting in a 5%-points lower female participation rate, or a 2½%-points lower overall participation rate. Variant 6 reveals that such a lower participation rate of females pushes the required tax adjustment up by 0.6% of GDP. The reason for this is that the downward effect of lower participation on tax revenues exceeds that on expenditures.

Until 2020, labour force participation of older persons is expected to rise as a consequence of continued female participation growth and a modest increase of male participation. After 2020, participation rates of older persons are assumed to remain constant. Although projections are always surrounded with much uncertainty, higher welfare might be a particular source of risk. Due to rising incomes, people may increasingly want to substitute work by leisure at older ages. To deal with this uncertainty, we gradually decrease participation of persons aged 55 to 64, ending up 5%-points lower in 2020 and later years. This corresponds with the overall participation rate eventually being 1%-point lower. This lower participation (variant 7 in table 5.1) results in a 0.3% higher required tax increase. In both participation variants pension contribution rates show only a small deviation from the baseline. Fewer people build up pension rights, but the contribution base also decreases. These two opposing forces cancel each other out.

Extra costs of government

The last two sensitivity analyses deal with the risk that public expenditure increases at a higher rate than in the baseline. Variant 8 assumes a 0.2% additional growth rate of healthcare costs until 2020. This reflects the uncertainty with respect to the costs of technological progress and income elasticity. Healthcare expenditures relative to GDP rise by roughly 0.3%-points in 2020 and 0.4%-points in 2040. The required immediate rise of indirect taxation to achieve sustainability in this variant is 0.2% of GDP higher than in the base case.

Another source of uncertainty is formed by the Baumol effect. The possibility of a differential rate of productivity growth (a differential rate of inflation) between public sector goods and services and those of the private sector justifies a sensitivity analysis that assumes a more expensive government. The nineth row of table 5.1 shows the impact on our sustainability measure if the cost of government consumption rises at such a pace until 2040 that its share in the economy is 1%-point larger than under the baseline assumptions. This entails a 0.1% higher annual growth rate. After 2040, expenditures follow the baseline growth rate. The immediate implementation of the tax increase has the result that its magnitude can be roughly 40% lower than the 1%-points higher cost of government after 2040. A measure of 0.6% of GDP suffices.

Other assessment of the business cycle

The baseline calculation contains a major assumption in the form of the assessment of the output gap in the base year. We based our calculations on an output gap of 2.3% of GDP, being the average of various measurements showing divergent outcomes. The uncertainty of this assumption justifies an analysis based on an alternative assessment. As the alternative, a neutral cyclical position was assumed. This assumption entails that the economy is not considered to have been booming during the last couple of years, but, instead, that it has shifted to a structurally higher rate of productivity growth. The alternative assumption implies that the cyclical effect on the deficit, which is 1.6% in the baseline calculations, is also zero. The last row of table 5.1 reveals that this change in the assessment of the present cyclical position roughly equals the shift in the required policy response. The required tax increase of 0.7% of GDP in the baseline calculations changes into a tax *reduction* of 0.7% of GDP.

5.2 The robustness of the policy recipes

An important question for policymakers is to what extent fiscal policies that are based on tax smoothing depend on the assumptions made. How much does the time path for the budget balance and government debt under a tax smoothing policy change if alternative assumptions are made? An indication for this sensitivity can be found by comparing the courses of sustainable budget balances and debts under the base-case assumptions to the sustainable courses of these variables under alternative assumptions. Figures 5.1 and 5.2 perform this comparison for the sensitivity analyses that were discussed above.

It turns out that the assumptions do matter for the course of sustainable budget balances and government debts. However, the main policy recipes that were derived under the base-case assumptions remain unchanged. For at least the first 24 years, all variants show positive budget balances and a substantial reduction of government debt relative to GDP. Government saving is largest in those variants that are characterised by a relatively large deterioration of circumstances for the government in the long term. These variants also show the lowest long-term level of government debt, indicating the increased need for reduction of interest payments in these variants.

Figure 5.1 Sustainable budget balances under alternative assumptions

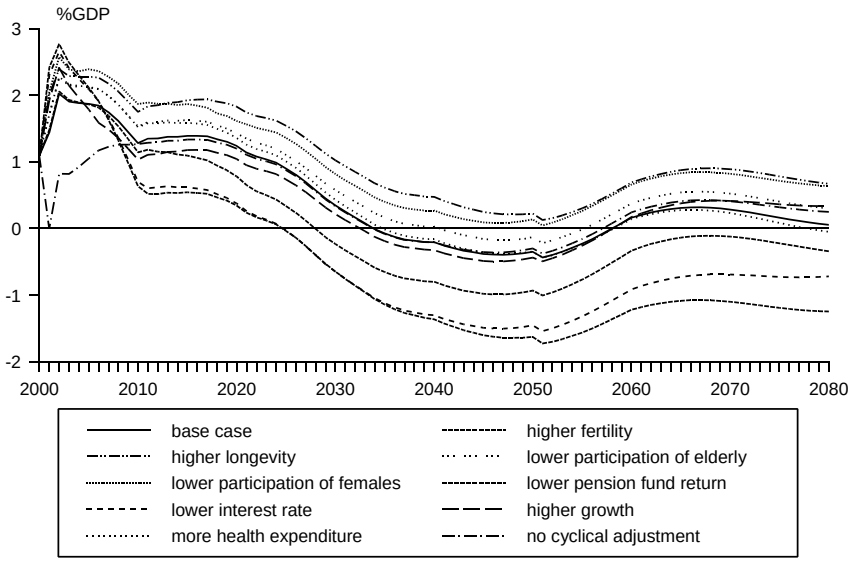
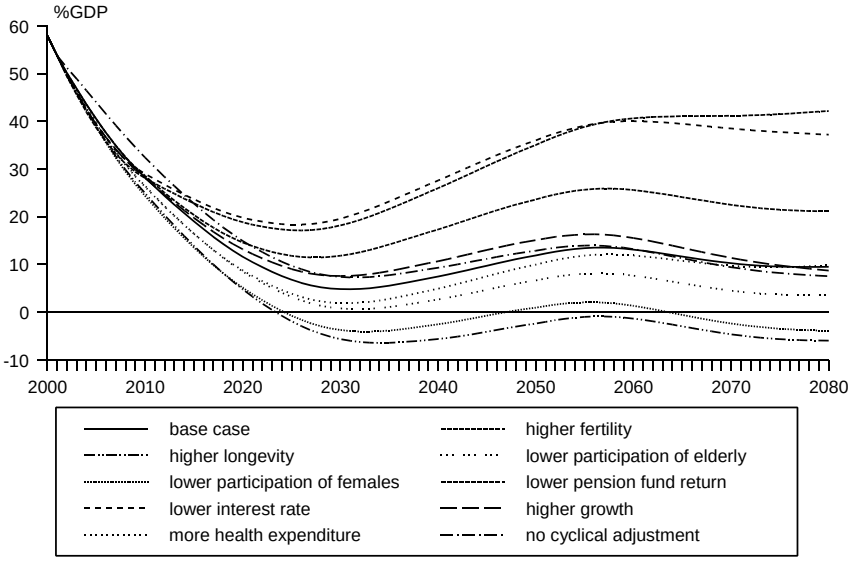


Figure 5.2 Sustainable government debts under alternative assumptions



5.3 A worst-case scenario

This section explores future budgets in a pessimistic scenario. We will replace a number of the assumptions in the baseline calculations by assumptions that are more burdening for public finances. This section combines three of the sensitivity analyses which were performed in section 5.1. One of the deviations is that life expectancy is one year higher, entailing higher costs for the government on public pensions and healthcare. The other two involve labour participation. For both females and the elderly, the participation rate now reaches a level in 2020 and onward that is 5%-points lower than in the baseline. This results in a lower growth of GDP and of the tax base.

Table 5.2 shows that in this scenario public finances get out of hand more rapidly than in the baseline. This is primarily caused by the sharper increase of expenditure on public pensions and healthcare and its additional effect of triggering a spiral of rising deficits, debts and interest payments. The unsustainability is already fully clear in 2040. The fiscal deficit will then have reached a level of 8.9% of GDP and government debt a level of 120%.

Table 5.2 Future budgets in a worst-case scenario with no policy adjustment

	2001	2010	2020	2040	2060	2080
	% GDP					
Expenditures						
Social Security	10.9	12.7	14.6	17.0	16.5	16.6
- public pensions	4.7	5.6	7.4	10.0	9.4	9.5
- disability benefits	2.7	3.3	3.6	3.4	3.5	3.5
- unemployment benefits	1.5	1.7	1.6	1.6	1.6	1.6
- other	2.0	2.1	1.9	2.0	2.0	2.0
Healthcare	7.0	8.0	9.4	11.9	11.7	11.6
Education	4.4	4.7	4.6	4.9	4.7	4.8
Other primary expenditures	19.1	19.4	19.4	19.4	19.4	19.4
Interest payments	3.5	2.4	2.7	6.6	14.2	25.0
Total	44.9	47.2	50.8	59.9	66.6	77.5
Revenues						
Income tax + social security contributions	20.7	21.6	22.7	24.6	24.4	24.2
Indirect taxes, other taxes and non-tax revenues	19.2	19.5	20.2	21.5	21.5	21.5
Corporate tax	3.6	3.2	3.2	3.2	3.2	3.2
Revenues from assets, including gas	2.4	2.2	2.0	1.6	1.4	1.4
Total	45.8	46.5	48.1	50.9	50.5	50.3
Budget balance (EMU definition)	0.9	– 0.7	– 2.7	– 8.9	–16.1	–27.2
Government debt (EMU definition)	54	41	48	120	252	443

Table 5.3 shows a condensed version of future budgets under these worst-case circumstances if sustainability is achieved through an adjustment of indirect tax rates in 2001. This necessitates a rise of 2.1% of GDP, which is 1.4%-points higher than in the base case. The combination of the higher future burden of the ageing population and the lower tax revenues requires that the budget balance (and thereby public savings) is raised to such an extent in the short term that government debt even becomes negative. Indeed, implementing a sustainable system in the short term under these worse long-term conditions entails that public policies must rely more on wealth creation. The costs of ageing and the lower tax revenues are compensated by lower expenditure on interest payments, or higher revenues from financial assets when debt turns negative.

Table 5.3 Future budgets in a sustainable worst-case scenario

	2001	2010	2020	2040	2060	2080
	% GDP					
Expenditures						
Primary expenditures	41.4	44.8	48.1	53.2	52.4	52.5
Interest payments	3.5	1.4	0.0	– 0.8	– 0.5	– 0.7
Total	44.9	46.2	48.1	52.4	51.9	51.8
Revenues	47.9	48.6	50.2	53.2	52.8	52.6
Budget balance (EMU definition)	30.0	2.4	2.1	0.8	0.9	0.8
Government debt (EMU definition)	54	21	– 2	– 14	– 9	– 12

PART III POLICIES TO COPE WITH AGEING

Chapter 6 Budgetary policies

This chapter discusses alternative budgetary policies, other methods of establishing sustainability, the effects of a later adjustment of policies and other policies with regard to debt and the budget deficit (thus non-tax smoothing). It calculates the welfare cost of policies that deviate from tax smoothing. Finally, this chapter also considers the impact of some other policy options.

6.1 Other budgetary measures to close the gap

This section explores measures that involve an adjustment in 2001 of other budgetary items than that of indirect taxes, which was used in the previous section and served as the measure of unsustainability. Table 6.1 provides insight into these required adjustments to make the system of collective arrangements sustainable. It shows that the size of these adjustments does not differ much. However, they do yield quite different effects on various generations. In particular, future generations benefit most from changes in budget items affecting the end of the life cycle (such as health and social security). Changes in these budget items also have the smallest (negative) effect on the present value of net benefits of newly borns because the effect of these measures is discounted more heavily.

Table 6.1 Adjustment of budgetary items and their intergenerational effects

	measure	Effect on net lifetime benefit					
		future generations	newly born	20-year olds	40-year olds	60-year olds	80-year olds
	%GDP	*thousands of euros*					
General government	– 0.7	7	– 6	– 5	– 4	– 2	– 1
Education	– 0.7	3	– 10	– 1	0	0	0
Social security	– 0.5	9	– 4	– 5	– 5	– 5	– 2
Health	– 0.5	9	– 4	– 5	– 5	– 5	– 5
Income tax	0.6	8	– 5	– 7	– 5	– 2	0
Indirect taxes	0.7	8	– 5	– 7	– 4	– 2	– 1

Table 6.1 shows also that the measures that are taken here to arrive at sustainability reduce the intergenerational gap by 13 thousand euros. This is less than the total generational imbalance, which amounts to 14.6 thousand euros (the difference between the net benefits of future generations and that of zero-year olds in table 4.8). Chapter 3 discussed how such a discrepancy can occur. Apparently, the net benefits within the group of future generations grow at a slightly smaller rate than that of lifetime income

and, consequently, a full closure of the generational gap would result in an explosion of government wealth.

6.2 Higher productivity growth with lagging expenditure

Under the baseline assumptions, higher productivity translates into higher primary expenditure. A policy line to attain sustainability might be found in breaching this linkage between the growth-induced rise of revenues and expenditures. One possible way of shaping such a measure might be to economise on expenditure. This might be relevant in the future if there is a consensus that expenditures are high relative to GDP. We will explore a variant with a 0.5% additional productivity growth wherein primary expenditures do not follow this extra growth until 2010. The extra growth is assumed to take place without any measures taken by government. After 2010, the baseline assumptions are reinstated, and primary expenditure rises with the additional 0.5% per annum.

This measure turns out to lead to a substantial improvement of sustainablity. In such a scenario, indirect taxes can even be lowered by 0.7% of GDP. Due to the higher productivity growth we assume here, this figure should be compared with required upward adjustment of 1.2% that was found in the high growth scenario (see the sensitivity analyses), implying an effect of the 'unlinking' the expenditures of 1.9% of GDP. Table 6.2 presents the effects of this measure.

Table 6.2 Effects of measure

measure	Effect on required adjustment	Effect on net lifetime benefit					
		future generations	newly born	20-year olds	40-year olds	60-year olds	80-year olds
	%GDP	*thousands of euros*					
Lagging expenditure	– 1.9	17	– 16	– 14	– 11	– 9	– 3

6.3 Effects of a later policy adjustment

Table 4.6 and figure 4.7 reveal the consequences for government finances if public arrangements are made sustainable in 2001. Table 6.3 shows the course of the budget balances and government debts if sustainability is achieved by a later adjustment of indirect tax rates. Postponing the adjustment to 2020 turns out to raise the size of the required tax increase from 0.7% of GDP to 1.0% of GDP. Postponing the adjustment until 2040 increases the necessary rise to even 1.7% of GDP. Later adjustments also

have the effect that sustainability can only be achieved at lower budget balances and higher levels of government debt. This reflects the fact that a larger part of the burden of the adjustment is shifted to later years and future generations.

Table 6.3 Budget balances and government debts with alternative dates of adjusting tax rates under baseline assumptions

		2001	2020	2040	2060	2080
	%GDP					
	Required adjustment	*Budget balance*				
-adjustment in 2001	0.7	1.6	1.2	– 0.2	0.1	0.0
-adjustment in 2020	1.0	0.9	0.7	– 0.8	– 0.4	– 0.5
-adjustment in 2040	1.7	0.9	– 0.4	– 1.7	– 1.3	– 1.3
	Required adjustment	*Government debt*				
-adjustment in 2001	0.7	54	12	8	13	10
-adjustment in 2020	1.0	54	27	23	29	24
-adjustment in 2040	1.7	54	28	49	54	49

Table 6.4 reveals the size of the required measures if the adjustment is postponed in the worst-case scenario. It shows also how the budget balance and debt levels develop. Due to the higher costs of ageing (see section 5.3), the costs of a delay of adjustment, in terms of the size of the adjustment as a ratio of GDP, are also more substantial than under the baseline assumptions.

Table 6.4 Budget balances and government debts with alternative dates of adjusting tax rates in a worst-case scenario

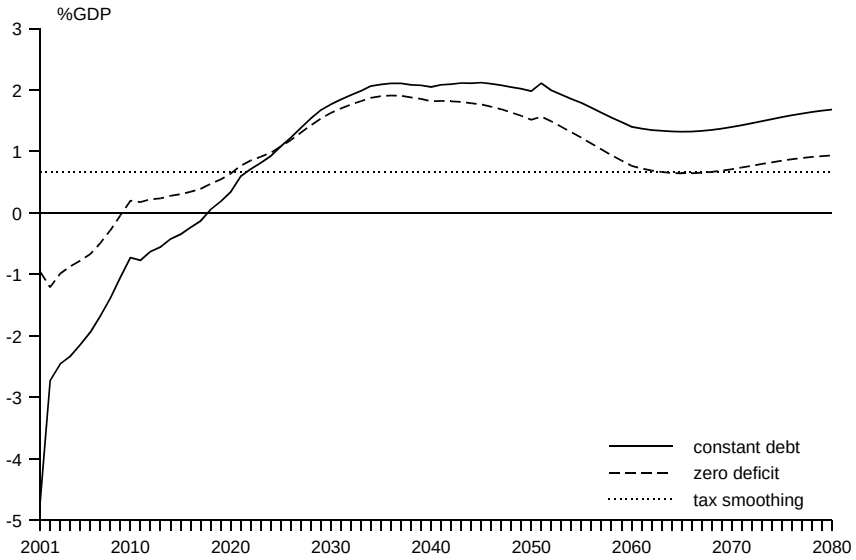
		2001	2020	2040	2060	2080
	%GDP					
	Required adjustment	*Budget balance*				
-adjustment in 2001	2.1	3.0	2.1	0.8	0.9	0.8
-adjustment in 2020	3.1	0.9	0.4	– 0.8	– 0.7	– 0.8
-adjustment in 2040	5.1	0.9	– 2.7	– 3.7	– 3.5	– 3.5
	Required adjustment	*Government debt*				
-adjustment in 2001	2.1	54	– 2	– 14	– 9	– 12
-adjustment in 2020	3.1	54	44	33	37	34
-adjustment in 2040	5.1	54	48	115	119	115

6.4 Alternative forms of fiscal response

Comparing the time path of tax adjustments

The policy line of an immediate adjustment of the system of public arrangements to sustainable levels might not be politically feasible. In particular, the long period of fiscal surpluses that it brings about may be considered too extreme. We will therefore explore two less austere alternatives, namely one policy line that balances future budgets and a policy line of holding the government debt-to-GDP ratio at its current level. In the latter policy line, government debt is allowed to grow at the same rate as GDP. The two alternatives also ensure sustainability of public finances, but differ from the tax-smoothing scenario in the time path of tax adjustments. Figure 6.1 compares the required course of tax-rate adjustments through time of these alternatives with that of a policy of tax smoothing. In all three variants, the policy is implemented in 2001, and indirect taxes are used as the instrument to achieve sustainability.

Figure 6.1 Tax rate adjustments



Until around 2020, both alternatives to the policy of tax smoothing turn out to allow for lower levels of taxation. Even a reduction of tax rates is possible until 2008 in the zero-balance variant, and until 2018 in the constant-debt variant, the latter showing sizable reductions in the near future. In the longer term, however, the policy of tax smoothing pays off through its effect on government debt and interest payments. This is revealed in table 6.5. The reduction of interest payments creates budgetary room to absorb the

increase of net primary expenditure (defined as the balance of primary expenditure and revenues that are not from assets) due to ageing[10] and the dwindling revenues from assets (particularly from natural resources). This can be accomplished without a further adjustment of tax rates.

In contrast, in the two alternatives a further rise of tax rates is necessary after 2020. In the zero-balance variant, where the net costs of ageing and the decreasing revenues from assets are still partially absorbed by a reduction of the debt-to-GDP ratio, this rise is more moderate than that in the constant-debt variant. The rise of taxation is reflected in the course of net primary expenditure, which shows only a small rise in the zero-balance variant, and even a decrease in the constant-debt variant. After 2040, tax rates can move downward in the zero-balance variant due to the decreasing costs of ageing and a slight further reduction of debt (relative to GDP). In the constant-debt policy, however, tax rates remain about 1% of GDP higher than under a policy of tax smoothing.

Table 6.5 Key variables under three different fiscal policies

	Policy line	2001	2020	2040	2060	2080
		%GDP				
Net primary expenditure	zero balance	– 1.1	0.1	0.3	0.4	0.6
	constant debt	2.7	0.3	– 0.1	– 0.3	– 0.3
	tax smoothing	– 2.7	0.0	1.4	0.5	0.8
Interest payments	zero balance	3.5	1.9	1.3	1.0	0.8
	constant debt	3.5	3.4	3.4	3.4	3.4
	tax smoothing	3.5	0.8	0.4	0.8	0.6
Revenues from assets	zero balance	2.4	2.0	1.6	1.4	1.4
	constant debt	2.4	2.0	1.6	1.4	1.4
	tax smoothing	2.4	2.0	1.6	1.4	1.4
EMU balance	zero balance	0	0	0	0	0
	constant debt	– 3.8	– 1.7	– 1.7	– 1.7	– 1.7
	tax smoothing	1.6	1.2	– 0.2	0.1	0
Debt	zero balance	55	33	22	17	14
	constant debt	59	59	59	59	59
	tax smoothing	53	12	7	13	10

[10] This is the net cost of ageing for the government. It includes the burdening impact of the increase of old-age benefits and healthcare, as well as the alleviating effect of taxes on rising pension incomes.

Comparing the efficiency and distributional effects

Table 6.6 provides an assessment of the impacts of the policies that are particularly relevant for policymaking, *i.e.* the effects on efficiency and on the intergenerational distribution of welfare. The efficiency effect is estimated by a method we borrowed from Cutler *et al.* (1990), which adopts the notion of the Harberger triangle by relating the annual deadweight loss brought about by taxation to the squared value of the aggregate tax-to-GDP ratio. The average annual deadweight loss, which is the measure we employ to compare the distortionary effects of the three fiscal responses, is obtained by taking its average over a long period. Obviously, this method is only weakly linked to microeconomic theory. It is still useful, however, as it gives an indication of the differences in distortionary effect. The upper part of table 6.4 shows the expected result, namely that the average annual deadweight loss of the tax-smoothing policy is the lowest of the three policies considered, due to the beneficial effect of a constant tax-to-GDP ratio. Under the zero-balance- and constant-debt policies, the average annual deadweight losses are (respectively) 0.07% and 0.16% of GDP higher. Relative to the deadweight loss itself, these figures are (respectively) 1.0% and 2.3% higher. These differences may be considered small.

Table 6.6 Zero-balance- and constant-debt policies versus tax smoothing

Average annual deadweight loss (average in 2001-2097) and the absolute (relative) difference with tax smoothing

	%GDP				
	tax smoothing	zero balance		constant debt	
	level	*level*	*difference*	*level*	*difference*
	6.74	6.81	0.07 (1.0%)	6.9	0.16 (2.3%)

Net benefits over remaining lifetime (present values in thousands of euros) and the difference with tax smoothing

	tax smoothing	zero deficit		constant debt	
	level	*level*	*difference*	*level*	*difference*
unborn	52.6	50.0	– 2.6	43.1	– 9.5
zero year olds	53.5	48.8	– 4.7	46.1	– 7.4
20 year olds	– 128.7	– 128.1	0.6	– 124.5	– 4.2
40 year olds	– 78.2	– 74.2	4.0	– 67.6	10.2
60 year olds	100.9	103.3	2.4	107.2	6.3
80 year olds	128.4	129.4	1.0	130.8	2.4

The lower part of Table 6.6 shows the intergenerational effects of the three policies. It shows that, compared to the alternatives, tax smoothing benefits the presently young and the unborn, but is relatively unattractive to those aged twenty and over. This pattern emerges due to the tax collection early in time. The size of the intergenerational effects can be described as considerable, especially when the tax-smoothing policy is compared

to the constant-debt policy. For example, a zero-year old is then 7.4 thousand euros better off, whereas the welfare position of a 40-year old deteriorates by 10.2 thousand euros —both in present-value terms. Whether one favours a tax-smoothing policy, or one of the alternative policies for reasons of intergenerational fairness, depends on the weights attached to the various generations.

Summarising, the three policy options differ markedly in the time paths of tax rates, net expenditure, debt ratios and budget balances. The tax-smoothing scenario is superior to the alternatives in terms of loss of economic efficiency. The efficiency differences are relatively minor, however. The three scenarios differ in their intergenerational effects. These differences, in contrast, are substantial. The alternative policies, in particular the constant-debt policy, are unattractive to the young and future generations.

Chapter 7 Increasing labour force participation

By increasing labour force participation, the government can alleviate the burden of ageing. The attractiveness of the social security system is an important reason for non-participation, but also the tax system plays a role. This chapter discusses ways to reduce the negative influences of the social security and tax system by looking at three groups with relatively low participation: women, older persons and low-skilled persons. Quantitative illustrations are given for the effect of some of these policies on the sustainability of government finances. Policies aimed at reducing the attractiveness of social security programmes are doubly effective: they increase tax revenues due to increased participation and lower social security expenditures.

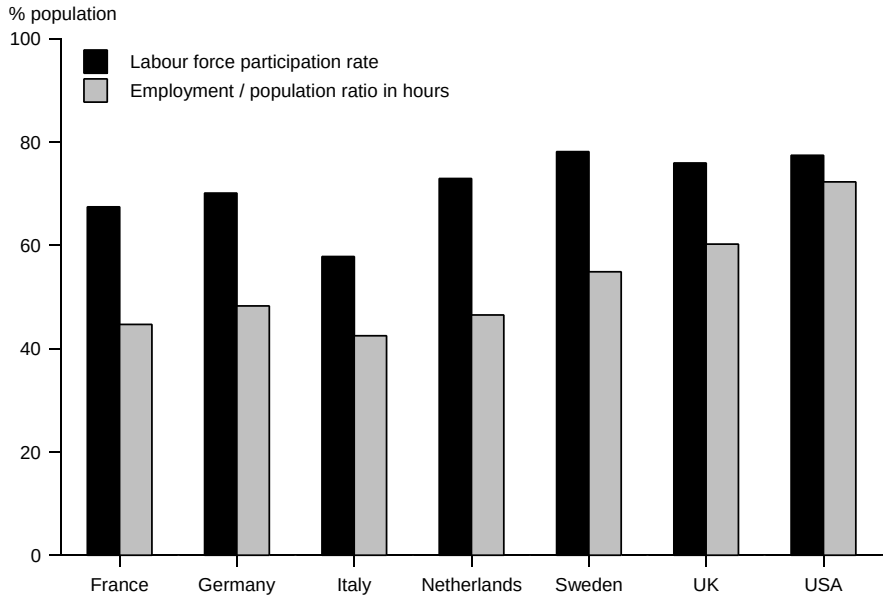
Since the mid eighties, labour force participation has increased considerably, particularly due to a strong rise in female participation. Overall participation in the Netherlands currently ranks above the EU average, but is still lower than that in Sweden, the United Kingdom, and the United States, for example (see figure 7.1). Measured in hours, the picture seems less rosy, scoring around the EU average. Reasons are a high incidence of part-time work, and a short standard working week relative to the UK and US.

Non-participation isn't a problem as long as the decision is made voluntary in the absence of market distortions. The social security system is an important source of distortions. Social security programmes are mostly financed by means of collective premiums and taxes, which means that employers and employees are often not confronted with the costs of their use. This will lead to a substitution away from work to a stay on social benefits, either intended or unintended (moral hazard). Higher premiums and taxes will, in turn, further discourage labour supply. Also the tax system is a source of distortions. Labour supply will be discouraged not only by taxes and premiums raised to finance social security and public goods, but also by subsidies given through the tax system. The distortions mentioned above come at a cost to society in terms of lower supply of capital and labour, and consequently lower production.

By taking away or correcting for the distortions brought about by the social security and the tax system, the government can increase participation, broaden the tax base and alleviate the burden of ageing. Such policies probably won't come without costs. Cutting back on social security programmes or reducing subsidies may result in higher efficiency, but may also cause higher income inequality (trade-off between equity and efficiency). Correcting for distortions, for example through the tax system, might create new distortions. In this chapter we discuss some policy options by looking at three groups with low participation: women, older persons and low-skilled persons. Not surprisingly, these three are also mentioned by the government as groups with relatively

low participation (Ministry of Economic Affairs 2000, Ministry of Social Affairs and Employment 2000).

Figure 7.1 Participation compared internationally [a]



[a] Source: OECD (2000)

7.1 Women

Compared to other countries, the share of women working in the Netherlands is not very high. Although female participation in persons in the Netherlands exceeds the EU average, many countries rank higher, notably most English-speaking and Scandinavian countries. Moreover, the participation rate measured in persons is rather misleading. In full-time equivalents, participation lies around the EU average, the share of women working in part-time jobs being very high in comparison to other countries. These part-time jobs do not appear to be involuntary, however: in surveys, women often answer that part-time work is a deliberate choice.

The past decades female labour supply has grown strongly. Due to emancipation and individualisation trends, labour force participation of women is expected to grow further as the cohorts with low participation rates 'retire' (see chapter 4). Changes to the tax system or the subsidisation of childcare can contribute in a modest way to female participation growth.

Tax system

Under the current tax system the tax-free allowance of married women may be transferred to the husband. In 2001 — as part of the revision of the tax system — the tax-free allowance will be transformed into a refundable tax credit. This will prevent women who are married to high-income-earning husbands from being confronted with high marginal tax rates when starting to work.

The government could further increase female participation growth by abolishing the tax credit for partners without incomes (see Gelauff and Graafland 1994). If the tax credit would be dependent on income, then non-working partners would have a greater incentive to start working as a consequence of lower marginal rates. The government had an opportunity to do so but decided against it, since the measure would have caused many single-income households to be confronted with substantial setbacks in income.

Besides the tax credit there are other programmes that facilitate sole-breadwinner-households and discourage female participation (see Bekkering *et al.* 1998). Workers, for instance, may receive public health care insurance (the *ZFW*) for their non-working partners at virtually no extra charge. Married persons on disability and unemployment insurance may receive a supplement if household-income is below the minimum wage. This prevents the household having to claim welfare benefits and the partner being confronted with job-seeking requirements. The last measure is only temporary since only persons with partners born before 1972 are eligible.

Childcare

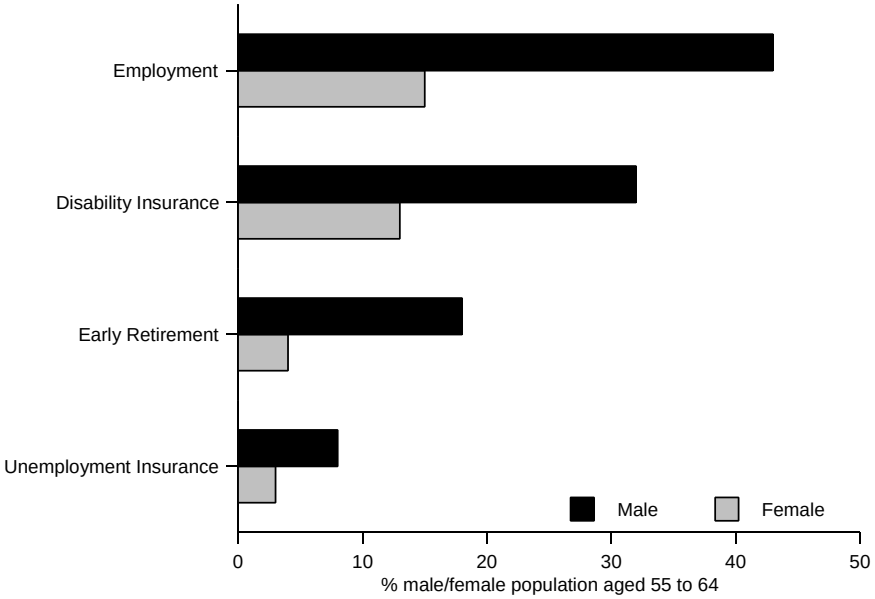
The number of (subsidised) childcare places has grown strongly during the past decade. Although an international comparison is difficult to make, statistics suggest that the availability of childcare is still average at best (see European Commission 1996). Especially the Scandinavian countries possess a large formal childcare sector. This, in combination with high participation rates of women in those countries, has led many to conclude that subsidising childcare increases participation. Of course, causality might to some extent be the other way around: high participation rates cause high demand for childcare.

A well functioning market for childcare is important for continued female participation growth, so as not to make impossible the participation of women by the absence of suitable care. High taxes on labour might justify the subsidisation of childcare on efficiency grounds. Subsidised childcare increases the reward of work for women with children, thereby compensating the discouraging effect of high marginal tax rates, but it will also introduce new distortions (see Rosen 1997). Research indicates that subsidising childcare might be an effective way to stimulate female participation: the budgetary benefits of higher tax revenues might even exceed the budgetary costs (Graafland 1999). The effect on participation will be small, however.

7.2 Older persons

Labour force participation of older persons ranks very low internationally: in 1999, the participation rate of persons aged 55 to 64 in the Netherlands was 5%-points below the EU average. This low participation rate is largely caused by the attractiveness of disability insurance, early retirement programmes and unemployment insurance as exit routes out of employment (see figure 7.2). Although the total number of older males on social security benefits is bound to be higher than in most countries, a more detailed comparison is difficult to make due to large institutional differences between countries. Participation of persons aged 55 to 64 may be low, but participation past the age of sixty-five is even lower: only 4% of persons aged 65 to 69 are still working.

Figure 7.2 Participation and non-participation of men and women aged 55 to 64 in 1998



Disability insurance

Disability insurance is the prime exit route for older workers: nearly one third of men aged 55 to 64 received disability benefits in 1998. The high use of disability insurance is not restricted to older workers, but is widespread (see box called ‘Dutch sickness’). Reasons for the high use among elderly are internationally high benefit levels, broad coverage and consequently considerable moral hazard problems:

Dutch sickness

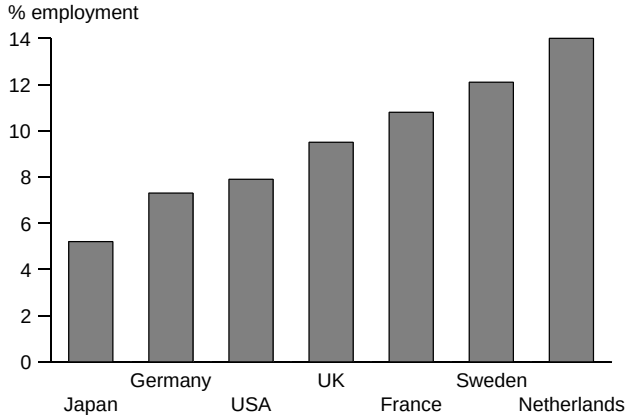
The Netherlands is renowned for its large number of people on disability benefits (see figure below). This not only manifests itself in a high use of older workers, but also in an above-average inflow of women and low-skilled persons.

A reason for the widespread use of disability insurance is that no distinction is made between 'risque social' and 'risque professionel'. Other countries often know much stricter conditions for the risque social programmes: lower benefit levels, a higher minimum degree of disability and eligibility depending on employment history. The more generous risque professionel schemes have strict rules concerning the kind of disabilities that are admissible.

Various policies have been implemented during the past decade to curb the number of disabled. Most drastic was the measure taken in the early 90s that tightened admission criteria and cut benefits. Although the benefit cuts were mostly repaired in collective labour agreements, this resulted in a substantial reduction of disability rates. Also financial responsibility for sickness and disability insurance was assigned to individual employers to prevent them from dismissing redundant workers into disability.

These measures haven't ended the discussion: since 1997 the number of disabled has been on the rise again, bringing disability back to the top of the political agenda. Recently, the government instated a commission to find a solution for the Dutch sickness.....

Persons on disability in some countries in 1997 (in fte's)



Source: Arents et al. (2000)

– Fully disabled persons over 58 upon entry are entitled to 70% of final wage until retirement. Statutorily, younger entrants fall back to a benefit level depending on the minimum wage after some time, since the government cut benefit levels in the early nineties. Those cuts were for the most part reinstated in collective labour agreements, however. Benefit levels are high relative to other countries (see Blöndal and Scarpetta 1998).
– No distinction in coverage is made between work-related (*risque professionel*) injuries and disabilities that originated outside work (*risque social*). In other countries, programmes covering the *risque social* not only often have lower benefit levels but also know much stricter admission criteria. They only cover relatively large drops in income due to illness, ranging from 25% in Sweden to 100% in Germany, Italy, the UK and the US compared to a threshold of 15% in the Netherlands. Furthermore, eligibility under foreign *risque social* schemes depends on the duration of employment, ranging from six months in Belgium to up to five years in Germany and Italy.
– Disabilities are, in practice, hard to diagnose. Therefore, medical examinations do not play a prominent role in the admission process. Instead, medical complaints are judged on consistency (CTSV 2000). Not only is identifying the truly disabled difficult, but also considerable discretion is left to medical examiners. Estimates of hidden unemployment in the disability scheme indicate that moral hazard constitutes a considerable problem (Hassink *et al.* 1997). Although other countries probably encounter similar problems in establishing disabilities, moral hazard will be less of a problem since disability schemes are often less generous. The more generous *risque professionel* programmes know strict limitations as to the disabilities recognised.

By reducing benefit levels or narrowing down the scheme, the government can reduce the inflow in disability and increase labour force participation. Such policies generally have a price tag, however. People will lose coverage to disability risk, which they might not be able to insure privately, or only by paying higher premiums.

Early retirement schemes

Early retirement programmes expanded enormously in the eighties. By distributing labour from old to young people the government, employers and unions wanted to tackle the serious unemployment problem, especially among the younger people at the time. Early retirement schemes are not mandated by the government, but negotiated by employer organisations and unions in collective labour agreements. Two-thirds of all Dutch employees work for a company that has some form of early retirement programme.

Under most programmes, workers are not confronted with the cost of their retirement decision, since (1) benefit levels are to a large extent the same regardless of the number of years the worker made contributions to the early retirement fund, and (2) retiring early doesn't affect the accrual of future pension rights. The schemes are not actuarially

fair: by working another year a worker foregoes one year of generous benefits — on average 80% of final gross wage — and has to make one more year of contributions to the pension fund without being compensated for these costs in terms of higher future pensions. This results in implicit tax rates on labour of as much as 90% (see Kapteyn and de Vos 1997). No wonder 80% of workers reaching the minimum retirement age — often at the age of sixty — seize the opportunity to quit working (Lindeboom 1996).

Although early retirement schemes are negotiated by organisations of employers and employees in collective labour agreements, the government plays a role by extending collective agreements, making them legally binding for the entire industry. The government also implicitly promotes the use of these schemes through the tax system: contributions to early retirement funds are tax-deductible, early retirement benefits are taxed. This amounts to an implicit subsidy, since premiums are deducted at marginal rates, while benefits are taxed at lower average rates.

Step by step early retirement schemes are being transformed into more actuarially fair programmes for flexible retirement. Although already 70% of workers are covered by agreements on flexible retirement, these agreements are in many cases no more than declarations of mutual intent to reform existing schemes. Less provisional agreements often embody transition periods, starting off with gradually raising the minimum retirement age (Arbeidsinspectie 1999).

Actuarially fair programmes will confront workers with the costs, thereby inducing a postponement of retirement and an increase in participation. Surveys indicate that few workers are willing to keep working until the age of sixty-five. Workers with a high preference to retire at a relatively early age and who are willing and able to pay the ensuing costs can do so. This has a negative influence on participation, but won't come at a cost to society. Since the costs aren't shifted onto the collective pool, labour supply isn't discouraged by higher premiums. Even in case of fully actuarially fair programmes, incentives to exit the labour force prematurely will continue to exist as a consequence of, for example, the discouraging effect of high marginal tax rates. Such distortions could be compensated by the introduction of flexible retirement arrangements that are more than actuarially fair, i.e. the present value of pension income increasing with the retirement age.

The use of flexible retirement arrangements also depends on benefit levels and the age at which these levels can be achieved. Under the new programmes for flexible retirement lower benefit levels (on average just over 70% of finale gross wage) are achieved at a higher age (on average at the age of 61). A further increase in the standard age and/or a decline in standard benefit levels can induce a further postponement of retirement. This will come at a cost to those who prefer to retire at an earlier age with higher pension levels. They will have to make private arrangements to save for supplements. Rising incomes in the coming decades will probably result in a decline of the desired age of retirement, while increasing life expectancy — provided it concerns

extra years to be spent in good health — will lead to higher preferred working life to save for the extra free time.

Unemployment insurance

Unemployment insurance is the least popular exit route for older workers. This doesn't mean it is an unattractive programme. Older workers receive benefits often amounting to 100% of their final wage and are exempt from job-seeking requirements, while employers face few disincentives to dismiss older workers into unemployment insurance:

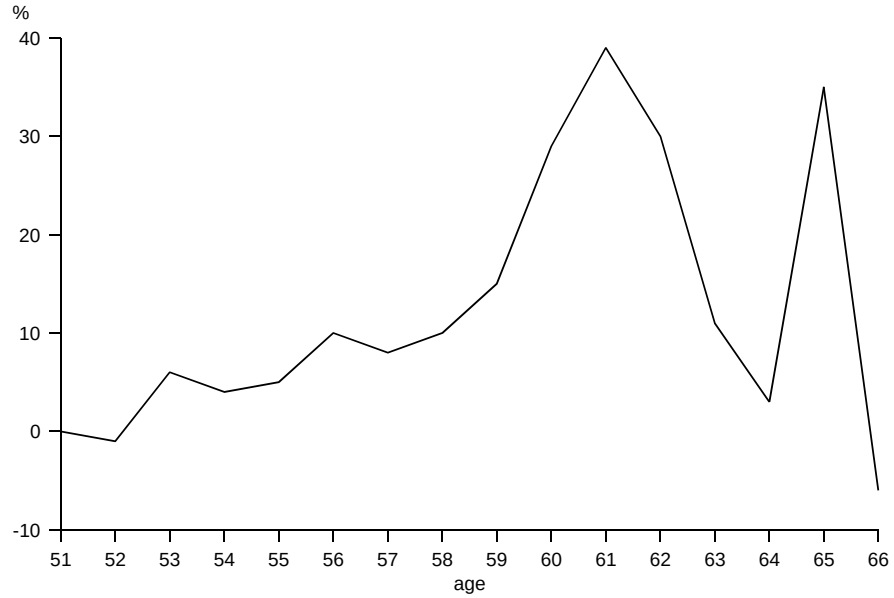
- Most persons getting unemployed after the age of 57½ years can claim unemployment insurance until the age of sixty-five, without having to resort to welfare. Benefits amount to 70% of final wage for a maximum of five years — depending on employment history — followed by 70% of the minimum wage. Many employers offer generous supplements to redundant older workers, however — often as much as a hundred percent of final wage.
- Like in many other countries, unemployed persons over the age of 57½ years are exempt from actively seeking employment. Influenced by tight labour market conditions, the government is considering lifting the job-seeking exemption, but it wants to establish first whether such older unemployed persons have a real chance of finding work. Recently, the government did reintroduce the obligation to accept a suitable job offer.
- From the point of view of the employer, there are few disincentives to dismiss older workers into unemployment insurance, since premiums paid by individual employers are independent of the number of dismissals. The introduction of risk-dependent premiums would reduce these incentives, but higher firing costs would also put a strain on employers hiring people.[1] The government intends to introduce an obligation for firms that dismiss workers older than 57½ years of age into unemployment insurance to cover 25% of benefit payments.

Statutory retirement age

Very few people work after they have reached the age of sixty-five, the age at which people begin to receive public pensions (the statutory retirement age). For the most part, this is caused by workers exiting the labour market prior to the statutory retirement age: only 7½% of persons aged sixty-four are still working. Still, a peak in outflow rates shows that the public pension age has a large impact on the decision to retire (see figure 7.3).

[1] See Besseling *et al.* (1998) for a more elaborate discussion on premium differentiation in unemployment insurance.

Figure 7.3 Outflow rate out of labour force for men, 1998 [a]



[a] Actually, the net outflow rate calculated as the percentage decline of the participation rate. The negative outflow rate at the age of sixty-six is caused by a small increase (in absolute terms) of the participation rate.

Two institutional arrangements are responsible for the peak in the outflow rate:
– Everybody reaching the age of sixty-five is entitled to public pension payments independent of one's employment record, which exerts a negative influence on participation through the income effect. On top of that, many people have built up supplementary pensions during their working life.
– It is often not possible for employees who want to keep working after the age of sixty-five to do so. The reason is that under many collective labour agreements labour contracts are automatically terminated at the age of 65. Few employers offer extensions, possibly as a consequence of the high costs of employing older persons.

Participation is not discouraged by reduction or suspension of public and supplementary pension payments. Unlike the situation in many other countries, pensions in the Netherlands are not means-tested, nor are direct restrictions on work imposed.

Raising the statutory retirement age may stimulate participation by postponing public pensions through the income effect, and by enabling employees to continue working. Given the low participation of persons aged sixty-four at the moment, no large participation gains should be expected. Raising the statutory retirement age would be

more effective if disability insurance and early retirement schemes were reformed simultaneously (see also Blöndal and Scarpetta 1998).

7.3 Low-skilled persons

Labour force participation of persons with low skills is low compared to that in other countries: in 1998, participation ranked around the EU average. This low participation is especially unwelcome, since many non-participants receive collective benefits such as welfare and unemployment insurance.

Many low-skilled persons on unemployment benefits are not formally registered as being part of the labour force. They either do not want to work, or they are not actively seeking work. It is often hardly profitable to accept a job (the 'poverty trap'). The difference between net income working and net income staying on unemployment benefits is simply too small, and sometimes even negative. The high replacement rates are caused not only by high benefit levels, but also by various special programmes for low-income groups, such as housing subsidies, remittance of local taxes and benefits to cover school-expenses of children that are lost when income increases.

One solution would be to cut down on benefit levels and/or special programmes. This would, however, increase income inequality. An alternative would be to make work more profitable by means of a general or specific tax credit for working people. A specific tax credit — targeted at people with low earnings — is most effective in getting low-skilled out of unemployment benefits, but raises marginal tax rates in the phase-out range. Higher marginal tax rates reduce the incentives for training, and thereby the quality of labour supply. In 2001, the government will introduce a general tax credit — being the same for all workers — for working people. A general tax credit is less effective — being more costly — in reducing the replacement rate of the low-skilled, but doesn't affect marginal tax rates. Both general- and specific tax credits do not pay for themselves: the costs exceed the benefits of lower social security expenditures and higher revenues out of taxation (see van Oers *et al.* 1999).

Despite the small rewards of going to work, many persons on unemployment benefits still have an obligation to actively seek work. This obligation is not strictly upheld in practice. Social security agencies already have a wide variety of sanctions at their disposal, but these sanctions are not very frequently imposed. Recent research indicates that the use — or even a credible threat — of sanctions might make the use of active labour market policies — like training or work experience — more effective (CPB 2000). An argument for using moderation when applying sanctions might be that it is hard to discriminate between persons that are not willing and persons that are not able to find work.

7.4 A number of policies and their effect on sustainability

The previous sections presented some policy options to raise labour force participation of especially women, older persons and people with low skills. This subsection illustrates the effect on the sustainability of current budgetary policies for the following measures: more childcare subsidies, stricter eligibility criteria for disability insurance, a tightening of exit routes for older workers, and a higher tax credit for working people. The results are summarised in table 7.1.

Table 7.1 Effects of measures

measure	Effect on required adjustment	Effect on net lifetime benefit					
		future generations	newly born	20-year olds	40-year olds	60-year olds	80-year olds
	%GDP	*thousands of euros*					
Increasing subsidised childcare by 225 million euros	– 0.03	0.2	– 0.4	– 0.6	0.1	0.1	0
Restricting inflow into disability schemes by 22½%	– 0.6	7	– 5	– 7	– 5	0	0
Raising effective retirement by curbing use of exit routes	– 0.5	7	– 5	– 6	– 4	0	0
Raising tax credit for working people by 1% GDP	0.5	– 5	4	5	3	0	0

Increase in subsidised childcare

Subsidising childcare can increase female labour supply. We assume that the government expands subsidised childcare by about forty thousand places. This will eventually lead to a rise in the female participation rate of a ½%-point, or a rise in overall participation of a ¼%-point. Due to the subsidy, government expenditures will rise by 225 million euros, but higher tax revenues will more than make up for that.[2] However, the net effect is small. On balance, the required adjustment decreases by 0.03% of GDP. When judging the merits of such a measure, it should be taken into account that net incomes in the private sector will also increase. The social benefits of this measure might therefore be higher than can be measured by this small decrease of the required tax adjustment.

[2] This corresponds with the economic effects found in J.J. Graafland (1999).

Restricting eligibility for disability benefits

By lowering the inflow into disability insurance, the government can increase labour force participation, especially of older persons. It is assumed that the tightening admission criteria will reduce inflow rates by 22½%. This will curtail growth and stabilise the number of disability claimants at around one million, implying a reduction of around 200 thousand relative to the baseline.

Labour force participation will eventually rise by ¾%- to 1%-point. But the reduced attractiveness will also result in substantial substitution of disability insurance by unemployment benefits (20%), early retirement programmes (10%) and non-participation without social security benefits (10%). Due to the high share of the partially disabled, it is assumed that 20% already participated on the labour market.

The reduction in disability claimants yields a double dividend: higher tax revenues due to increased participation and lower social security expenditures. It turns out that the combination of these two effects improves our measure of sustainability by 0.6% of GDP, implying an (almost) sustainable system.

Higher effective retirement age

The age at which older workers retire depends crucially on the attractiveness of exit routes like disability insurance, early retirement programmes and unemployment insurance. In this variant, it is assumed that policies are implemented that curb the use of these schemes and raise the effective retirement age by one year. As a result, the number of persons on social security benefits is around 160 thousand lower, and those on early retirement 65 thousand, implying a total effect on participation of 225 thousand. The higher effective retirement age corresponds with a rise in the participation rate of 1¾%-points in 2050. As a result of these measures, the required tax adjustment is reduced to 0.2% of GDP, which implies a total effect of 0.5% of GDP.

Higher tax credit for working people

By raising the tax credit for working people, the government can increase participation of especially low-skilled persons. The higher tax credit lowers the net replacement rate, making it more attractive for people on unemployment benefits to start working.

We assume that the general tax credit for working people is increased by an amount equivalent to 1% of GDP.[3] The tax cut partly finances itself because of higher tax revenues due to increased participation. Participation eventually rises by about 150 thousand persons (125 thousand in full-time equivalents), corresponding with a rise in the participation rate of 1½%-point. This beneficial effect is somewhat mitigated by a lower real wage rate. The number of people on unemployment benefits declines by about 80 thousand persons (70 thousand in full-time equivalents), thereby reducing

[3] The economic effects of the measure are taken from F.M. van Oers *et al.* (1999).

social security expenditures. On the other side, expenditures that are not attributable to beneficiaries increase by roughly the same amount through their linkage with GDP.

The required indirect tax adjustment rises from the baseline outcome of 0.7% of GDP to 1.2%. This increase of 0.5% is less than the initial impact of the tax cut of 1.0%, suggesting a beneficial effect of the measure of 0.5% of GDP. However, this might be a too-favourable interpretation of its effect, as the larger indirect tax adjustment that is now required for sustainability will bring about efficiency losses.

Chapter 8 Does ageing affect pensions?

The general belief is that pension schemes in countries like France, Germany or Italy, which rely on PAYG financing, are extremely vulnerable to ageing. Countries like the Netherlands and the United Kingdom, where most pensions are funded, are thought to be less vulnerable. This chapter explores how pensions are affected by ageing. It is demonstrated that one aspect of ageing, the increase in life expectancy, is of particular importance for funded pensions. Ageing also affects the possibilities of absorbing unexpected shocks. The chapter concludes with a summary of the policy options that funded pensions might employ to mitigate the effects of ageing.

The pension system in the Netherlands consists of the well-known three pillars. The public pension comprises the first pillar. This is a PAYG-financed lump-sum benefit that is linked to the minimum wage. The second pillar includes the occupational pensions. These are organised by employers and employees on the firm- or sectoral level. The role of the government in the second pillar is confined to providing a fiscal and legal framework for the occupational pensions. The third pillar is comprised of strictly individual retirement provisions. Both the second and third pillars are funded. The share in retirement income of the three pillars differs substantially. The first pillar accounts for 50% of retirement income, the second pillar accounts for 40%, whereas the third pillar only accounts for the remaining 10% (Besseling (1997)).

It is generally believed that pension schemes in countries like France, Germany or Italy, which rely on PAYG financing, are extremely vulnerable to ageing. Countries like the Netherlands and the United Kingdom, where most pensions are funded, are believed to be less vulnerable. Because these pensions are funded, the capital needed to pay the pensions is already there or is being saved for. Thus, unlike in PAYG schemes, the pensions of the retired persons are not paid by the workers. Because ageing decreases the number of workers relative to the number of retirees, PAYG pensions become increasingly costly. Funded pensions would not have this problem. Yet, is this correct? Is it true that countries with funded pension schemes do not need to worry about the upcoming demographic developments?

This chapter looks at two channels through which ageing affects funded pensions. The first channel is one of the sources of ageing: the increase in life expectancy. The next section explores this channel. The effect of ageing on the possibilities of absorbing unexpected shocks to a pension fund constitutes the second channel, which is the topic of section 8.2. Section 8.3 provides policy options to mitigate the negative effects of ageing. The final section contains a detailed numerical analysis of one policy option, *i.e.* a rise in the statutory retirement age for the public pension.

8.1 Increasing life-expectancy

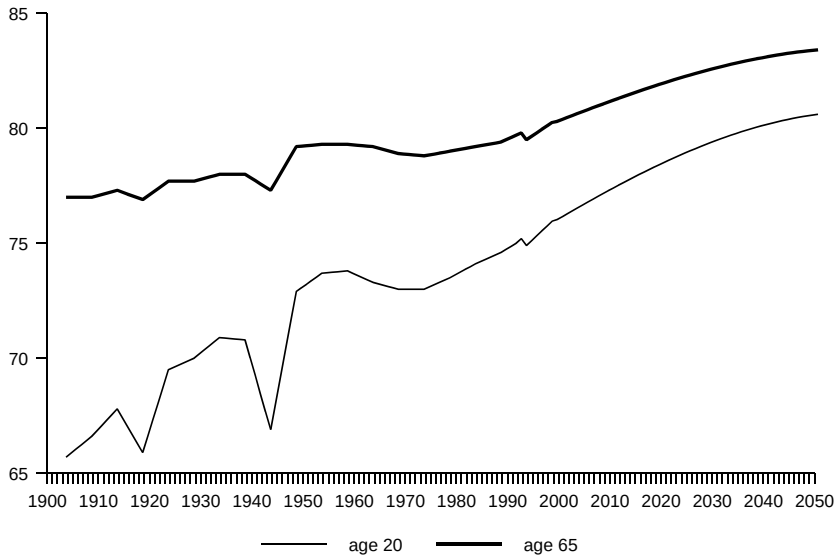
Chapter 2 showed that two demographic developments account for the ageing of the population: the increase in life expectancy and the decline in fertility rates. The most direct impact of ageing on funded pensions stems from the increase of life expectancy: with people living longer, also funded pensions become more expensive. In order to gauge more precisely the impact on pension costs, one has to analyse in more detail the drop in mortality rates accounting for the increase in life expectancy. On the one hand, a drop in the mortality rates of the elderly raises the number of years that will be spent in retirement, and thus unequivocally raises pension costs. On the other hand, a drop in infant mortality rates has no impact at all. For calculating pension contribution rates, only the mortality rates of those participating in the schemes are needed, and entry ages usually range from 20 to 25. A drop in the mortality rates for the middle-aged does raise the required pension contribution rates, but only modestly. The probability of reaching the retirement age becomes higher, raising not only the costs, but also the number of contributing years as well, mitigating the required increase of the contribution rate. Thus, it is important to know which mortality rates actually fall. Therefore, figures 8.3 and 8.4 show the remaining life expectancy for both the 20-year olds and the 65-year olds.[1]

Figures 8.1 and 8.2 clearly reveal a steep increase in life expectancy, *i.e.* a pronounced drop in mortality rates, for older women in the Netherlands during the previous five decades. The costs of pensions have gone up, particularly for women. If the assumptions made by Statistics Netherlands come true, then the costs of pensions will rise further—particularly for men.

Equally important for the financing of funded pensions is the question whether a future increase in life expectancy is anticipated or not. An anticipated increase will, *ceteris paribus*, raise the standard contribution rate. An unanticipated increase confronts the pension fund with a loss. This loss will usually be met by a surcharge on the standard contribution rate for the active members (for a Defined-Benefit scheme), or by a lower pension for the retired (for a Defined-Contribution scheme) (see box on Dutch funded pensions for an explanation of these terms). In order to prevent such an outcome, the funds' actuaries regularly review the life tables used both to calculate the standard contribution rates and the present value of the accumulated pension rights on the balance sheet. Once the actuary decides to put forward a new set of life tables, usually implying a higher life expectancy, the board of directors of the fund is confronted with a financial

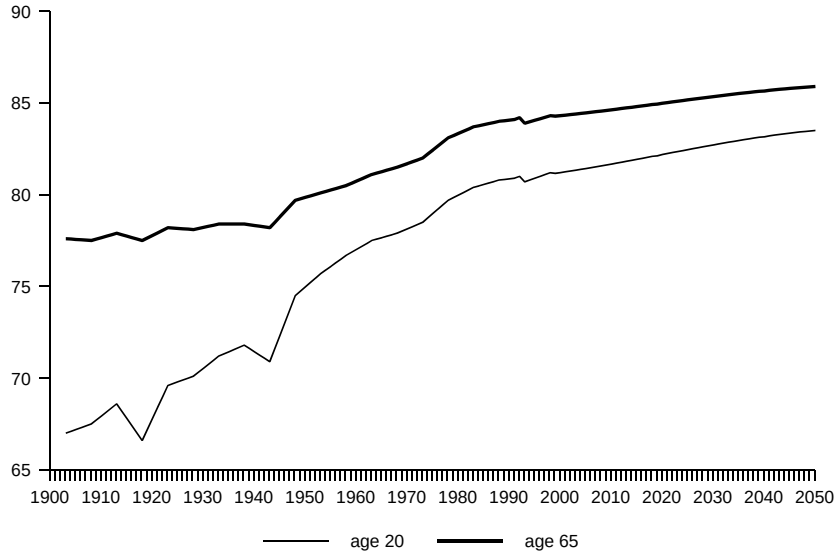
[1] Note that these life expectancies are based on the mortality tables of the year involved. For example, the life expectancy of a 20-year old in 1930 is derived from the mortality rates in 1930.

Figure 8.1 Life expectancy of men at ages 20 and 65



source: Statistics Netherlands

Figure 8.2 Life expectancy of women at ages 20 and 65



source: Statistics Netherlands

Dutch funded pensions

There are two types of funded pensions: Defined-Contribution (DC) schemes and Defined-Benefit (DB) schemes. Within DC schemes, individual pensions are directly related to individual contributions plus investment income. The resulting pension is not fixed in advance, but depends on the accumulated capital on the date of retirement. DB schemes can be considered a mixture of PAYG and DC schemes. Pensions are based on salary levels preceding retirement. Accumulated individual contributions do not necessarily match the discounted value of future pensions. If accumulated contributions fall short, the pension fund levies a surcharge on the contribution of the active members of the fund to finance the unfunded part of the pension. This shortfall may be caused by e.g. unanticipated low rates of return or wage increases that are higher than expected.

The occupational pension schemes in the Netherlands are mainly DB schemes. More than 90% of the active members participate in a DB scheme. Only 1% participate in DC schemes. In addition, some pension schemes offer a combination of DB- and DC schemes. The DB schemes offer mostly pensions based on final salaries. Table 8.1 gives an overview of different types of pension schemes.

Table 8.1 Types of occupational pension schemes (1999)

	Number of funds	Number of active members	Number of passive members	Number of retirees	Balance total
Total (absolute)	947	4.842[a]	5.888[a]	1.869[a]	342.809[b]
% of total					
DB based on:					
final wage	61.2	59.5	43.0	65.5	68.7
average wage	16.0	31.5	51.0	25.5	18.1
other	4.5	1.6	1.8	1.4	3.4
DC	3.5	0.2	0.1	0.1	0.2
Combinations of DB and DC	7.3	6.2	4.2	7.4	9.4
Other	7.5	1.0	0.1	0.1	0.1

[a] million people
[b] million Euro
Source: Verzekeringskamer 2000

problem. The more traditional solution in DB-schemes has been to raise the standard contributions rates, and in order to address the newly created deficit on the balance sheet, impose a surcharge on the standard contribution rates as well.

Would it not be more appropriate to have the increase in life expectancy be accompanied by an increase in the regular retirement age? This would prevent, or at least mitigate, the increase in pension costs. As it is now, such a decision has to be in line with the preferences of the participants in the fund. But in the past, every increase in life expectancy has been devoted automatically to post-retirement leisure. Note that the statutory retirement age in the public pension schemes, preceding the current public pension scheme, that were introduced in the beginning of the previous century already was 65 years. Today it still is 65 years, despite the large increase in life expectancy in the past hundred years (*cf.* Chapter 2). Moreover, with the recent introduction of flexible retirement schemes, the regular retirement age has even been lowered in a number of occupational pension schemes. If pension funds would indeed have an increase in life expectancy followed by an increase, to some extent, of the regular retirement age, then one could label this as a situation in which the regular retirement age is effectively indexed to life expectancy.

8.2 Increasing vulnerability to shocks

It is obvious, and also well-known, that PAYG schemes are extremely vulnerable to ageing. In PAYG schemes, pensions of current retirees are funded by contributions of current workers. Because ageing decreases the number of workers relative to the number retirees, it is clear that contributions will have to increase if PAYG-pensions levels have to be maintained.

The decline in the number of workers relative to the number of retirees also has consequences for Defined-Benefit (DB) schemes. DB schemes contribute to intergenerational risk-sharing, since they guarantee a particular path of income to the retired (*cf.* Chapter 3). In case of an unanticipated shock, DB schemes may impose a surcharge on the contribution rates of the active members of the scheme to meet a deficit on the balance sheet. The level of the surcharge in a DB scheme depends on the leverage within the pension fund. Leverage is usually defined as the ratio of present value of accumulated pension rights to total wages. Because pension funds must be able to honour accumulated pension rights at each point in time, assets must equal the present value of accumulated pension rights (apart from financial buffers). Total wages constitute the base for contribution rates and surcharges. Hence, leverage is high if there are many retirees or older workers, which already have accumulated substantial pension rights, relative to the wage sum of the active members of the pension fund.

If there are relatively many young, active members, the surcharge can be low (in case of a negative shock). If, however, there are relatively few younger active members, then surcharge will be higher. Because surcharges cannot be imposed without limit, the relative number of active members determines the possibilities to absorb unanticipated shocks, and therefore limits the degree of intergenerational risk-sharing.

Thus, besides the impact due to a rising life expectancy, there is the additional risk of ageing for DB schemes: ageing reduces the possibilities to absorb unanticipated shocks. DB schemes are therefore more vulnerable to ageing than Defined-Contribution (DC) schemes. Note that it is the ageing of the members of the pension fund that is most relevant here, and not the ageing of the whole population. Funds operating in firms or sectors with relatively many young, active members are less vulnerable to ageing than funds in firms or sectors with relatively few young, active members.

How can the consequences of an increase in leverage be met? The policy option to raise the retirement age, mentioned in the previous section to deal with the increase in life expectancy, has favourable effects on leverage as well. Because of this, the number of active members will rise relative to the number of retirees. This increases the contribution base, which will improve the possibilities to absorb unexpected shocks.

Other options try to decrease the likelihood of a surcharge. First, one could make pension funds less vulnerable to risks. For example, by shifting to a DC scheme, a fund may shift some risks (like low rates of return) from the fund to individual members (both active and retired). Another possibility is to increase financial buffers. Since this implies higher contribution rates now, part of a possible future surcharge is funded by current active members instead of the future active members. Therefore, this implies an intergenerational transfer from current to future generations of active members. This transfer compensates for welfare losses due to greater risks of future generations. A further possibility to mitigate dependency on surcharges is adapting the asset and liability structure to the ageing of the pension fund according to modern Asset-Liability Management (ALM) techniques (see *e.g.* Frijns 1995). The appendix provides a stylised illustration of how pension funds can mitigate the effect of ageing by reallocating their portfolios.

8.3 Policy options

Ageing affects both the first pillar PAYG public pension as well as the second pillar funded occupational pensions. To mitigate the effect on PAYG public pensions, several policy options can be mentioned. One that is illustrated numerically in the next section is to raise the statutory retirement age of the public pension. Other options that are not worked out in this study include lowering the benefit level or introducing means-tested benefits.

We have distinguished two effects of ageing on funded pensions. First, for DB- and DC schemes, is an increase in costs because of an increase in life expectancy. Second, for DB schemes, is a limitation of the possibilities to absorb shocks because of an increase in leverage. The following policy options for funded pensions were mentioned.

Policy options to meet increasing life expectancy:
- make retirement age conditional on life expectancy

Within current (second-pillar) pension schemes, pension funds, with the active members, fully bear the risk of an increase in life expectancy. However, since people not only live longer but also live longer in good health, one could argue that the retirement age of the pension schemes should increase in proportion with life expectancy. In this way, the pension funds and the retirees share the risk of an increase in life expectancy.

Policy options to meet increasing leverage:
- make retirement age conditional on life expectancy

Besides mitigating the effects of an increase in life expectancy, a higher retirement age also decreases the leverage of a pension fund by increasing the base for surcharges.
- shift from Defined Benefit to Defined Contribution

By shifting to individual defined-contribution pensions, part of the risks are shifted from the pension fund to the individual. If pension funds face fewer risks, then fewer surcharges are necessary.
- adapt the asset and liability structure

By taking account of ageing in ALM studies, pension funds try to minimise the risks of ageing through portfolio choices, etc.
- increase buffers

Gradually increasing financial buffers before ageing reaches its peak makes it possible not only to absorb shocks on the peak of ageing, but also to spread the possible burden of aging over time and therefore over more generations.

8.4 A rise in the statutory retirement age for public pensions

This section explores a rise of the statutory retirement age for public pensions, which is currently 65 years of age in the Netherlands. Due to the transitional problems involved, we will assume that this policy is implemented stepwise. Beginning in 2001, the age for eligibility is increased each year by a month until it reaches the age of 67 years in 2024.

The rise of the statutory retirement age results in a loss of income over a period spanning two years from 2024 onwards — in the ages of 65 and 66 — and this requires that assumptions will have to be made about the way this loss of income is absorbed.

The most important assumption concerns the response of the pension funds. Due to

the uncertainty involved in this response, we will explore two variants that might be considered as polar cases. This enables us to determine the contours of the effect of this policy.

In the first of these variants, the loss of income from public pensions is fully compensated by increasing private supplementary pensions. This obviously calls for higher pension contributions. We assume that these are raised each year in accordance with the increased need for pension-fund asset formation. The other sources of private income, such as income from early retirement schemes and third-pillar pensions, remain unchanged in this variant. The same applies to incomes from disability benefits and from unemployment benefits. Accordingly, those who are on these schemes at the age of 64 are also assumed to make the transition into private supplementary pension income at the age of 65. This is possible because most of the people on these schemes have built up pension rights in the period in which they participated in the labour force, and many of those who receive disability benefits continue to do so, due to favourable pension fund arrangements. In contrast, the transition into private pensions at the age of 65 is not assumed for those who are on social assistance and survivor benefits because many of the people who are on these schemes have not worked in the past and did not build up rights on supplementary pension income. In order to maintain a public safety net, we assume that the eligibility for social assistance is prolonged and 'follows' the rise in the age for eligibility for the public pensions.

In the second variant, the other extreme, pension funds provide no compensation at all. Moreover, they even raise the eligibility age of receiving private sector pension income along with the age for receiving public pensions. This variant allows for lower pension contributions. As in the first variant, we assume that contributions are adjusted in accordance with the gradually increasing private sector retirement age. The gap in pension income (public and supplementary) in this variant is 'filled' by prolonging both private sector incomes and the benefits from the social security arrangements, which are currently terminated at the age of 65. The average age of benefiting from early retirement schemes moves up gradually by two years. Correspondingly, the age of effective retirement for older workers is raised by two years. In this variant, not only social assistance and survivor benefits, but also disability benefits and unemployment benefits, are prolonged in order to fill the gap that is left by the rise in the age of eligibility for pension income. The prolongation of these arrangements also partly offsets the saving for government on public pensions.

Table 8.1 illustrates the effects of the measure in both variants by showing the impact on the government budget for 2040. The second column shows that in the first variant the saving for government on public pensions is partially offset by the lower income taxes that result from the requirement for higher, tax deductible, pension contributions.[2]

[2] The increased spending on social assistance and survivors benefits plays only a minor role.

On balance, this variant benefits future generations at the expense of present generations and reduces the required adjustment of indirect taxes to arrive at sustainability by 0.3% of GDP (see table 8.2). This gain is largely a result of the shift of the need to save from the government to the private pension funds. The other part of the gain is obtained by the high yield we assume on pension fund investment (5.75% in real terms) relative to the yield of 4% on government savings. This higher yield entails that there is also a national gain from this shift, though at the cost of increased risk.

The second variant, raising the private pension retirement age, has many effects. On balance, it benefits future generations by demanding a higher net tax burden from the present generations, and reducing the required adjustment for sustainability by 0.4% of GDP (see the last row of table 8.2). This is not achieved by reducing expenditure because the saving on public pensions is offset by the higher expenditure that results from the prolonged eligibility for disability and unemployment benefits and the higher expenditure on those items that are linked to aggregate economic activity (GDP). The reason for the reduced required adjustment lies in higher tax revenues. Economic activity is higher, due to the increased labour participation of the elderly workers, thereby raising the tax base. The higher age of receiving pensions is also reflected in lower tax revenues from this source, but this is partially counterbalanced by the revenue-increasing effect of the lower pension contributions.

Table 8.1 Effects of raising the statutory retirement age on the budget in 2040

Pension fund response	Compensation of income loss	Raising retirement age
	%GDP	
Effect on primary expenditure	– 0.8	0
– lower public pensions	– 0.8	– 0.8
– leakage to other social security	0	0.4
– from changes in economic activity	0	0.4
Effect on tax revenues	– 0.3	0.6
– from changes in economic activity	0	0.9
– from changes in pension contributions	– 0.3	0.5
– taxes on pension income	0	– 0.8
Effect on primary surplus	0.5	0.6

Table 8.2 summarises the results of the measures discussed in this section.

Table 8.2 Effects of raising the statutory retirement age

measure	Effect on required adjustment	Effect on net lifetime benefit					
		future generations	newly born	20-year olds	40-year olds	60-year olds	80-year olds
	%GDP	*thousands of euros*					
Raising statutory retirement age for public pensions by two years, with pension funds compensating income loss	– 0.3	6	– 1	– 3	– 7	– 1	0
idem, with pension funds also raising retirement age	– 0.4	7	– 4	– 6	– 5	0	0

Appendix: Ageing and vulnerability to unforeseen shocks

One of the effects of ageing on funded pensions was caused by an increase in leverage, *i.e.* the ratio of the accumulated pension rights over the total wage sum. Since the former coincides with the value of pension fund assets (if we abstract from financial buffers), the following expression defines leverage:

$$\text{(1)} \qquad \text{Leverage} \equiv \frac{V}{w \cdot L}$$

with:
V : value of pension funds assets
W : average wage
L : number of active members

Equation (1) clearly shows that ageing indeed increases leverage. Since ageing implies relatively more retirees and more older workers with substantial accumulated pension rights, the value of pension funds assets will be high relative to the wage sum.

Pension funds face a trade-off between risk and return, just the same as any other investor. They want to maximise the rate of return, since this implies lower contributions for the members of the pension fund. At the same time, they want to

minimise the associated risks. These risks manifest themselves in the volatility of the contribution. This leads to the following objective function for the portfolio manager of the pension fund:

$$U \equiv -E(\pi) - \frac{1}{2} \cdot \beta \cdot Var(\pi) \tag{2}$$

where π is the contribution and β reflects the risk aversion of the portfolio manager or the pension fund.

For the sake of simplicity, we assume that there is only one source of risk for pension funds: volatility of the rate of return. Assume that a pension fund has only two types of investment to choose from: risk-free government debt and risky equity. Then, in a zero-growth steady state, the following budget restriction applies:

$$((1-\mu) \cdot \bar{r} + \mu \cdot \tilde{r}) \cdot V + \pi \cdot w \cdot L = \lambda \cdot w \cdot N \tag{3}$$

where:
$\bar{r}$: risk-free interest rate of government debt
$\tilde{r}$: the expected rate of return of equity
λ : target pension level as percentage of wage
N : number of retirees
μ : the percentage of assets invested in equity.

The budget restriction in equation (3) can be rewritten as:

$$\pi = \frac{\lambda \cdot w \cdot N - \bar{r} \cdot V}{w \cdot L} - \frac{\mu \cdot V}{w \cdot L} \cdot \tilde{r} \tag{4}$$

Note that we have assumed only one source of risk: the volatility of the rate of return. Hence, from equation (4) an expression for the variance of π can be derived:

$$Var(\pi) = \mu^2 \cdot \left(\frac{V}{w \cdot L} \right)^2 \cdot Var(\tilde{r}) \tag{5}$$

Thus, equation (5) denotes the relation between the volatility of the contribution ($Var(\pi)$) and the volatility of the rate of return ($Var(\tilde{r})$).
Equation (5) clearly shows that if leverage increases then, *ceteris paribus*, the volatility of the contribution increases as well.

From these expressions we can derive an optimal portfolio choice μ^*. Inserting equations (4) and (5) into the objective function of the portfolio manager, we find that equation (2), yields:

$$(5)\quad U(\mu) = -\left(\frac{\lambda \cdot w \cdot N - \bar{r} \cdot V}{w \cdot L}\right) + \left(\frac{\tilde{r} \cdot V}{w \cdot L}\right) \cdot \mu - \frac{1}{2} \cdot \beta \cdot \left(\frac{V}{w \cdot L}\right)^2 \cdot Var(\tilde{r}) \cdot \mu^2$$

Equation (5) gives the objective function of the portfolio manager as a function of the portfolio choice. Optimisation with respect to μ results in the following portfolio choice:

$$(6)\quad \mu^* = \left(\frac{w \cdot L}{V}\right) \cdot \frac{\tilde{r}}{\beta \cdot Var(\tilde{r})}$$

From equation (6) we immediately see the consequences of ageing, and, thus, of an increase in leverage, for the portfolio of a pension fund. Ageing leads to a decline of μ^* which implies a less risky portfolio choice.

Data from the Dutch pension system used in this study can be used to provide a numerical illustration. Assume that the variance of $\tilde{r}$ and the risk aversion parameter β are constant over time. The following values hold for the variables defining leverage (equation (1) in 2001 and 2030 respectively):

	2001	2030
V (× 1 billion)	984	2595
$w \cdot L$ (× 1 billion)	370	655
Leverage	2.66	3.96

With μ^* equal to 0.40 in 2001, it has to decline to 0.27 in 2030. Thus, in this hypothetical example, if the optimal portfolio of the pension fund consists of 40% equity and 60% government debt in 2001, and it would evaluate this portfolio in 2030, the fund would have to shift the portfolio from 40% equity and 60% government debt to 27% equity and 73% government debt in order to maintain an optimal portfolio.

In reality, of course, pension funds face many other risks as well, and have other instruments to hedge against these risks. One of these risks is the variability of wages. From equation (3) it can be seen that variability of the wages affects both the contribution base as well as the pension level. In addition, wages and rates of return may affect each other (hence the covariance between $\tilde{r}$ and w becomes important). In ALM studies, pension funds try to incorporate all these different risks and instruments.

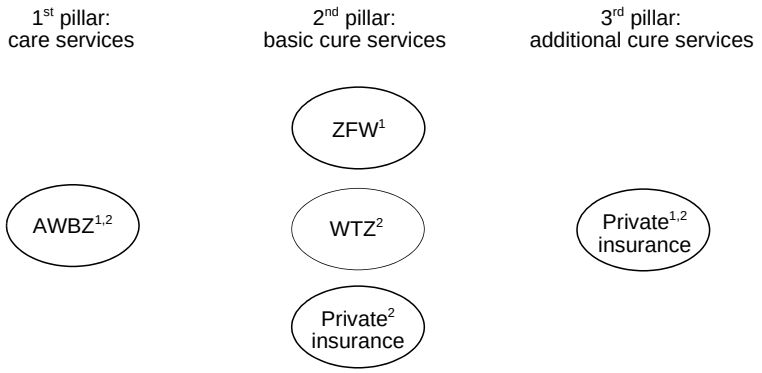
Chapter 9 Reforming healthcare

Shortages for many types of services and long waiting lists in the healthcare sector call for institutional reforms. If these reforms reduce primary public expenditure, they will help to remove the unsustainability of fiscal policies as well. As an illustration, this chapter investigates the effects of two policy options: one that reduces the premiums for public insurance of cure services (the ZFW) and one that reduces the premiums for public insurance of care services (the AWBZ).

The Dutch healthcare scheme aims to combine the efficient delivery of medical services with various forms of solidarity. Obviously, the choices that have been made to date need not be optimal. Indeed, shortages for many types of services and long waiting lists suggest that an institutional reform is necessary. Furthermore, ageing implies a significant increase in healthcare expenditure. Combined with the impact of ongoing income growth and progress in medical technology, medical expenditure is expected to rise much faster than GDP. *Ceteris paribus*, this will significantly increase premium rates, with unfavourable consequences for the functioning of the labour market. As a consequence, institutional reforms in the healthcare sector may not be interesting in themselves, but may also help to reduce the unsustainability of fiscal policies.

To assess the elements of efficiency and solidarity that are incorporated in the Dutch healthcare scheme, we briefly characterise the Dutch health system.

Figure 9.1 The Dutch health insurance system



1 : Administered by sickness funds

2 : Administered by insurance companies

9.1 The Dutch healthcare scheme

Health insurance in the Netherlands is organised with the help of a three-pillar scheme (see Figure 9.1). Globally speaking, these three pillars stand for care services, basic cure services and additional cure services. Care services are insured by a public scheme.[1] Insurance for basic cure services is organised by two public schemes and a variety of private schemes. Insurance for additional cure services is administered by private organisations only (*i.e.* insurance companies and sickness funds).

The three pillars of insurance

The first-pillar public insurance scheme, the AWBZ, covers the whole population. Insurance is obligatory. Premiums are income-dependent and do not differentiate with respect to risk class or insurer. Sickness funds and private insurers act as administrative bodies.

Insurance for second-pillar services is organised by two public schemes and a large number of private schemes. The first public scheme, the ZFW, regulates the insurance for those with labour income below a certain threshold. This ZFW scheme is administered by a large number of independent sickness funds. The ZFW insured pay two types of premiums: a basic premium and a supplementary premium. The basic premium is uniform across sickness funds and is a function of the income of the insured. Supplementary premiums are set by individual sickness funds. These may differ and do differ across sickness funds. However, they do not differentiate with respect to income or with respect to risk. ZFW insurance is obligatory for those who are eligible.

The second public scheme, the WTZ, regulates insurance for those aged 65 and older who do not apply for ZFW insurance. Premiums are uniform for all those covered by the WTZ scheme. Anyone who does not meet the criteria for joining the ZFW scheme or the WTZ scheme must seek insurance on the private market. Premiums for these insurance policies differ across insurers and risk classes.

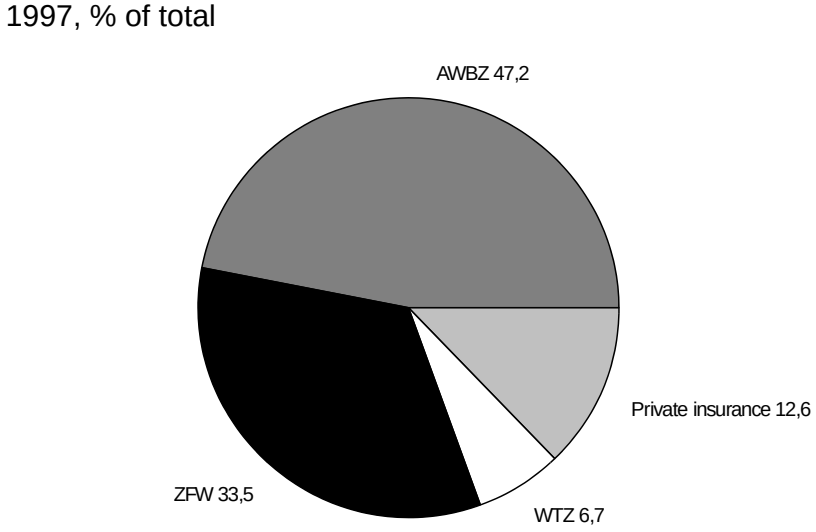
Third-pillar services can only be insured through insurance companies and sickness funds. Premiums for these policies vary, depending on the different insurers and risk classes. They are unrelated to the income of the insured.

Figure 9.2 demonstrates the role of the four types of insurance schemes. The AWBZ scheme covers almost 50 percent of Dutch health expenditure. Private insurance

[1] We define a public insurance scheme as a scheme of which the acceptance conditions are decided upon by the government.

schemes comprise only a small part of the costs of medical consumption. Indeed, about 90 percent of health expenditure is paid through public insurance schemes.[2]

Figure 9.2 Health expenditure in insurance schemes



Co-payment policies

In some cases, the consumers of medical care are faced with co-payments. In the first pillar, most services feature co-payments. Moreover, some of these co-payments are income-dependent. In private insurance contracts, deductibles are common. Contrary to co-payments in the AWBZ scheme, these deductibles are unrelated to the income of the consumers. In addition, the privately insured are free to choose a contract without any deductible. Consumers who are covered by the ZFW scheme and the WTZ scheme are exempted from co-payments.

[2] The figure of 90 percent is higher than that in some other publications. The reason is that the WTZ scheme is often viewed as private insurance. This is because WTZ insurance is administered exclusively by private insurance companies. However, as the conditions for WTZ insurance are comparable to those of AWBZ and ZFW insurance, this study considers WTZ insurance as public insurance.

9.2 Solidarity in the healthcare scheme

The contribution of the Dutch healthcare scheme to risk solidarity is huge. Only the premiums that are levied to finance the expenditure on basic cure services by private insurers and the expenditure on additional cure services differentiate with respect to risk; all other premiums apply to different levels of risk. Next, the ZFW insured are allowed to have also their families insured at zero- or small contribution rates. This adds to solidarity between different household types with different levels of medical risk. Co-payments reduce the level of risk solidarity. Co-payments are used in the AWBZ scheme as well as in the majority of private insurance schemes. The ZFW scheme lacks co-payments, however.

Risk solidarity implies solidarity between different types of risk belonging to the same generations. Risk solidarity contributes to intergenerational solidarity as well, however. Most importantly, since risk generally increases with age (witness the rising age profile of medical expenditure), risk solidarity is equivalent to intergenerational solidarity. Other elements contribute to intergenerational solidarity as well. In particular, the contributions made by the WTZ insured are insufficient to finance their health expenditure. To balance the WTZ budget, the privately insured are required to pay an additional amount on top of their on insurance premiums. This results in redistribution from the young towards the old within the group of people who cannot obtain ZFW insurance.

Furthermore, the healthcare scheme contributes to income solidarity in many ways. Most importantly, as the contributions to the AWBZ scheme and the ZFW scheme are income-dependent, these schemes redistribute from high-income to low-income households. To the extent that the elderly have lower incomes, the elements that imply solidarity between low- and high-income people adds to solidarity between generations.

9.3 Efficiency in the healthcare scheme

Co-payment policies may contribute significantly to the efficiency of the delivery of medical services. Institutions in health insurance may also affect efficiency. In particular, the reimbursement of insurers may incorporate incentives or disincentives to induce insurance companies to pursue managed-care policies. By "managed care" we mean all activities that insurance companies may undertake to influence the provision of healthcare services. This may involve the volume, the quality or the price of healthcare services.

AWBZ and WTZ insurance

How do the Dutch insurance schemes compare in terms of efficiency? The AWBZ scheme and the WTZ scheme are administered by private insurers and sickness funds, which are reimbursed for their expenditure through central government funds.

Premiums, co-payment schedules and the contents of the insurance package are all determined by the government. Next, insurers are obliged to accept each individual who demands insurance and who meets the requirements. Hence, it is no surprise that we see little managed care activity taking place in the markets for AWBZ and WTZ services.

Private insurance

The situation on the markets for private insurance is the opposite in many respects. Private insurers receive no funding from a central scheme, and set their premiums independently. They are allowed to supply different insurance policies that vary in their coverage of medical expenditure or in their use of co-payments. In addition, private insurers are not obliged to accept everyone who wants insurance.

Still, the markets for private insurance are far from competitive. In particular, private insurers are not actively engaged with managed care. A major explanation is that the insurer side of the market has traditionally been quite fragmented, whereas the supplier side has historically been rather well-organised. This has resulted in low bargaining power for insurers. Next, the low degree of market concentration has aggravated the problem of insurers that free-ride on the managed-care activities of other insurance companies. Moreover, the Dutch government has contributed to the absence of managed care through a number of regulations that have made monitoring of providers by insurers more difficult (Schut 1995).

ZFW insurance

The ZFW insurance scheme is in a sense midway between the AWBZ and the WTZ, on the one hand, and the market for private insurance, on the other hand. Insurance companies that administer the ZFW, the sickness funds, obtain central funding. Further, they are not allowed to refuse people who are eligible for ZFW insurance. However, they are only partially reimbursed for their medical expenditure. Indeed, a large part of their financing is in the form of a budget that is unrelated to actual expenditure (*i.e.* at the level of the individual sickness fund). The idea behind budgeting is to put sickness funds at a risk and, by doing so, induce them to pursue managed-care policies. Like private insurers, sickness funds are not actively engaged in managed care. Partly, this is for the same reasons as private insurers. Moreover, budgeting of sickness funds is only imperfect.

9.4 The implications of ageing

As explained in chapter 4 of this study, ageing will increase expenditure on medical goods and services. Unlike other types of government services, healthcare expenditure may even rise faster than GDP. Labour market, income and medical technology considerations were presented to account for additional expenditure growth. Underlying these considerations is that healthcare expenditure is different from other types of public

expenditure. In particular, we assume that societal preferences for medical consumption are such that they warrant that an increasing share of GDP is devoted to healthcare expenditure.

As described above, the Dutch insurance scheme distinguishes between care and cure services. The consumption of care services is covered by the first pillar of the insurance system, the AWBZ scheme; consumption of cure services is covered by the insurance schemes which correspond to the second and third pillar. The projected increase of medical expenditure in terms of GDP applies to the consumption of care services as well as to the consumption of cure services (Westerhout 1999). The role of demographic factors is larger in the case of care services, as the corresponding age profiles are steeper. Cost-increasing progress in medical technology is more important for cure services, however. Moreover, if Baumol effects are taken into consideration (see Chapter 5 of this study), these apply more to the expenditure on care services than to that on cure services. In particular, the scope for boosting labour productivity in the labour-intensive production of care services seems relatively small.

The projection of a significant increase in the share of healthcare expenditure to GDP has far-reaching implications. In particular, if policies are left unchanged, ageing will accentuate the trade-offs between efficiency and solidarity. Through time, ageing will generally increase the price of solidarity and intergenerational equity. If society is unwilling to accept higher efficiency losses in order to achieve higher levels of solidarity, policy reforms will become necessary.

9.5 Policy options

At least four policy options to increase efficiency in the medical sector come to the fore. An obvious policy option is to reduce the coverage of public insurance schemes. By specifying that some services will no longer fall under the AWBZ or ZFW scheme, expenditure under these schemes will be reduced. It may be necessary to take action more than once. Forces like demography and income growth continue to give rise to increasing expenditure on services that are publicly insured. In addition, in the field of pharmaceuticals and medical appliances, new goods and services are introduced almost continuously. Unless the government should stop completely the inclusion of new types of services in public insurance, this trend will add to ongoing expenditure growth.

In recent years, the government excluded several types of services from the public insurance schemes. In particular, homoeopathic pharmaceuticals, dental care for adults (except regular consults) and physiotherapeutic care exceeding nine visits to the physiotherapist were excluded from ZFW and WTZ insurance. Moreover, the government strengthened the rules that new pharmaceutical products have to obey in order to be covered by public insurance. These examples illustrate the lesson from welfare theory that those services should be excluded from public insurance that are

most subject to moral hazard considerations and that add least to the solidarity between sick and healthy persons.

Related to this, one policy option is to introduce co-payments in the ZFW and WTZ scheme. This policy option is much like that of excluding certain types of services from public insurance, albeit that the former is less dramatic. In particular, exclusion implies that consumers should co-pay the full price of the services that are being excluded without any upper limit. Co-payment schemes often require consumers to pay a fraction less than 100 %, whereas they always specify an upper limit, at which point the co-payment rate drops to zero.

Theoretically speaking, it would be reasonable if the ZFW and WTZ schemes introduced co-payments for those services for which co-payments exist under private insurance arrangements. The line that distinguishes the ZFW scheme from private insurance schemes is the income of the insured; the line in-between the WTZ scheme and the private insurance schemes is the age of the insured. According to welfare theory, it is primarily the price elasticity of demand for medical services and the size of the medical risk of these services that should determine whether that type of service should be included in public insurance. The link between these two factors, on the one hand, and the income and the age of the insured, on the other, is weak. One could therefore consider introducing co-payment schemes that are common in private insurance schemes into the two public schemes for basic cure services.

A third policy option would be to weaken the link between public insurance premiums and the income of the insured. This could be done by reducing contribution rates for the public insurance schemes. Insurers would then have to raise the flat premiums that the insured pay directly to the insurers. Obviously, this would come at the price of less income solidarity. In particular, those with low incomes would come to pay larger health insurance premiums. In this, the policy option of shifting towards flat premiums differs from the proposals to reduce the scope for insurance or to increase the role for co payments. In the latter two cases, it is people who are unlucky enough to become ill who suffer from increased co-payments. If the share of flat premiums in the financing of medical care were to be increased, it is low-income households who would suffer from increased health insurance premiums.

A final policy option would be to strengthen elements of managed competition in the health insurance sector. Managed competition refers to the situation in which insurers compete for market shares on the market for health insurance under the condition that they accept anybody who wants to become insured (and who meets standard conditions) at community-rated premiums. The latter type of premiums do not differentiate to risk, so that high-risk consumers pay exactly the same premium as low-risk consumers. The model of managed competition aims to combine the efficient delivery of medical services with risk solidarity among the insured. But, as always, also the model of managed competition is not a free lunch. In particular, more competition combined with

an acceptance obligation inevitably raises the rate of bankruptcies or the variation of health insurance premiums (Douven and Westerhout 2000).

An important difference between the proposal to move towards a model of managed competition and the other three policy options is that the former relies heavily upon the behaviour of players on the market for health insurance — in particular, the health insurance companies. If health insurers respond to the introduction of more competition by investing more in the efficient delivery of medical services, then expenditure on healthcare may drop. However, if health insurers choose to compete on quality, then healthcare expenditure may rise rather than decrease. Moreover, health insurers may also opt to intensify their efforts to select good risks and block bad risks. In that case, costs may go up without improvement in either the quality of or accessibility to medical care. Hence, the effects of the option to move towards a model of managed competition are much less certain than those of the other three policy options.

9.6 Two Policy Scenarios

As an illustration, we present two policy scenarios that reduce public health insurance premiums. The two scenarios both reduce public insurance premiums. The first pertains to the ZFW, the second to the AWBZ. The two scenarios may have different effects because the two components of healthcare have different age profiles — the rise with age of expenditure on cure services is less steep than that of expenditure on care services. In particular, as the age profile of the expenditure on care services is steepest, one may expect current expenditure reductions to have bigger effects in the longer term.

Our first measure is a 10% reduction of the expenditures on the ZFW and involves a cost saving in 2001 of 1.5 bln. euros. The second is a 10% reduction of expenditures on the AWBZ, involving a 1.5 bln. euros lower cost in 2001. Table 9.1 presents the effects of the two policy adjustments.

Table 9.1 Effects of measures

measure	Effect on required adjustment	Effect on net lifetime benefit					
		future generations	newly born	20-year olds	40-year olds	60-year olds	80-year olds
	%GDP	*thousands of euros*					
Curbing cure	– 0.4	5	– 3	– 3	– 3	– 3	– 2
Curbing care	– 0.5	7	– 3	– 3	– 3	– 4	– 7

Table 9.1 demonstrates that the effect of the ZFW measure on our measure of sustainability is largely equal to the initial impact of the measure itself. The required adjustment is lowered by 1.6 bln. euros, or 0.4% of GDP. In case of the AWBZ measure,

the required adjustment is larger, namely 2.1 bln. euros, or 0.5% of GDP, than the impact of the measure in 2001, due to the ageing of the population (which will lead to a sharp rise of AWBZ expenditure). Because indirect taxes will show a far more moderate growth, the initial rise will have to be larger in order to compensate for having the same result in present-value terms.

Chapter 10 Conclusion

10.1 The problem of ageing

Over the coming decades, the ageing of population will lead to a substantial shift between generations. While at present for each older person (65 and older) there are 4.5 persons in the working age of 20 to 65, this number is expected to fall to 3.1 in 2020, and eventually to only 2.3 in 2040. Importantly, this number will stabilise at this low level thereafter. In the Netherlands, the problem is not so much that of a 'baby boom' but rather that of a 'baby bust'. That is, ageing is caused by a structural decline in fertility in the 1960s and 1970s, together with a steady increase in life expectancy. In the eyes of future generations, the population will not be exceptionally 'grey' in the future, but current population happens to be rather 'green'.

Despite the considerable change in demography, the economic consequences of ageing in the Netherlands seem fairly modest, provided that adequate policies are followed. This study focuses on the implications of ageing for the government budget. The central question is whether current fiscal arrangements will be sustainable in the future, when ageing puts an extra burden on the government budget. Starting from the (projected) budget for 2001, we find that the government budget is not sustainable at present. It can be made sustainable by a permanent increase in taxes by 0.7% of GDP. If done in a timely manner, this will generate a time path for the government budget with sustained surpluses in the next decades. As a result, public debt will fall to a level close to zero at the time when ageing peaks in 2040.

More important than the precise measure of unsustainability - which is quite sensitive to the initial conditions - is that a sustainable fiscal policy features a prolonged surplus in the government budget of about 1- 2 % of GDP in the coming decade.

Upon the condition of a sustainable fiscal policy, the impact of ageing on public finances seems relatively mild. This is the result from a number of factors:

- First, the demographic change in the Netherlands is substantial, but not unfavourable if compared with other EU countries. In the Netherlands, the elderly dependency ratio (the number of people aged 65+ as a fraction of people aged 20-64) increases by 21%-points, from 0.22 to 0.43 in 2040, while for the fifteen EU countries on average it rises by 26%-points, from 0.27 to 0.53 in this same period. Outside the EU, dependency ratios rise as well, but are generally more modestly (except Japan) and often later than in the EU, particularly in Eastern Europe and outside the OECD.

- Second, labour market participation is expected to increase by about 1.5 %-point (in full time equivalents) in the next decades, which helps to broaden the tax base in the future. Especially the participation of women will rise, which in the first place has to do with low initial levels around the year 2000. Present participation of women, although above the EU average, is not high, especially for older cohorts of women. Participation of younger cohorts is comparable to participation in the English-speaking and Scandinavian countries. When these cohorts move through the age profile, one can expect that participation grows to a level comparable to the Scandinavian and US level by 2020. Also, participation of older persons is exceptionally low, and can be expected to increase. Note that for people aged 55-64 participation in 1999 was even 5% points below the EU average.
- A third determinant of the budgetary impact of ageing is the age profile of government expenditure. Although old-age benefits and healthcare expenditure comprise a substantial part of the government budget, there are at least one factor that alleviate the burden of ageing. The pension system features a large - funded - second pillar of occupational pensions. Only public pensions, which aim at a minimum social welfare level, are financed on a pay-as-you-go basis. The Netherlands (together with the UK) has by far the largest amount of pension fund assets.
- The fiscal treatment of retirement savings in the Netherlands turns out to be highly favourable for public finances in the future. The deductibility of pension premiums and the exemption of pension fund income, in turn, for taxation of pension benefits implies that ageing will increase future tax revenues when more retirees start receiving pension benefits. This greatly helps to smooth tax revenues over time, especially when the population becomes older and the number of pensioners increases. In fact, the fiscal treatment of pensions implies that tax revenues are postponed until people actually retire.

  So, to a large extent, pensioners in the Netherlands pay for their own costs of old-age benefits and healthcare in the government budget. Taxes paid on pension incomes will rise from 3.3 % of GDP in 2001 to 8.4 % of GDP in 2040. By this increase in taxes the old generations pay a considerable part of rising government expenditures. Taxes on pensions increase by 5.1% points of GDP, whereas public pensions (AOW) as a percentage of GDP rise by 4.3 %-points, and healthcare by 3.6 %-points.
- Finally, the initial budgetary position is not unfavourable. Due to solid fiscal policies in the past decade, and greatly helped by the recent cyclical upswing, the government budget is already fairly on track with regard to sustainable public finances. Extending this policy to the future will in itself lead to a structural surplus in the government budget, contributing to a steady decline in public debt. This presumes, however, that policy does allow the current surplus — which is due to the cyclical upswing — to become structural.

10.2 Uncertainties

This assessment of the ageing problem for the Netherlands is subject to great uncertainties. Not only with regard to the underlying exogenous variables, but also with regard to presumed policies.

The projections hinge on adequate fiscal policies that follow the principle of tax smoothing. According to this principle, tax rates should be constant over time in order to ensure efficiency, and to minimise the welfare cost of taxation. At the same time this principle avoids that the burden of ageing is disproportionally shifted to future generations.

At lower tax rates public finances will be unsustainable, and lead to ever-higher deficits and public debt in the long run, thereby shifting the burden to future generations. For example, if public debt is not reduced but kept constant at its present level, the favourable economic situation in the near future — when the population is still 'green' — will be used to reduce taxes, after which time they must be increased again in the more distant future, eventually leading to a higher tax burden by more than 2% of GDP in 2040. This will not only shift the burden to future generations, but the varying tax rates will also cause welfare losses.

In order to assess the robustness of the projections, we made a sensitivity analysis with regard to the main determinants, *i.e.*. demography, participation, interest rate and productivity rate, and the impact of the initial - cyclical - situation. In particular we looked at the impact of these variables on

i. the distance to sustainability: this is measured by the amount by which taxes have to be raised — on a permanent basis — to make public finances sustainable. Alternatively, this can be interpreted as a discrepancy between the base-line projection and a sustainable path in terms of a (growth adjusted) annuity.
ii. the time path of sustainable fiscal policy in the near and more distant future; that is, the path of the budget surplus that would be consistent with sustainability.

In general, the result with regard to the required policy adjustment to ensure sustainability (criterion i.) proves to be fairly sensitive to a number of underlying assumptions. In particular, this measure is sensitive to the estimate for the cyclical component in the initial budget position in 2001. The baseline projection is based on an estimated cyclical component of 1.6% of GDP. This implies that the cyclically adjusted budget still shows a deficit of 0.7%, while the actual budget features a surplus of 0.9%. If, for example, the cyclical component would be 2.5% (which is regarded as an upper boundary), then the required adjustment would amount to 1.6% of GDP instead of 0.7%.

Important, however, is that the time path of the budget surplus (criterion ii.) is insensitive to this hazard. In general, the time path turns out to be very robust with regard to main factors in the sensitivity analysis, showing a prolonged budget surplus of about 1 - 2% of GDP on average in the decade until 2010.

A few uncertainties stand out:

demography

The uncertainties around the demographic projections are well illustrated by the wide differences between projections for the Netherlands that have been made by three renowned institutes: according to the UN (1998) the elderly dependency ratio will rise to 0.57 in 2040, according to Eurostat (1999) it will be 0.46, while the recent estimate of Statistics Netherlands amounts to only 0.43. This is quite a significant range. How this uncertainty affects the economy over time will depend on the underlying cause of these differences. Focussing on the government budget in the Netherlands, we obtain

- an increase in life expectancy by one year, which gives rise to an extra burden for the government that would require a permanent rise in taxes by 0.6% of GDP.
- a increase in fertility, although it naturally affects the age profile of the population, has a very small negative effect on the government budget.

The first effect comes as no surprise; as people live longer the cost of public pensions and healthcare will go up. The second result is remarkable, however, as the fall in fertility has been the principal cause of the ageing we are now facing.

Why doesn't it help the government if people have more children? This has to do with the initial position of Dutch public finances, and the projected contribution of current generations. On balance, we leave a positive net wealth to future generations through public finances. New generations are net beneficiaries of the government, rather than contributors. Put differently, new children `cost' the government more in terms of extra expenditure than they yield through higher taxes over their lifetime.

participation

Another source of uncertainty is participation. According to present projections, female participation will reach Scandinavian levels in 2020. A drop in female participation by 5% causes an extra burden to the budget of equivalent to a permanent tax rise by 0.6% of GDP— that is, equal to the burden of one year extra life expectancy. Also, participation of older persons adds a considerable risk to the budget, as does the contribution of ethnic minorities to participation.

world interest rate

The interest rate affects the government budget directly through interest payments on public debt, but also indirectly through taxes on capital income, and through the returns

of pension funds. The impact of ageing on the world interest rate is ambiguous, depending on two opposing factors:

- labour supply will decrease relative to capital, which will depress the marginal productivity of capital, and thereby reduce the demand for investment.
- also savings may decrease due to ageing, having an opposite effect on the interest rate.

The net effect on the interest rate is uncertain, and may vary over time along with the process of ageing. It is also sensitive to policies in reaction to ageing. If all countries react to ageing by increasing their savings (as they should do), it seems likely that the real interest rate is going to fall in the future. This would have a negative impact on the sustainability of public finances in the Netherlands. A drop in the interest rate by 1%-point would create an additional burden to the government of 1% of GDP.

productivity

It is often thought that higher productivity growth may help to soften the budgetary consequences of ageing. Yet, in this analysis productivity growth turns out to have a *negative* impact on public finances. First, notice that higher productivity also speeds up the growth of government expenditure. This is a natural assumption in the context of a long-term analysis. Consequently, both the growth of revenues and expenditures goes up, so that positive and negative effects may cancel. The reason why there is yet a negative impact of productivity growth, lies in the Dutch supplementary pension system. A higher growth rate of wages — concomitant to productivity growth — requires contribution rates to pension funds to be raised. As these contribution are deductible for taxation, this will reduce tax revenues and thereby burden public finances.

This analysis focuses on the long-term relations. Obviously, one could argue that a productivity increase in the short run might help if it does not feed into higher government expenditure. Furthermore, distributive restrictions on fiscal policies could be eased by productivity increases. Then, productivity growth could alleviate the government budget, indeed. But over a longer time horizon it is hard to imagine that public expenditure can systematically lag behind growth in the private sector.

10.3 Debt policy and intergenerational equity

Present social security institutions involve substantial transfers between generations, in particular from the young working population to the old pensioned generations. In the Netherlands, public pensions (AOW) and healthcare comprise some 26% of the government budget. As a result of ageing this share will rise to 38% in 2040. This raises the obvious question of who is going to pay for these extra costs. Will the burden be shifted to future generations, the tax payers in 2040, or can it be distributed over other generations as well, notably the present?

The natural instrument to redistribute the burden of ageing over generations is debt policy. By adjusting the time path of taxes, the government has an effective instrument to influence the intergenerational distribution. The budgetary problem of ageing is therefore, in the first place, a problem of government finance.

This study avoids the issue of the desired distribution of income over generations. It focuses on the sustainability of current fiscal arrangements. That is, can present arrangements be maintained in the future without having to raise taxes later on? This criterion for sustainability has the advantage that

- it satisfies the principle of tax smoothing, which is a prerequisite for efficiency.
- it is neutral with respect to the distribution of income over generations, in the sense that all - future - generations contribute and benefit equally (as a fraction of their income) to the government.

Following this criterion, our projections show that government finances should be characterised by a budget surplus for a prolonged period, thereby reducing public debt to a level close to zero at the time when ageing reaches its maximum in 2040. This can be achieved with a fairly modest adjustment in the initial government budget, leading to sustained surpluses until the year 2034. Thereafter, it will turn into a small deficit (0.2 % in 2040).

That the surplus approximates zero in the distant future is no necessity ensuing from the criterion for sustainability. It is actually quite accidental, related to the fact that public debt in these projections happens to fall to zero. For different demographics and different budgets, the surplus and the debt might as well tend to positive or negative levels as a fraction of GDP in the long run. This approach of sustainability is different from - and to be preferred above- the reasoning underlying the Pact for Stability and Growth. Luckily, the resulting time path for public finances in the Netherlands satisfied the criteria of the stability pact. It is far from obvious, however, that similar exercises for other EU countries would also lead to results that are consistent with the stability pact.

The required increase in taxes by 0.7% of GDP is the net change in revenue. If this increase has to be generated by taxes, the increase in tax rates has to be greater — about 1 % of GDP — because of the distortionary effect of taxation. The difference is caused by a ‘leakage’ due to a decreasing tax base.

10.4 National life cycle

The analysis focuses on long term growth, and neglects short- and medium-term dynamics. The analysis extrapolates the current life cycle pattern in savings and

consumption. Although a more dynamic analysis, based on a full-fledged model of long-term growth, could yield relevant additional information, the present approach is acceptable for current purposes, especially for a small open economy where prices are fixed by world market prices in the long run. The results should be used with great caution, however.

Although the analysis focuses on accounting relations following from the budget constraints, it is possible to derive the main features of the underlying macroeconomic development. An important feature of the sustainable path is that Dutch inhabitants will build up a substantial net foreign asset position, up to 300% of GDP. Although, due to the long time horizon (60 years), this result is highly sensitive to the underlying assumptions with respect to growth and the interest rate, it does illustrate how a small open economy like the Netherlands can manage with its ageing problem by building up a surplus on the world capital market. Just like individual households, also the Dutch nation exhibits life cycle behaviour, building up their wealth when young, and using this wealth when it is old.
This life cycle leads to s substantial claim on world financial markets. With well developed financial markets there is no evidence that this would generate particular risks.

10.5 Other policy options

As the consequences of ageing for the Dutch economy seem fairly modest, they can probably be accommodated by adequate fiscal policies. These projections are subject to major uncertainties, however. Also the adjustment in taxes may be more costly than now provisioned —for instance, due to increasing international mobility of the tax base or intensifying international tax competition. Therefore, it is useful to consider other policy options as well.

alternative fiscal policies

Rather than tax smoothing, the government could follow alternative fiscal policy rules, *e.g.* targeting at a zero deficit (stability pact), or a constant ratio of public debt to GDP. The government could also just postpone the necessary adjustment required to achieve sustainability. Each of these alternatives satisfies the solvency constraint, but they have different effects on the intergenerational distribution and economic efficiency.

participation

Encouraging participation, which may be welfare-enhancing by itself, is also an effective means to improve public finances. Participation broadens the tax base and raises tax revenues, while it exerts only a limited upward pressure on expenditures. Three categories stand out:

- participation of women can be encouraged by fiscal measures and by subsidising childcare;
- participation of older workers (55-64) is exceptionally low in the Netherlands. Many of the older workers them are in disability schemes (about 30% of male), and also early retirement is very popular (20% of male). Step-by-step early retirement schemes are being transformed into more actuarially fair programmes for early retirement. Still, these programmes will not do away with the fiscal distortion, which means that people retire earlier than is optimal, from a welfare point of view. From this perspective, it is remarkable that these flexible pension schemes benefit from tax exemptions similar to those of pension funds.
- disability seems to be a further unfolding problem ('Dutch sickness'); extrapolating from present inflow and outflow probabilities, the number of beneficiaries of disability insurance will increase up to 1 1/4 million in 2020, and will stabilise at that high level thereafter. This is some 16% of the labour force. Measures to curb the use of disability benefits are doubly effective, as they increase the tax base and at the same time reduce expenditure.

immigration

Could immigration help to cure the problem of ageing? Obviously, immigration could improve the demography in - some - ageing countries, but it is questionable whether it also contributes to more sustainable public finances. If activity rates of immigrants were equal to those of natives, immigration might help to alleviate the ageing problem. However, immigrants from Third World countries tend to display much lower activity rates and a much higher dependency on benefits as compared to natives. So, immigration might well aggravate rather than alleviate the ageing problem.

Replacement migration would imply a considerable increase in the size of the population. In order to keep the dependency ratios on the present level, the EU population would even have to triple over the next 50 years; beyond that horizon, the increase would have to continue. What this means in terms of congestion costs can only be guessed.

retirement age

Although life expectancy (at birth) has increased by some five years since 1970, the regular retirement age has been constant at 65 years. For the period until 2050, life expectancy is expected to increase by a further five years for men and two years for women. This could raise the question if the regular retirement age should not be increased as well. Raising the age for eligibility of public pensions to the age of 67 in 2024 would have a beneficial effect on government finances of 0.3 - 0.4% of GDP in annuity terms. This effect is not very large, which is due to three factors:

1. pension funds may decide to compensate for the loss in public pensions,
2. since participation is already very low in this age category, one may expect a strong leakage to other social security schemes (unemployment and disability), and
3. there seems to be a strong preference for early retirement.

Also future preferences with regard to retirement age are uncertain. On the one hand, the demand for leisure tends to increase with income, which would imply a lower retirement age. On the other hand, later retirement may help to smooth leisure better over the life cycle of people. Given these uncertainties and the limited effectiveness, it seems more important to focus policies on increasing the *effective* age of retirement and curbing the outflow into social security (disability), rather than on increasing the official retirement age.

healthcare

Ageing will increase demand for healthcare. The share of healthcare in the government budget is expected to rise from 16% in 2001 to 21% in 2040. Although this increase can probably be financed by appropriate fiscal policies, the sheer size of the healthcare sector may be reason to look carefully whether the efficiency and the financing in this sector can be improved. As most of these expenditures are funded on a pay-as-you-go basis, this sector entails large intergenerational transfers. Cutting expenditures, or shifting the financing of healthcare to the private sector, reduces the burden of ageing to the government budget. A cut by 10% on each of the large schemes (ZFW and AWBZ) relieves the government budget by 0.4% of GDP in annuity terms. Ageing in itself provides little argument for such measures, however. This exercise indicates, however, that if it is possible to cut expenditures in this sector, this would significantly contribute to the sustainability of public finances as well. Furthermore, it could help to contain potential financial risks in the government budget.

No account is taken of a possible *Baumol effect* in healthcare, and in government expenditure in general. The Baumol effect may arise when productivity growth in the — typically labour intensive — public sector lags behind productivity growth in the private sector. This effect could have a pervasive effect on the sustainability of the government budget. For example, an additional rise in the share of government expenditures in GDP by 5% in 2020 would burden the budget in our accounting framework by an additional 2.9% of GDP each year. There are some caveats to this result, however.

- First, it is not clear that productivity growth for these type of expenditures will systematically lag behind productivity growth in the private sector, where the service sector also becomes more and more important. Furthermore, new - information - technologies could have an impact on the optimal mix of private and public provision of many goods, which could well compensate for this Baumol effect.

- Secondly, the Baumol effect requires that the price elasticity of demand for these types of expenditures is smaller than unity.
- Finally, and most importantly, one could doubt whether tax smoothing would still be reasonable for this case. If future generations decide to spend a larger part of their income on healthcare or other types of government expenditure (*e.g.* education), it is by no means obvious that also present generations should contribute to this burden. Here, the criterion for efficiency no longer coincides with that of generational neutrality.

10.6 Intergenerational risk sharing

Most discussions on ageing focus on the — possibly undesired — effects on the intergenerational distribution arising from the pay-as-you-go systems in public pensions and healthcare. There is also another important dimension. One of the rationales behind public pension systems is their contribution to risk sharing between generations. Private markets are unable to provide this insurance, as there is no party that can act on behalf of future generations. The government can compensate for this market failure. Pay-as-you-go arrangements in public pensions and healthcare can therefore be interpreted as an implicit contract between generations. As it is easier for younger people to accommodate to shocks in income than for the old, this risk sharing enhances total welfare. Moreover, the type of shocks faced by the young and the old is generally not the same, so that they can gain by pooling their risks. Also mandatory — second pillar — private pensions contribute to intergenerational risk sharing, especially in the Netherlands, where these pensions guarantee a particular path of income to the old (defined benefit). Shocks in the returns and expenditures of pension funds are accommodated by adjusting contribution rates. Risks are therefore fully borne by the younger members of these pension funds.

Ageing is a possible threat to this system of intergenerational risk-sharing in two ways. First, ageing changes the demographic balance between young and old generations. As there will be fewer young people to bear the shocks in the financing of pensions (and other old-age transfers), their risk exposure tends to increase. This would make present arrangements for intergenerational risk-sharing more costly in welfare terms. Second, there are also political risks. When the burden of ageing is shifted in a one-sided manner to one or another of the parties, *i.e.* the young generations, this might put the system of intergenerational risk-sharing at risk. This again emphasises the importance of avoiding undesired effects of ageing on the intergenerational distribution — that is, by an adequate and timely adjustment in fiscal policy.

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