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The Long-Term Sustainability of Sweden's Public Finances

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The long-term sustainability of Sweden's public finances

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Foreword

The ordinance of the NIER includes implementing long-term projections of public finances and assessing their long-term sustainability. Each year, the government specifies the framework for the commission in the appropriation directions for the NIER. This assessment must be quantitative and, according to the appropriation directions, it should include a number of scenarios.

This is the fourth NIER report concerning the long-term sustainability of Sweden's public finances. Last year's report is entitled "Is an Unchanged Public Sector Commitment a Sustainable Commitment?" (Occasional Studies No. 39). The reports from 2013 and 2012 are published as Brief Papers, numbers 20 and 18 respectively (in Swedish).

Erik Jonasson was the project manager. Erik Höglin, Helena Knutsson and Ulla Robling were also involved in the project.

Stockholm, 25 March 2015.

Mats Dillén
Director-General

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Summary

One of the recurring tasks of the NIER is to evaluate the long-term sustainability of Sweden's public finances. Long-term sustainability can be said to prevail if public income and expenditure over time is balanced in a way which does not give rise to long-term structural deficits. Evaluating long-term sustainability amounts to implementing long-term projections of public income and expenditure under the assumption that policy remains unchanged. These projections are based on long-term forecasts of population growth and simplified assumptions of the development of the economy in the long term. The objective is not to create a long-term forecast for Sweden's public finances, but to study scenarios with a view to identifying at an early stage any risks of imbalances building up as a result of current policy.

WELFARE SERVICES ACCOUNT FOR GROWING PERCENTAGE OF GDP AS NUMBERS OF ELDERLY PEOPLE INCREASE

The demographic dependency ratio began to increase a few years ago, and this coincides in part with the fact that the many people born in the 1940s have reached retirement age. The dependency ratio will continue to increase until the mid-2030s, as the number of elderly people in the population rises. According to the population forecast from Statistics Sweden, there will be a further increase in the dependency ratio in the latter half of the 2000s, albeit on a smaller scale. One contributory factor in the anticipated increase in the number of elderly people is that the average life expectancy is expected to go on increasing. The anticipated remaining average life expectancy for a person aged 65 is approximately 20 years at present. This is expected to increase to almost 24 years by 2050 and no less than 27 years by 2100.

Of course, a high – and increasing – average life expectancy is in many ways an indicator of health in terms of both public health and social development from a broader perspective. An increase in life expectancy leads to an increasing dependency ratio, but it also represents a choice of approaches for political decision-makers. If the need for healthcare and elderly care at various ages remains the same in future as it is present, this increase in life expectancy will lead to a massive increase in the need for welfare services. If the retirement age also remains the same as at present, the increasing need for welfare services will have to be financed by a shrinking percentage of people in employment. As a result, welfare commitments would have to be cut back or taxes would have to be increased. Maintaining current welfare commitments while keeping taxes unchanged will require both an extended working life and a reduced use of welfare services.

ALTERNATIVE SCENARIOS ILLUSTRATE THE IMPORTANCE OF BETTER HEALTH

This report looks at four scenarios. In the base scenario, it will be assumed that the retirement age will remain the same as at present, while the need for welfare services in each age group will remain unchanged at the current level. This scenario is pessimistic in the sense that the increase in life expectancy will not make people more capable of continuing to work for longer into old age or reduce their need for care when they reach a given age. And thus the scenario means that people's lives will essentially be extended by "frail" years. With a scenario like this, the current regulations will not be sustainable in the long term. Government consumption as a percentage of GDP, maintaining staffing levels within the welfare services, would increase from the present-day level of 27 per cent to approximately 33 per cent by 2099. If taxes were to

remain unchanged, this would lead to a soaring deficit in public finances as the expenditure ratio increases.

However, there is reason to believe that the increase in the average life expectancy will result in people having more years of healthy life. In the first alternative scenario, it is assumed that withdrawal from the labour market will be postponed by two-thirds of the increase in the anticipated average life expectancy. This means that by 2099, when the remaining average life expectancy for a 65-year-old is expected to be almost seven years more than at present, the average retirement age will have increased by approximately five years. This gradual increasing of the retirement age will have tangible effects on public finances in the long term. The fact that we are continuing to work for longer into old age means an increase in the supply of labour and a higher GDP per capita. This means better opportunities to finance any given welfare commitment. The economic dependency ratio, which indicates how many people – besides themselves – each person working has to provide for, will increase in this scenario until the mid-2030s. However, this figure will then decrease as people choose to postpone their exit from the labour market. In the base scenario, this ratio will increase even after 2030.

In the second alternative scenario, the increase in average life expectancy is assumed to go hand-in-hand with a declining need for welfare services among the elderly. This assumption implies that the average 80-year-old in 2099 will have the same need for health and social care as people aged 75 at present. The assumption does not imply any impairment of the standard of welfare services for the people using them, but merely that the need for them (utilisation level) in each age group will decline over time. Development of this kind would help to provide significantly better public finances than would be the case if the need in future were to remain the same as at present. The assumptions of extended working life and a reduction in the need for welfare services are combined in the third alternative scenario in this report. In this case, government consumption would be barely 2 percentage points of GDP higher in 2099 than today, and considerably lower than in the base scenario.

FAILURE TO CHANGE POLICY RISKS DEEPENING THE PRESENT STRUCTURAL DEFICIT

In these scenarios, government consumption in relation to GDP will increase by 2.5−3.5 percentage points up to the mid-2030s, while maintaining public sector commitments. This kind of development in combination with no changes to tax rates would deepen the deficit already prevailing in public finances. In the pessimistic base scenario, the primary deficit would be increased to more than 3 per cent of GDP by 2030 and almost 4 per cent of GDP by the end of the projection period. In the scenario involving postponement of the exit from the labour market, the development would be slightly more favourable; but the deficit would increase here as well, given the expenditure pressures of the next two decades. It is only when the assumption of extended working life is combined with the assumption of a reduced need for welfare services that public net lending will increase in the long term and approach zero. Given the structural deficit currently prevailing, tax increases or a reduction in welfare commitments will nevertheless be required in order to balance Sweden's public finances in the long term.

ADAPTED FISCAL POLICY IN LINE WITH CHANGES TO DEMOGRAPHIC CRITERIA

None of the scenarios in the report will strictly balance public finances in the long term. Even the relatively optimistic scenario will require tax increases or expenditure reductions in order to eliminate the structural deficit prevailing at present which would deepen over the next two decades if current public sector commitments were maintained. The measures required to restore long-term sustainability to public finances are partly an issue concerning the degree to which the taxpayers of today should finance the welfare requirements of future generations. It may seem alien to adapt today's fiscal policy ahead of expenditure pressures that will be brought to bear at some point in the far distant future.

A number of calculation examples are provided in the report in order to illustrate the need for future tax increases in order to maintain public sector commitments. In one example, taxes are adjusted in a manner which leads to zero government net lending for each year of the projection. An immediate tax increase of 2 per cent of GDP is required in this example. In the optimistic alternative scenario III, taxes then need to be increased gradually by almost 2 per cent of GDP until the mid-2030s in order to meet the increasing need for welfare services. As the economic dependency ratio will then fall, the tax burden can subsequently be relieved gradually. At the end of the projection, the tax ratio will stand at just over 43 per cent in alternative scenario III, just marginally higher than at present. In the base scenario, on the other hand, taxes would go on needing to be increased even after the 2030s. At the end of the projection, the tax ratio will stand at almost 50 per cent, or 7 per cent of GDP higher than at present. In alternative scenarios I and II, where the assumptions of extended working life and a reduced need for welfare services will be studied individually, the need for tax increases in order to maintain public sector commitments will be relatively small after the 2030s.

1 Introduction

Long-term sustainability in Sweden's public finances involves balancing future public income and expenditure, given the current formulation of fiscal policy. If fiscal policy promises greater welfare commitments than the present tax system is able to finance, however, this may be considered to be unsustainable in the long term.

From a broader perspective, it can be argued that long-term sustainability in Sweden's public finances requires more than just balanced development of income and expenditure. The manner in which income and expenditure develops must also be perceived by voters to be reasonable and fair so that there is parliamentary support for the policy which is financially sustainable. For example, it is reasonable for various generations to bear their own costs and for the existing regulations and tax system not to result in significant transfers of funds from one generation to another. In other words, it is possible to argue that besides financial sustainability, there must be a "political sustainability" in current regulations for public finances to be considered sustainable in the long-term. The analysis in this report, like most other assessments of the long-term sustainability of public finances, is based largely on the narrower definition relating to financial sustainability. Assessments of the fairness of the tax system and the reasonableness and adequacy of the welfare commitment are subjective considerations beyond the scope of this analysis. However, the report does discuss how alternative development paths for Sweden's public finances may be regarded from these broader perspectives.

The report makes projections concerning the public sector's income and expenditure up to 2099. The report is a scenario analysis which attempts to describe what would happen in the long term if the tax system were to remain unchanged according to its present structure while, at the same time, the public sector is expected to live up to the same welfare commitments that it has at present. The aim of such a scenario analysis is to detect, at an early stage, any imbalances which could lead to a future crisis in public finances. In other words, the projections should not be viewed as a *forecast* of how public finances will develop until 2099.

The NIER is not the only organisation assessing the sustainability of public finances in the longer term. Each year, the government provides its assessment of this in its spring fiscal policy bill. The European Commission carries out assessments of sustainability for public finances of each EU country every three years. Regular equivalent evaluations also take place outside the EU, in most OECD countries. The financial crisis, which led to major budget deficits and rapidly growing public debt in a number of countries, has made long-term sustainability calculations for public finances a more prominent feature of both budget policy work and evaluation of financial policy. In the mid-1990s, only a handful of OECD countries published sustainability assessments; but by 2009, 27 out of 30 member states did so.

To be able to comment on the development of public finances in the long term, a scenario is needed which indicates how the economy will develop. The sustainability of public finances can be said to be influenced by everything which affects public income and expenditure with given regulations. These include demographics, productivity development, the functioning of the labour market, global demand for our products and how the need for welfare services is developing. Again, it is not a matter here of creating the best forecast in all respects, but of creating a scenario which is

realistic and founded on reasonable, transparent assumptions. Many assumptions of how the overall economy will develop in future are based on historical observations in a way so that the future in many respects is expected, on average, to resemble the historical development. Productivity development in the economy is one such example.

One of the most central factors in the long-term projections is demographic development, population growth and age composition. Demographic development affects the development of the labour force and the need for welfare services in the form of schools, healthcare and elderly care. The demographic development in the report is based on Statistics Sweden's long-term population forecast. Of course, this forecast also involves a high degree of uncertainty. However, one thing that can be stated with a certain amount of certainty is that the number of elderly people in the population will increase more quickly than the number of young people. This means a tendency for the proportion of employed people in the general population to decline, while at the same time the proportion of the population with relatively great needs in terms of welfare services will increase. One of the most central issues in the analysis of the long-term sustainability of public finances therefore involves considering whether the current regulations for public income and expenditure are suited to the demographic development.

The base scenario in the report – which should not necessarily be viewed as a primary scenario – is based on the assumptions of a constant retirement age (and otherwise unchanged labour market behaviour among individuals) and a constant need for welfare services among various age groups in future. These rather pessimistic assumptions present, in part, a dismal scenario for public finances. If staffing levels are maintained within the welfare services, government expenditure would increase by approximately 5 percentage points of GDP up to 2099.

This rather dismal base scenario is contrasted with alternative scenarios in which we will gradually be assumed to "rejuvenate" our behaviour on labour market and so carry on working for longer into old age as the anticipated average life expectancy increases. In the alternative scenarios, it is also assumed that the need for welfare services among the elderly will be slightly lower for each given age group in the future than is the case at present. These alternative scenarios provide, not unexpectedly, a brighter view of the development of public finances. When the assumptions in the alternative scenarios are combined – so people will carry on working for longer into old age and at the same time the need for welfare services among the elderly will decline – the current tax burden will largely be capable of financing the maintenance of public sector commitments.

The report is structured as follows. Chapter 2 begins with a description of the macroeconomic scenario which forms the basis for the analysis. Demographic development and effects on the labour market are discussed. Chapter 3 then analyses the development of government expenditure in the base scenario, focusing on how the composition of the population will affect the need for welfare services and hence the development of government consumption. Chapter 4 subsequently studies the sustainability of public finances in the base scenario and reflects on how taxes would need to be adapted in order to achieve sustainability. Chapter 5 considers the three alternative scenarios. The report ends with conclusions in Chapter 6.

2 Demographics and macroeconomic development

Macroeconomic development is of major significance to public finances. Not least the development of the labour market, which in the long term is greatly influenced by demographics, is crucial to how much tax revenue will be raised. However, demographics influence not only tax revenues, but also public sector expenditure. All things being equal, a larger population will result in higher expenditure on welfare services and social transfers. If the population increase is concentrated to younger people and the elderly, who consume more welfare services than other groups and are employed to a lesser extent, this will increase the pressure on public finances.

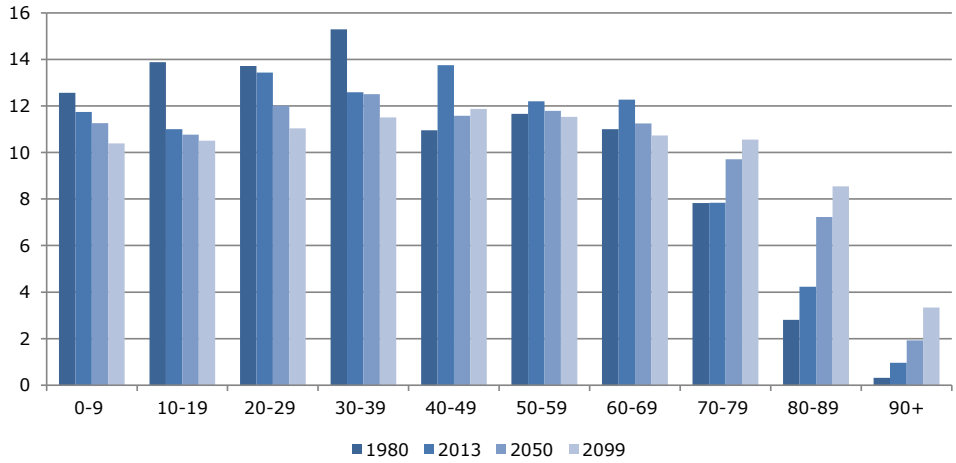
Demographic development

DEPENDENCY RATIO RISING

The composition of the population has altered significantly over the last few decades. In the 1980s, people under 40 made up the largest age groups (see Diagram 1). These groups have declined as a proportion of the population, not least as regards children and young people aged under 20. Instead, the proportion of elderly people has increased. This development is expected to continue throughout much of the 2000s, with particularly strong development until the 2050s with people reaching very old age.

Diagram 1 Age distribution of the population

Percentage of overall population



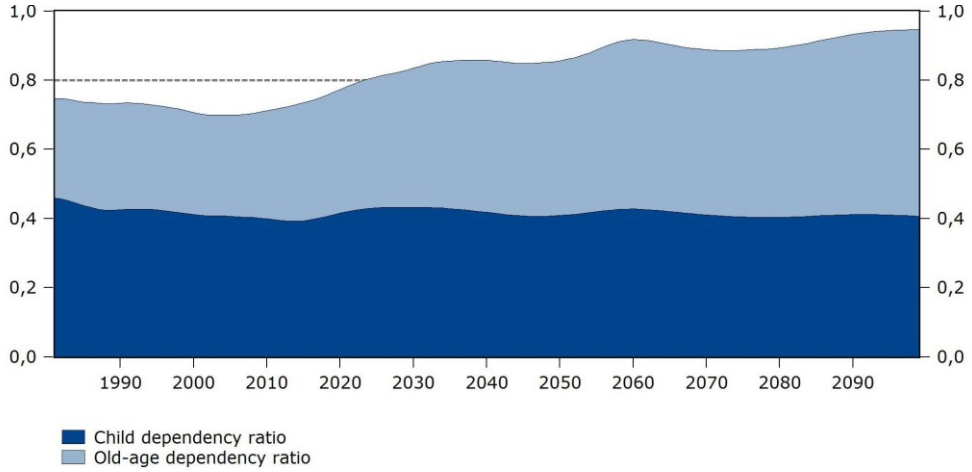
Source: Statistics Sweden.

The population of non-working age compared to the population of working age, the demographic dependency ratio, is often used as a way of summarising demographic development. It provides a rough measure of how many people of non-working age

that every person of working age has to provide for, besides themselves.[1] The dependency ratio fell slightly in the 1980s and 1990s, and then remained at a constant 0.70 level in the early part of the 2000s. However, the dependency ratio has been rising since 2006, and according to Statistics Sweden's population forecast this development will continue over the next few decades. At the end of the present century, the dependency ratio is expected to approach 0.95, which means that there will be more or less the same number of inhabitants of non-working age and working age (see Diagram 2).

Diagram 2 Dependency ratio

Non-working-age population relative to the working-age population



Note: Working age is defined here as 20–64 years. The diagram shows the total dependency ratio divided into child dependency ratio (the number of individuals aged 0–19 in relation to the working-age population) and the old-age dependency ratio (the number of individuals aged 65 and over in relation to the working-age population).

Source: Statistics Sweden.

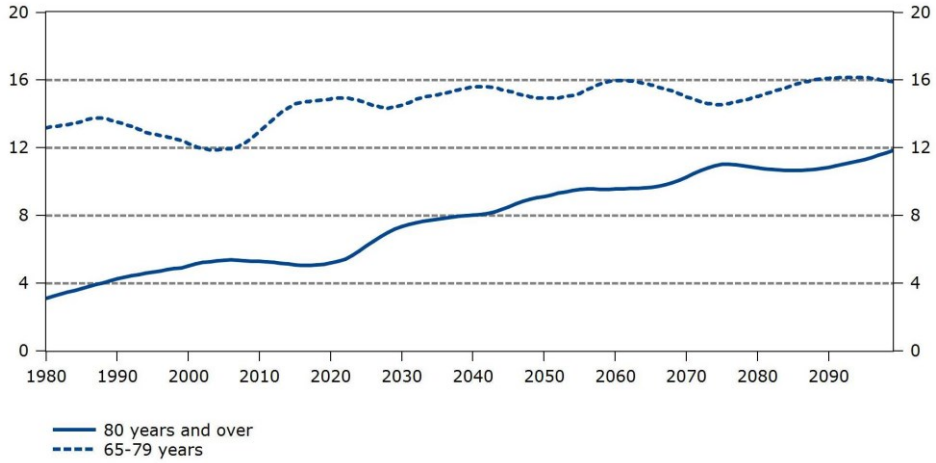
The rising demographic dependency ratio is largely due to the fact that the number of elderly people is growing rapidly. The old-age dependency ratio – that is to say, the number of people aged over 65 in relation to the number of people aged 20–64 – is expected to increase from the current level of approximately 0.35 to almost 0.55 by 2099. However, the child dependency ratio will not contribute to the overall rise in the dependency ratio. The number of children (aged 0–19), according to Statistics Sweden's population forecast, is expected to remain at a level of around 40 children for every 100 people of working age.

The 65–79 age group has grown rapidly over the last few years (Diagram 3). Together with a slight increase in the child dependency ratio throughout the period, this group is responsible for the increase in the dependency ratio over the past decade. However, the percentage of the population aged over 80 has fallen slightly since 2005. In future, this group in particular will be increasing as a percentage of the population. Up to 2099, the over-80s are expected to increase from approximately 5 per cent to 12 per

[1] Working age is defined here as 20–64 years, as the level of employment outside this age group is relatively low at present. As the average life expectancy rises in future, the upper limit in the definition of working age can of course be adjusted upwards.

cent of the total population, while the percentage of people aged 65−79 will merely increase from 15 to 16 per cent of the population.

Diagram 3 Population growth, age groups over 65
Percentage of population



Source: Statistics Sweden.

Labour market development

Together with productivity growth, development in the labour force largely determines how the overall production of a country (GDP) develops from a long-term perspective. The size of the labour force, in turn, is determined primarily by developments in the working-age population and the inclination of various age groups to participate in the labour force.

Looking at the population aged 15−74, there is significant variation in labour force participation. Participation among those aged 15−19 is currently just over 30 per cent, as the vast majority attend school at this age. Participation is then around 90 per cent in the 25−59 age group and around 70 per cent in the 60−64 age group, before decreasing significantly from the age of 65. The participation rate is 20 per cent among those aged 65−69 and just under 10 per cent among those aged 70−74 (see Diagram 4).

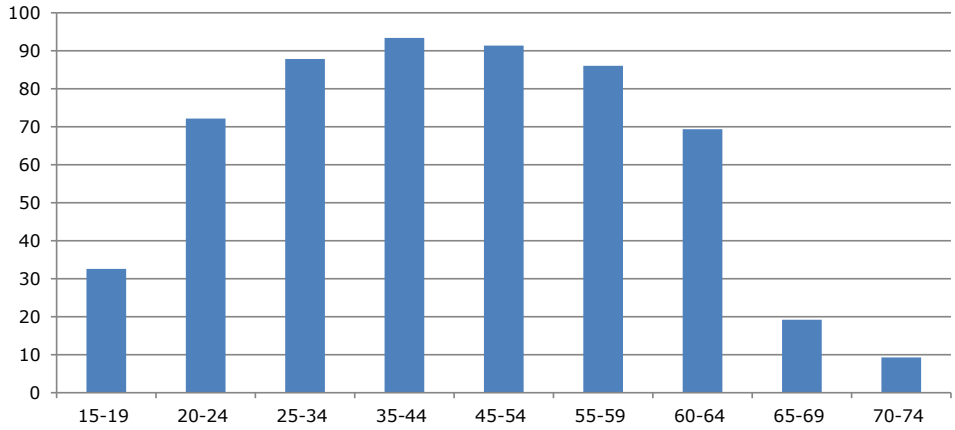
Developments in the labour market over the next few years will be affected by the economic recovery and the economic policy reforms decided on in 2007−2014, which overall are expected to boost labour force participation. This means that both employment and the labour force will grow more quickly than is demographically motivated. For the period from 2020, it is assumed that labour market developments will be determined entirely by demographic developments. Long-term movements in labour market variables are estimated using the NIER's model for long-term labour market projections, KAMEL. In this model, labour market variables are influenced by changes in the composition of the population in terms of gender, age and country of origin. Different population groups have different characteristics, including labour force participation rates, employment rates and average hours worked by those who are in employment. The model projections assume that these differences will persist

over time. If, for example, a group with a high employment rate grows in size relative to the other groups, this will have a positive effect on the overall employment rate.

This method does not necessarily produce the most likely outcome. For example, because average life expectancy is rising, it is likely that people will exit the labour market later and the effective retirement age will increase. The design of the pension and tax systems and the likelihood of an increasingly healthy population in the 65–74 age group would support such a change. It can therefore be argued that purely demographic projections may underestimate the employment rate in the long term. Hence Chapter 5 analyses alternative scenarios which illustrate the consequences of such development in the labour market and public finances. It is also possible that demand for leisure time will rise with economic prosperity. For example, the strong increase in prosperity seen in the 20th century coincided with a substantial reduction in average hours worked, in the form of both shorter working weeks and more holiday and other time off. This might mean that demographic projections overestimate employment or average hours worked.

Diagram 4 Labour force participation by age group (2013)

Percentage of population in each age group



Source: Statistics Sweden.

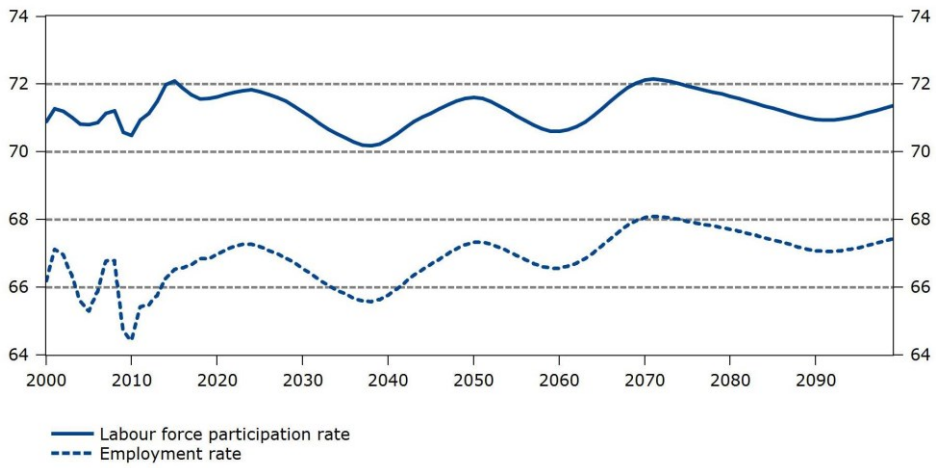
The long-term model projections suggest that labour force participation in the 15–74 age group will fluctuate between about 70 and 72 per cent through to 2099, and the employment rate between 66 and 68 per cent (see Diagram 5). The slightly negative trend from the start of the 2020s through to the end of the 2030s in both labour force participation and the employment rate can be explained by the age group with the highest participation rate (25–59 years) accounting for a declining share of the overall working-age population. Once this age group begins to grow again as a share of the working-age population, this trend will reverse towards the end of the 2030s. In the 2020s, unemployment will fall slightly for demographic reasons and then remain between 6.3 and 6.5 per cent of the labour force in the following decades.

The demographic dependency ratio presented in previous sections underestimates the burden facing the economically active population if the employment rate is low in certain groups of the working-age population. The *economic dependency ratio* takes this into account and is defined here as the ratio between the number of economically inactive (non-working) people in the population and the number of employed. The economic dependency ratio is almost 1 at present, which means that there are approx-

imately as many economically inactive people as there are people in employment. In the projections, the economic dependency ratio moves almost in parallel with the demographic dependency ratio, reaching 1.2 in 2099 (see Diagram 6). In the projections, the number of hours worked will increase by 0.5 per cent per year on average between 2013 and 2030. This is slightly less than the population increase of 0.7 per cent for the period. For the period 2030−2099, the population will continue to grow more quickly than the number of hours worked, but the difference will be less than in the previous period.

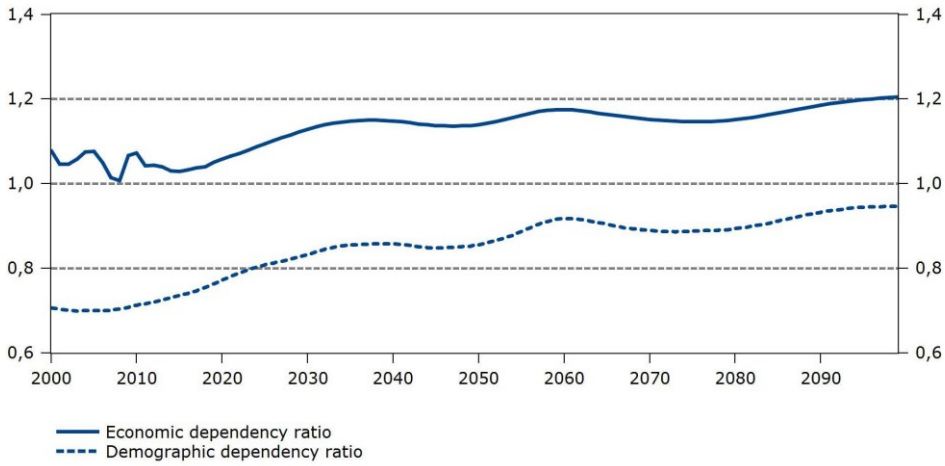
Diagram 5 Labour force participation and employment rate

Percentage of population aged 15–74



Sources: Statistics Sweden and NIER.

Diagram 6 Economic and demographic dependency ratios



Note: The economic dependency ratio refers here to the ratio between the number of non-working people in the population and the number of employed.

Sources: Statistics Sweden and NIER.

Macroeconomic development[2]

Macroeconomic development until 2019 is based on the scenario presented in *The Swedish Economy*, December 2014. Over the next few years, the economy will recover gradually from the current slump. Balanced resource utilisation is expected to be achieved within the economy within a couple of years. Resource utilisation will then be slightly higher than normal for a few years. The economy is expected to return once again to normal resource utilisation in 2020. After that, the long-term macro scenario is based on the simplified assumption that the economy will remain at capacity. GDP growth is then determined by the demographically driven development of hours worked and technological advances which, together with capital formation, produce aggregate productivity growth.

PRODUCTIVITY AND GDP GROWTH

The NIER's assessment of long-term productivity growth is based on data for 1980−2013. The annual rate of growth in productivity in the overall economy averaged 1.7 per cent during that period (see Table 1). It is assumed that this historical growth rate will continue in the long-term. However, average productivity growth will be slightly lower between 2013 and 2030. This reflects the fact that the slow productivity growth of the last few years will gradually return to the historical average growth level. From 2030 onwards, average productivity growth will stand at 1.7 per cent per year. Together with long-term growth in hours worked averaging about 0.2 per cent per year, this means that GDP will grow by about 2 per cent per year in the long-term projections.

Table 1 Hours worked, productivity and GDP

Percentage change, geometric means for each period

	1981–2013	2013–2030	2030–2099
Population	0.4	0.7	0.3
Labour force	0.5	0.4	0.2
Employment	0.3	0.5	0.2
Hours worked	0.4	0.5	0.2
Productivity	1.7	1.5	1.7
GDP (constant prices)	2.1	2.0	2.0
GDP per capita (constant prices)	1.6	1.3	1.7

Sources: Statistics Sweden and NIER.

Productivity growth will vary between sectors in the macro scenario. In export-producing industries, technical development takes place rapidly and productivity is growing by more than 3 per cent per year, while weighted productivity growth in industries producing goods and services for government consumption is assumed to increase by just 0.25 per cent per year. This, too, is in line with historical developments. The overall economy's productivity growth is therefore influenced by changes in the composition of demand. If demand in the economy is aimed towards sectors

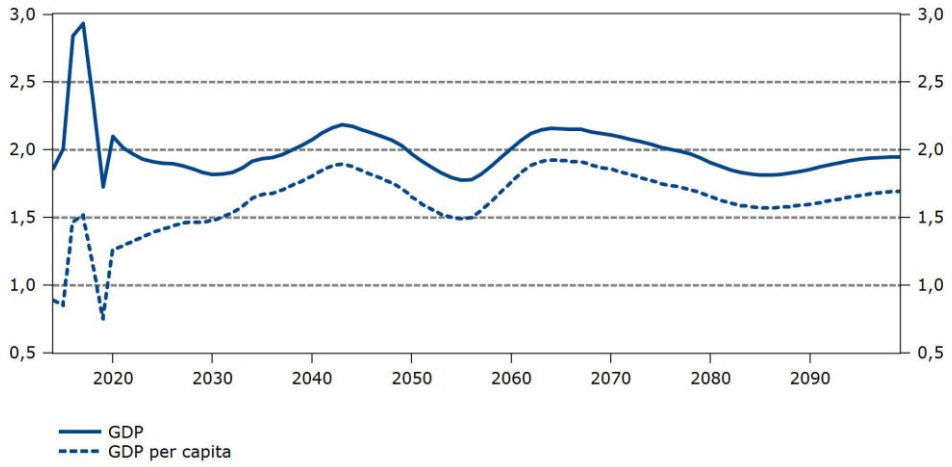
[2] See Appendix 2 for an extended description of the assumptions forming the basis of the macro scenario in the report.

with high productivity growth, GDP will grow more quickly than if demand is biased towards those with lower productivity growth.

GDP growth also varies slightly over time as a consequence of demographic development (see Diagram 7). In periods when the labour force, employment and hours worked grow more quickly than the average, GDP growth follows to a corresponding extent. This means, for example, that GDP growth will be slightly below 2.0 per cent in the 2030s as the number of hours worked will grow more slowly than average on account of the demographic development. GDP per capita is also very dependent on demographics. During periods in which the population grows more quickly than the number of hours worked – particularly up to 2030 – growth in GDP per capita will be slower than productivity growth. When the population increase then takes a downturn after 2030, while the growth in the number of hours worked does not fall as much, growth in GDP per capita will increase to approximately the same level as that seen in the period 1980−2013.

Diagram 7 GDP and GDP per capita

Percentage change



Source: NIER.

MOVEMENTS IN PRICES IN LINE WITH THE INFLATION TARGET IN THE LONG TERM

The Swedish Riksbank's inflation target is the nominal anchor of the Swedish economy. In the long term, inflation measured by the increase in the CPI is assumed to standard 2 per cent per year, and other prices will develop in a manner consistent with this rate of inflation. However, the slump in recent years means that inflation is less than 2 per cent. As the economy recovers, inflation will pick up. When the output gap turns positive in 2018−2020, inflation will temporarily overshoot the target somewhat.

Wage growth is assumed to be the same in all sectors. The difference between wage growth and sector-specific productivity growth is reflected fully in price movements (deflators) for the various components of total demand. Sectors with low productivity growth increase prices more quickly than those with relatively high productivity growth. This permits the same wage growth in all sectors without altering labour costs' share of value added.

The deflator for household consumption rises by around 1.9 per cent per year in the long-term projections.[3] Investment goods are largely produced in sectors with high productivity growth, which means that the prices of investment goods rise more slowly than the prices of consumption goods. For the same reasons, the export and import deflator rises more slowly than the household consumption deflator. The government consumption deflator largely follows wage growth, because the production of public services is labour-intensive and productivity growth is lower than in other production. Prices for consumable and capital goods used in production of government consumption do, however, climb more slowly than hourly wages, which means that the government consumption deflator rises slightly more slowly than hourly wages. In the long-term projections, the government consumption deflator rises by 3.3 per cent per year, which is about the same as the average rate seen in the period 1995−2013. The GDP deflator increases by approximately 2.1 per cent per year for 2020 onwards, resulting in a GDP growth in current prices of 4 per cent per year on average. With this GDP deflator and productivity growth throughout the economy equivalent to 1.8 per cent per year (2020−2099), nominal productivity will rise by 3.9 per cent per year, which is also the wage growth in the overall economy. This rate of increase is consistent with the inflation target. Since wage growth corresponds to nominal productivity growth, total wages are constant as a share of GDP.

DEMOGRAPHICS DETERMINE DEVELOPMENTS IN TOTAL DEMAND

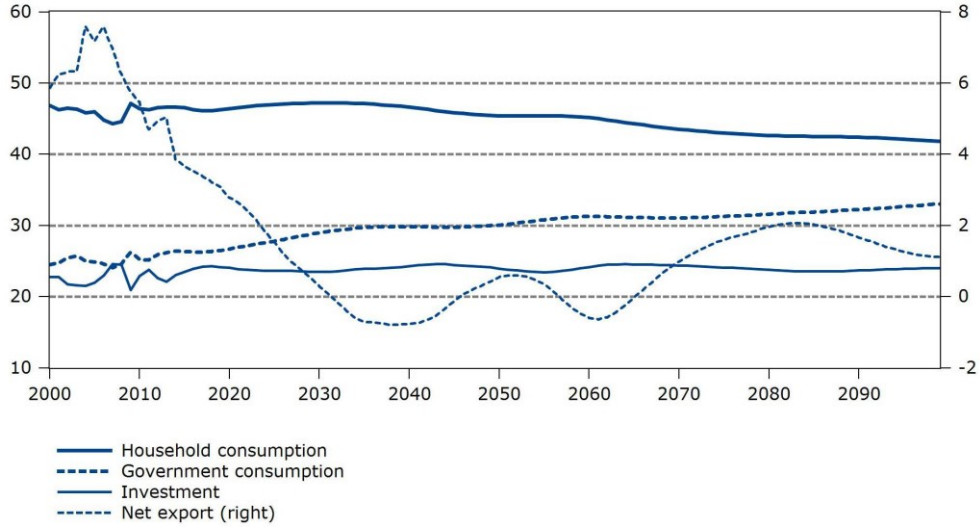
The development of items in total demand is largely dependent on demographic developments as this is significant to household savings and development in government consumption.

Demographics have less of a part to play in investments' share of GDP as Sweden is a small, open economy. Thus there is no direct relationship between savings in the Swedish economy and the volume of investments in Sweden. Instead, the difference between savings and investments is channelled via net exports. Sweden has had a significant foreign trade surplus since the 1990s. Net export as a percentage of GDP, however, has been falling since 2006, the year in which the dependency ratio began to rise. Demographic development in the future involves a shift in the population from a high proportion of middle-aged people, who have a high propensity to save, to elderly people, who save less or even take funds from their earlier savings in products such as occupational pensions. This motivates lower international net lending and is expressed through the fact that the foreign trade surplus continues to fall as a percentage of GDP (see Diagram 8). In the long term, a balanced scenario requires primary international net lending as a percentage of GDP to be almost zero. This rules out an unrealistic development whereby Sweden would accumulate ever-growing international assets or liabilities (as a percentage of GDP). The foreign trade surplus is assumed to amount to almost 1 per cent of GDP towards the end of the calculation period, which is motivated by the fact that the total of the EU contributions and development aid is assumed to be equivalent to approximately this level.

[3] Different measurement methods mean that CPI will rise slightly more quickly than the household consumption deflator. See Appendix 2 for a more detailed description of the assumptions relating to deflators.

Diagram 8 GDP by expenditure

Percentage of GDP



Sources: Statistics Sweden and NIER.

Instead of being determined by net lending, investments in the long-term projections are based on the assumption of a constant capital stock in the long term in relation to GDP. Investment will grow relatively quickly in the next few years as the economy recovers, rising to more than 24 per cent of GDP in 2017 when the economy returns to capacity and then largely holding at this level.

Government consumption is largely determined by demographic development. Personnel density in government welfare services is assumed to remain constant at the current level, which reflects the assumption of unchanged public sector commitment. A rising dependency ratio means, then, that an ever-increasing proportion of existing resources, in terms of hours worked in the economy, must be made available for the production of welfare services. This, together with an increase in the relative price of government consumption, means that this will produce an uptrend as a percentage of GDP until 2099 in the base scenario.[4]

Household consumption is assumed to rise with population growth plus a certain increase in standards. Thus household consumption per capita is growing at a constant pace. This reflects the fact that households prefer a smooth consumption profile over the life cycle. Hence the household savings ratio, rather than household consumption, follows demographic development. The increase in household consumption per capita is influenced by the size of government consumption as GDP is determined by supply, and the investments and net exports proportion of GDP follows the above-mentioned assumptions. Therefore, more government consumption means less household consumption, and vice versa. In the base scenario, household consumption per capita grows by 1.7 per cent per year, which is slightly more than the historical (geometric) mean between 1980 and 2013, which stood at 1.3 per cent per year. Historically strong development of overall consumption, that is to say the total

[4] The underlying driving forces behind the development of government consumption are described in detail in Chapter 3.

of household consumption plus government consumption, is a consequence of the demographic development which involves net exports falling as a percentage of GDP.

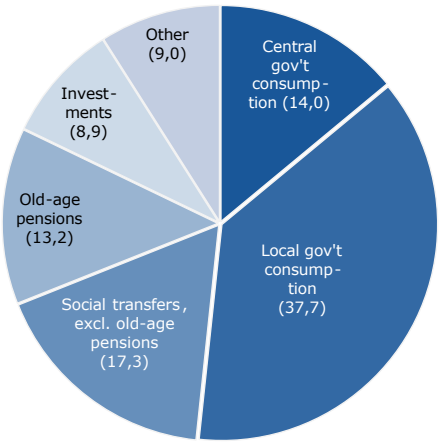
INTEREST RATES AND RETURNS

The average nominal interest rate on liabilities and interest-bearing assets is expected to reach a long-term level of 5 per cent in 2025. With inflation of 2 per cent, this gives a real interest rate of 3 per cent. This is in line with the assumptions for the real interest rate made by the European Commission and the Swedish government in their respective sustainability calculations. It is assumed that non-interest-bearing financial assets, such as shares and fund units, will increase in value by 2 per cent per year and generate a dividend yield of 3 per cent. This means that the total nominal return on these assets is also 5 per cent. These assumptions are greatly simplified. Historically, shares have given higher returns than bonds, and this risk premium, as it is known, may be expected to continue. With the assumption of differing returns on differing assets, however, public financial sustainability is susceptible to the composition of the public sector's assets and liabilities. The simplified assumptions in this report mean that development will be independent of the portfolio choices made in future. These are extremely difficult to forecast, and there are no set rules by which to abide.

3 Public expenses

The public sector's expenses are currently equivalent to about 50 per cent of GDP. Of these government expenses, more than half relate to government consumption, which consists of welfare services such as education, healthcare and care services, as well as other functions such as the judicial system and defence (see Diagram 9). Almost one-third of these government expenses involve social transfers to households in the form of old-age pensions, child benefits and unemployment benefits. Investments amount to less than one-tenth of the expenses. Interest payments on government debt and other liabilities in the public sector now amount to less than 1 per cent of GDP, compared with more than 5 per cent of GDP in the mid-1990s. Government debt as a percentage of GDP has declined since the 1990s and interest levels have fallen, so leading to a fall in interest expenditure. The falling interest expenditure has been one of several contributory factors in the reduction in government expenditure as a whole as a percentage of GDP since the 1990s. Even primary government expenditure – that is to say, total expenditure excluding interest expenditure – has fallen since the mid-1990s, from more than 56 per cent to just under 50 per cent in 2013. This is mainly explained by falling expenditure on social transfers in relation to GDP.

Diagram 9 Public sector expenditure (2013)
Percentage of total expenditure



Source: Statistics Sweden.

One fundamental principle in the evaluation of the long-term sustainability of public finances involves studying the development of income and expenditure with *unchanged policies* (or "unchanged rules"). The basic question is whether the present regulations are formulated in a way that allows government income and expenditure to coincide in the long term, or whether adjustments have to be made to either income or expenditure in order to prevent imbalances. The projections relating to government expenditure are made here in accordance with the principle of *unchanged public sector commitment*. Here, unchanged public sector commitment involves personnel density remaining the same in the welfare services, maintaining the same replacement rates in the benefit systems and increasing government investments at the same pace as the growth of the overall economy. An unchanged public sector commitment does not follow automatically by unchanged rules. Quite the opposite: active political decisions in favour of increases in expenditure are required so that the commitment is not erod-

ed over time. A narrower interpretation of unchanged regulations could involve grants and social transfers which are nominally regulated remaining unchanged and hence dwindling in size in real terms in the long run. However, a calculation method of this kind would not be particularly informative as regards whether the current level of welfare services and income protection can be financed with the current tax system. Unchanging regulations in this analysis are therefore viewed more as unchanged regulatory intentions or, in a slightly broader sense, unchanged ambitions in the public sector's overall commitment to its citizens.

In the base scenario in this report, there is a relatively extensive increase in government expenditure as a percentage of GDP during the projection period. The primary government expenditure will increase from the 2014 level of 49.7 per cent as a percentage of GDP to 54.6 per cent in 2099. This increase is explained mainly by increasing government consumption, while social transfers will fall slightly as a percentage of GDP. The occurrence of this development in the base scenario is studied below. The development of government expenditure and public finances in the alternative scenarios is studied separately in Chapter 5.

Government consumption

WELFARE SERVICES THREE-QUARTERS OF GOVERNMENT CONSUMPTION

Government consumption can be divided into *individual* (user-specific) and *collective* (joint) government consumption. Individual consumption consists of public services that can be linked to a specific individual, such as healthcare and education. These are simply referred to as welfare services in this report. Collective consumption is that which cannot be linked to the individual, such as defence or law and order. Almost three-quarters of government consumption is made up of individual consumption, while the rest is accounted for by collective consumption; this distribution has remained fairly stable over the past two decades. In the projections of government consumption, collective consumption is assumed to be dependent on the overall population growth. The projections of individual consumption, however, are dependent on the development of the population in various age groups, as the utilisation of welfare services differs significantly depending on age.

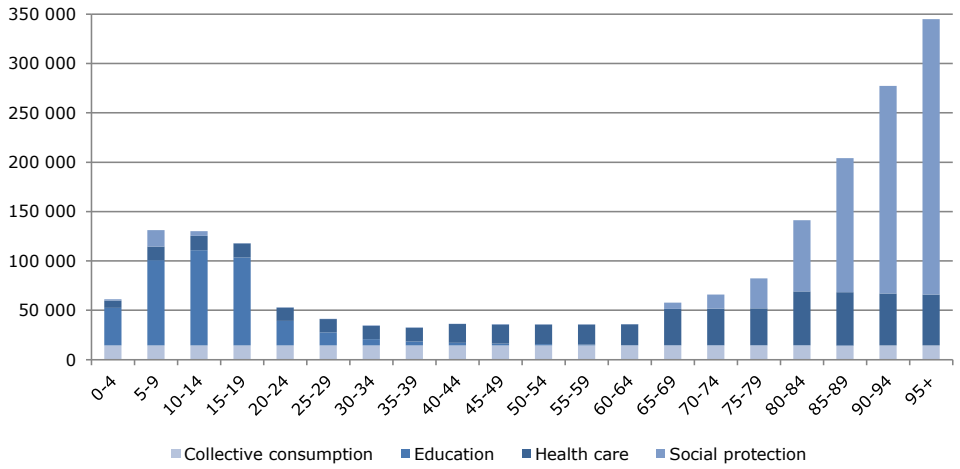
Individual government consumption can be roughly divided up according to three purposes, known as COFOG groups (Classification of the Functions of Government): *healthcare* (COFOG 7), *education* (COFOG 9) and *social protection* (COFOG 10). Expenditure for each and every one of these purposes accounts for approximately one-quarter of total government consumption expenditure. Social protection denotes public services in the form of elderly care, after-school childcare, daytime child care etc. (social transfers are not included in the term as transfers do not constitute government consumption). Diagram 10 shows the average cost per age group for these services in 2012. Each column in the diagram also includes the average cost of collective consumption per person (approximately SEK 15,000 and equal for all regardless of age, as they cannot be linked directly to specific users). Of course, for children and young people education is the welfare service which accounts for most of the government consumption costs. For children aged 5−9, there is also a cost for after-school care amounting to, on average, almost SEK 16,000 per child per year (this is classified as social protection, not education). Expenditure on welfare services for

individuals of working age is relatively low on average; in the 25−64 age groups, the average cost of welfare services is just over SEK 20,000 per person per year.

The average cost per individual for welfare services rises as of the 65−69 age group. For this age group, the average cost for individual government consumption is twice as high as for the 60−64 age group. For the 75−79 age group, the average cost is more than three times as high. Healthcare costs increase up to the age of about 80, but after that they remain constant at just over SEK 50,000 per individual per year. Social protection in the form of elderly care does, however, increase significantly with age, and for the oldest group (people aged 95 and over) it increased to almost SEK 280,000 per individual per year, on average.[5]

Diagram 10 Average cost per person for government consumption in various age groups (2012)

SEK per year



Source: Statistics Sweden.

UNCHANGED PERSONNEL DENSITY PROVIDES STANDARD INCREASE IN WELFARE SERVICES

An unchanged public sector commitment for welfare services and other government consumption can be defined in a number of ways. One common method for projecting government consumption is to work on the basis of the cost profile for welfare services (as shown in Diagram 10) and calculate an annual total cost based on a forecast of the development of the population in the various age groups. This can be viewed as a projection of government consumption in accordance with strict demographic needs. The public sector commitment then remains unchanged in the sense that there is no change in the standard of welfare services over time. Standard of the welfare services remains constant, at least in statistical sense, in that the individual receives the same amount of welfare services (according to the definition in the National Accounts) both now and in the future.

[5] The cost profile for welfare services is based on Statistics Sweden's calculations from 2012. In last year's report, the corresponding cost profile was based on information from 2005. Costs for the 90−94 age group have increased by 14 per cent in fixed prices, and by 27 per cent for the 95 and over group. The changes in costs are generally small in other age groups.

In this report, unchanged public sector commitment instead means that personnel density will remain the same in the production of all goods and services included in the government consumption basket. For example, this means that the number of teachers per student, like the average number of home-help service hours per 85-year-old, will remain the same in the future as it is today. The difference between unchanged volume per user and unchanged personnel density arises as soon as it is assumed that productivity will rise in the production of welfare services. An annual productivity growth of 0.25 per cent is assumed here. Besides constant personnel density, the distribution of costs in the production of welfare services is also assumed to be constant. As the prices of capital and input goods are assumed to increase more slowly than wages, the assumption relating to the constant distribution of costs will lead to personnel over time having more and more input goods with which to work. The two assumptions together mean that government consumption will grow 0.6 percentage points more quickly per year than is demographically motivated (see Appendix 2 for more detailed description of this assumption).

The selected definition of unchanged public sector commitment is of major significance to the development of government consumption in the long-term scenario. In last year's report, government consumption amounted to 23 per cent of GDP in 2060 in the scenario based on unchanged volume per user. In the scenario involving unchanged personnel density, government consumption amounted instead to almost 31 per cent of GDP in 2060.[6]

Development over the last 20 years can be estimated to be approximately halfway between the development rates indicated by unchanged volume per user and unchanged personnel density. The fact that unchanged public sector commitment is given the relatively ambitious meaning of unchanged personnel density in this report is not based on any assessment of appropriateness concerning how government consumption should develop. Rather, it is motivated by the fact that the constant personnel density criterion is relatively simple to relate to. With the assumption relating to the constant distribution of costs in the production of welfare services, unchanged personnel density means that expenditure on government consumption is constant as a percentage of GDP when the demographics remain constant.[7] The assumption of unchanged personnel density is also used in the NIER's fiscal scenarios 5−10 years ahead.

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[6] Government consumption can also be related to the standard development of the economy as a whole, measured in terms of GDP per capita. Unchanged public sector commitment can then be defined as meaning that the cost of welfare services remains constant as a percentage of GDP per capita. GDP per capita for 2014 stood at approximately SEK 400,000. Given that a 50-year-old individual utilised, on average, welfare services worth SEK 20,000, this is equivalent to 5 per cent of GDP per capita. The unchanged public sector commitment according to the principle of a constant GDP per capita percentage means that a 50-year-old will utilise welfare services equivalent to 5 per cent of GDP per capita in the future as well, regardless of how GDP develops. Weak GDP growth and/or strong population growth may then involve the standard of welfare services actually deteriorating, while GDP increasing more quickly than the population means an increasing standard of welfare services. In last year's report, government consumption amounted to 28 per cent of GDP in 2060 in the scenario using this definition of unchanged public sector commitment. See "Is an Unchanged Public Sector Commitment a Sustainable Commitment? An assessment of the long-term sustainability of Swedish public finances", *Occasional Studies No. 39*, March 2014, NIER.

[7] This means that the income elasticity of demand for welfare services is 1 and that the substitution elasticity between government consumption and other consumption is also 1.

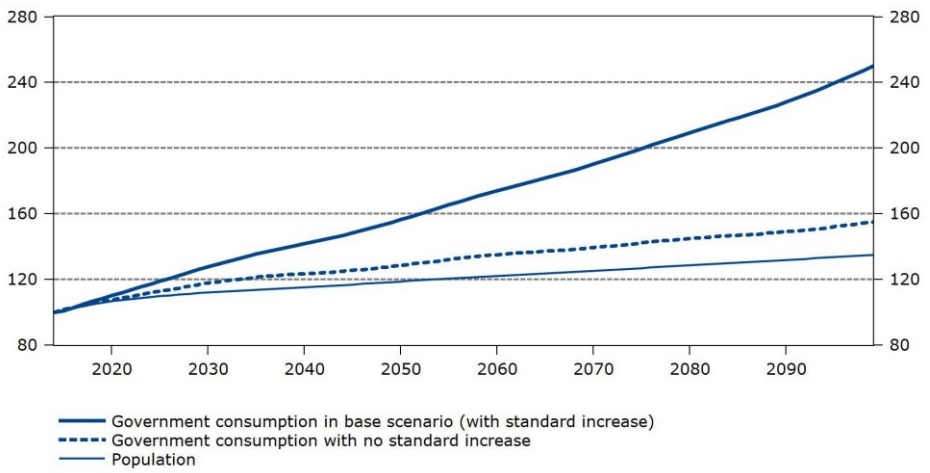
STRONG INCREASE IN GOVERNMENT CONSUMPTION IN THE BASE SCENARIO

According to the Statistics Sweden population forecast, the population will grow by about 35 per cent by 2099.[8] With a constant volume of welfare services per user, government consumption would grow in volume by 55 per cent in the same period (see Diagram 11). The fact that demographically driven consumption is growing more quickly than the population is due to the increasing demographic dependency ratio, which means that the number of children and elderly people (primarily elderly people) is increasing more quickly than the working-age population. Government consumption grows more quickly than the population as soon as groups with relatively high welfare consumption grow more quickly than groups with relatively low welfare consumption. Correspondingly, government consumption grows more slowly than the population if groups with lower welfare consumption are responsible for most of the population growth.

With the raising of standards assumed in the base scenario in the analysis, government consumption will grow by 150 per cent during the period, which means an increase from approximately SEK 1000 billion today to more than SEK 2500 billion by 2099, in constant prices. The difference in increase between the base scenario and the development involving a constant volume of welfare services per user illustrates the sensitivity in the analysis to the assumptions made concerning the growth rate for government consumption.

Diagram 11 Government consumption and population

Index 2014 = 100



Note: In the base scenario, a standard increase in welfare services is assumed to take place so that in terms of volume, government consumption (according to the National Accounts) will increase by 0.6 per cent per user per year.

Source: NIER.

The rate of increase for expenditure is determined partly by how quickly the relatively resource-intensive age groups grow, and partly by how high the costs are for each age group. Certainly, the 95 and over age group is associated with very high resource re-

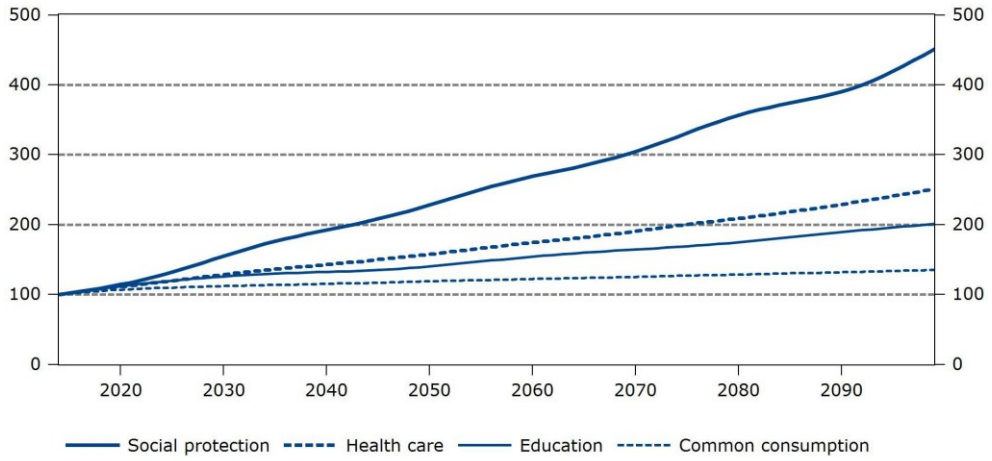
[8] Like the forecast in *The Swedish Economy*, December 2014, the calculations in this report are based on Statistics Sweden's population forecast of September 2014. Sensitivity calculations have been carried out on the basis of Statistics Sweden's revised population forecast of February 2015. The effects on public finances in the scenarios involving changes in the population forecast are very small.

quirements (on average almost SEK 350,000 per person per year), but the group remains relatively small in scope and thus does not affect the overall costs for welfare services to any major extent (see Diagram 1, Chapter 2). The increase is most pronounced between the ages of 75 and 89, where people aged 80−89 are associated with relatively high resource requirements on average. The fact that government consumption increases so much is explained in the first instance by the increase in the need for elderly care (social protection). The volume increase by 2099 in this category stands at more than 350 per cent, including the standard increase (see Diagram 12). This can be compared with the collective element of government consumption, which will slightly more than double in scope. The education and healthcare categories will also approximately double during the projection period.

The development of government consumption in the base scenario will mean a gradual increase as a percentage of GDP from approximately 26 per cent in 2014 to 33 per cent in 2099 (see Diagram 13). The biggest increase will be for social protection, which is responsible for almost 6 percentage points of the increase. As this will primarily be carried out under local government auspices, the municipalities will be responsible for the greatest increase in consumption as a percentage of GDP, from around 13 per cent at present to almost 18 per cent in 2099. Healthcare will be responsible for approximately 1 percentage point, while collective consumption and education expenditure will remain largely constant as percentages of GDP projections.

Diagram 12 Government consumption per purpose

Index 2014 = 100

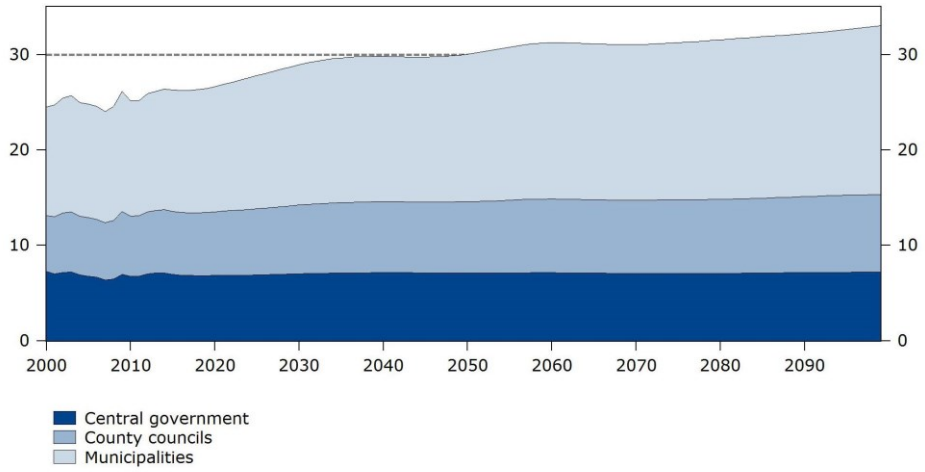


Note: Projections according to the base scenario's assumptions (growth rate 0.6 per cent beyond constant consumption volume per user).

Source: NIER.

Diagram 13 Government consumption as a percentage of GDP

Percentage of GDP



Sources: Statistics Sweden and NIER.

THE NEED FOR INVESTMENT INCREASES WHEN THE NEED FOR WELFARE SERVICES INCREASES

Government investment has averaged 4.5 per cent of GDP over the past 20 years. The local government sector accounts for slightly more than half of this, and central government for the rest.[9]

The assumption underlying the long-term projections is that local government investment will rise in line with municipal government consumption, whereas central government investment will increase in line with GDP. This assumption is motivated by the local government sector's core activity being the production of welfare services (demand for which is mainly demographically driven), whereas central government is responsible more for collective government consumption and the provision of collective utilities (demand for which can be expected to grow more in line with the economy as a whole). Central government investment expenditure is therefore constant as a share of GDP (2.4 per cent) in the projections. Local government investments will grow from 2.3 per cent of GDP in 2014 to approximately 3 per cent by 2099. The increase in local government investments follows on from the assumption concerning the huge increase in local government supply of welfare services in future.

Pensions and other social transfers

Approximately one-third of government expenses involve social transfers to households. These expenses have decreased over the past 20 years, both as a percentage of total expenditure and in relation to GDP (see Table 2). As a percentage of GDP, this expenditure has fallen from approximately 20 per cent in the mid-1990s to just over 15 per cent in 2014. This decline is due to reduced payments of unemployment bene-

[9] This year's report is based on the new standard for national accounts, ENS 2010. According to this standard, the concept of investment is extended to include investments in R&D, which increases the investments' percentage of GDP compared with older national accounts (ENS 95) which formed the basis for last year's report.

fits compared with 1990s levels, reduced benefits for long-term sick leave and early retirement, but also a certain reduction in the various old-age pension forms. Total benefits for ill-health amounted to 3.5 per cent of GDP from the end of the 1990s to around 2005, and since then they have fallen to 2 per cent of GDP (early retirement was included in the pension concept until 1998 and then became disability and sickness benefit, which is part of the ill-health concept from 1999 onwards). Labour market benefits are responsible for a further 2 percentage points of the reduction in expenditure for social transfers.

Table 2 Transfers to households

Percentage of GDP

	1995	2000	2005	2010	2013
Pensions[1]	11.0	7.9	7.9	7.9	8.4
of which the old-age pension system	6.0	5.8	5.7	6.2	6.7
Labour market[2]	3.0	1.8	1.5	1.0	0.9
Ill-health[3]	1.4	3.3	3.5	2.2	2.0
Family and children[4]	2.6	1.8	1.8	1.7	1.8
Studies[5]	0.5	0.6	0.4	0.4	0.4
Financial assistance[6]	0.7	0.5	0.4	0.4	0.3
Other[7]	1.3	1.3	1.5	1.7	1.6
Total	**20.5**	**17.2**	**16.9**	**15.3**	**15.4**

[1] Income and supplementary pensions, guaranteed pensions, survivors' pensions, occupational pensions for government workers and housing supplement for pensioners. [2] Benefits on unemployment and in labour market measures, wage guarantee. [3] Sickness and rehabilitation benefits, disability and sickness benefit, occupational injury compensation, disability allowance. Disability and sickness benefit were included in pensions (early retirement pension) until 1998. [4] Parental benefit, child benefit, care allowance, housing allowance. [5] Student grants, student aid. [6] Social benefits. [7] Assistance benefits, asylum benefits and elderly income support and other transfers to households.

Source: Statistics Sweden.

There has been a certain reduction in payments of state pensions (apart from the reclassification of early retirement pension to disability and sickness benefit). These include guaranteed pensions, survivors' pensions, widows' pensions, and housing supplement for pensioners. Payments from the old-age pension system, on the other hand, have increased marginally as a percentage of GDP since it was introduced in its current form in the late 1990s, partly as a result of the increasing old-age dependency ratio.

Unchanged payment rates in the social transfers mean that benefits are assumed to grow in line with wage development. The tendency to utilise contributions is assumed to remain the same in the future among various age groups as it is at present. These assumptions mean that social transfers, excluding payments from the old-age pension system, will virtually grow in line with GDP as soon as the cyclical effects are assumed to have abated. Thus as a percentage of GDP, this expenditure remains almost constant in the projections.

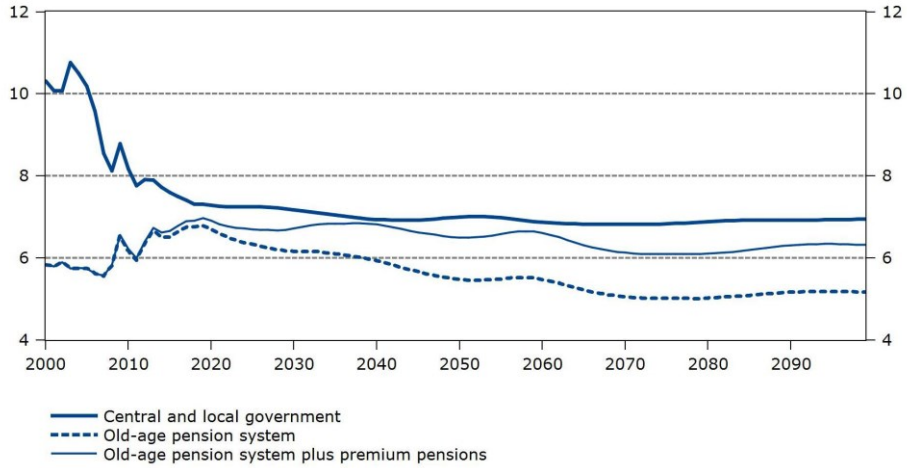
DECLINING REPLACEMENT RATE IN THE OLD-AGE PENSION SYSTEM

The payments of the old-age pension system are not projected in accordance with the unchanged replacement rate principle, but are based on calculations in accordance with the Swedish Pensions Agency's model indicating what will actually happen to

these payments. According to this forecast, payments from the old-age pension system will fall from the current level of 6.5 per cent of GDP to around 5 per cent from 2070 onwards. At the same time, payments from the premium pension system will increase in scope and stand responsible for a growing percentage of pensioners' income. Together, payments from the old-age pension system and the premium pension system will constitute an almost constant percentage of GDP in the projections (see Diagram 14).[10]

Diagram 14 Social transfers

Percentage of GDP



Source: NIER.

The number of pensioners is growing faster than the number of people in work throughout much of the projection period. This, combined with the fact that pension payments from the old-age pension system are reduced as a percentage of GDP in the projections, means that payments per pensioner are growing more slowly than wage development. This in turn means that the replacement rate in the pension system is declining.[11] In the projections, the replacement rate in pension payments is halved from approximately 45 per cent at present to around 22 per cent by 2099 (see Diagram 15). If the anticipated payments from the premium pension system are included in the calculations, the replacement rate will amount to around 27 per cent by 2099. There are also occupational pensions, which are of significant size nowadays for all wage earners with collective agreements, and private pension plans.

The fact that pension payments are increasing more slowly than wage development is due primarily to the structure of the pension system. As the expected average life expectancy increases, a specific pension contribution total deposited has to be shared out among an ever-increasing number of pensioners if the retirement age remains

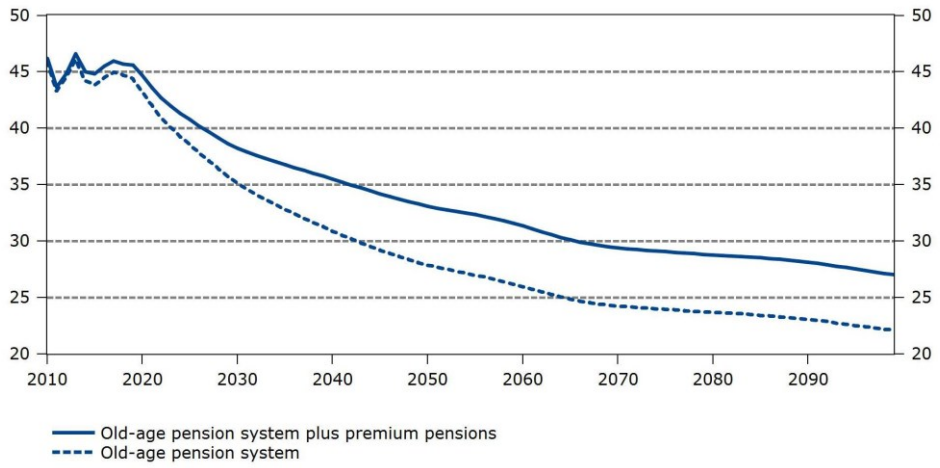
[10] According to the National Accounts, the premium pension system is not part of the public sector. Thus payments from this system do not represent expenditure for the public sector.

[11] The replacement rate in the old-age pension system is calculated here as the ratio of pension payments per pensioner to the average wage of all workers. This definition differs from the conventional definition for the pension system's replacement rate, which instead is based on a newly granted pension in relation to final pay. In its base scenario, the Swedish Pensions Agency (2014) calculates that a person born in 2000 who retires at the age of 65 will receive, on average, a pension equivalent to 33 per cent of his/her final pay. The replacement rate for a 65-year-old who retires in 2014 is, according to the Swedish Pensions Agency, around 45 per cent (including the supplementary pension paid to people born up to and including 1953).

unchanged. According to the Swedish Pensions Agency's calculations, two-thirds of the increase in the expected average life expectancy must be spent working for the overall replacement rate from the old-age pension system and the premium pension system to remain at the present level.[12]

Diagram 15 Pension payments relative to average wages

Percentage



Sources: Statistics Sweden and NIER.

[12] See the Swedish Pensions Agency (2014), "Orange report 2013".

4 Public finances in the base scenario

Public expenditure increases considerably in the base scenario as a consequence of an increasing need for welfare services. With an unchanged public sector commitment, expenditure for government consumption and government investments together will increase by over 7 per cent of GDP until 2099. Social transfers and other primary expenses are, however, reduced slightly in the projections, which means that the primary expenses as a whole will increase by approximately 5 per cent of GDP. With unchanged tax rates, this will create a growing deficit in public finances in the long-term projections.

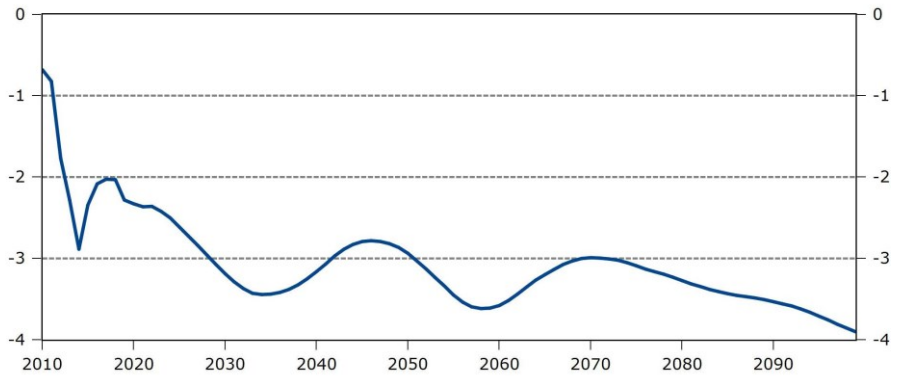
UNDERFUNDING IN THE BASE SCENARIO

Public finances are showing a deficit right from the outset of the projections. Government net lending is estimated to be −2.2 per cent of GDP in 2014 according to the forecast in *The Swedish Economy*, December 2014. The slump is contributing to this deficit, but essentially the deficit is structural; structural net lending amounted to −1.6 per cent of potential GDP in 2014 according to the 2014 December forecast. Primary net lending, which consists of net lending minus the net of capital income and interest expenditure, is estimated to be −2.9 per cent in 2014 before then being reinforced this year and in coming years as the economic situation returns to normal.[13]

The growing government expenditure during the projection period, combined with unchanged tax rates, means that the deficit currently prevailing in the public finances will increase and continue growing. Government primary net lending will fall gradually to −3.5 per cent of GDP in the early 2030s and remain at that level in the projections until 2099 (see Diagram 16). As expenditure increases must be financed by loans if tax rates remain unchanged, the deficit will lead to the build-up of major debt and high interest expenditure, which will lead to large negative net lending.

Diagram 16 Government primary net lending

Percentage of GDP



Note: Projections according to the base scenario (if tax rates remain unchanged).

Sources: Statistics Sweden and NIER.

[13] The forecast presented in *The Swedish Economy*, December 2014, includes tax increases between 2016 and 2019 which are assumed to finance expenditure reforms. These tax increases are not included in the calculations which form the basis of this report. The net of capital income and interest expenditure has been positive in the public sector since 2005, which is a result of the financial net wealth (financial assets minus liabilities) being positive since then.

The so-called S2 indicator amounts to 3.3 in the base scenario. The indicator value means that primary net lending must increase to an extent equivalent to 3.3 per cent of GDP – immediately and permanently – for public finances to remain balanced in the long term.[14] In other words, the indicator can be interpreted as the scope of the tax increases or expenditure reductions required in order to create long-term sustainability in the public finances.

However, the S2 indicator should be interpreted with caution for at least two reasons. Firstly, the indicator can only be interpreted meaningfully if the scenario forming the basis for the calculation is internally consistent and reasonable. The large increase in government consumption taking place in the base scenario, combined with unchanged tax rates, creates an imbalance between public sector finances and household finances. As government consumption increases, household consumption shrinks as a percentage of GDP.[15] As the increase in public expenditure is financed by loans (rather than being financed by taxes), households choose to save a relatively large amount of their income. Over time, saving leads to a very large build-up of wealth among households, while the public sector is deeply in debt. This build-up of wealth among households will lead to large capital income over time. This capital income will be taxed in turn and result in increased tax revenues. Therefore, in the model-generated base scenario – in theory – tax revenues will increase as a percentage of GDP by almost 3 percentage points in the projections, although tax rates will remain unchanged (see Diagram 17). The fact that the tax ratio would increase in this way if tax rates remain unchanged is unrealistic as the development of the underlying tax base (household capital income) is unreasonable. This means that the S2 indicator underestimates the need for tax increases in the base scenario.

Secondly, the conventional calculation of the S2 indicator constitutes a static calculation based on the assumption that primary net lending can be improved (by means of tax increases, for example) without affecting the underlying financial net lending included in the calculation. It can be stated that the conventional S2 calculation is based on the assumption that the tax bases are exogenous; that is to say, that they are not affected by changes in the tax rates. However, there is reason to believe that the tax bases would change in the event of a large tax increase, which means that taxes need to be increased more than the constant increase shown by the S2 indicator.[16]

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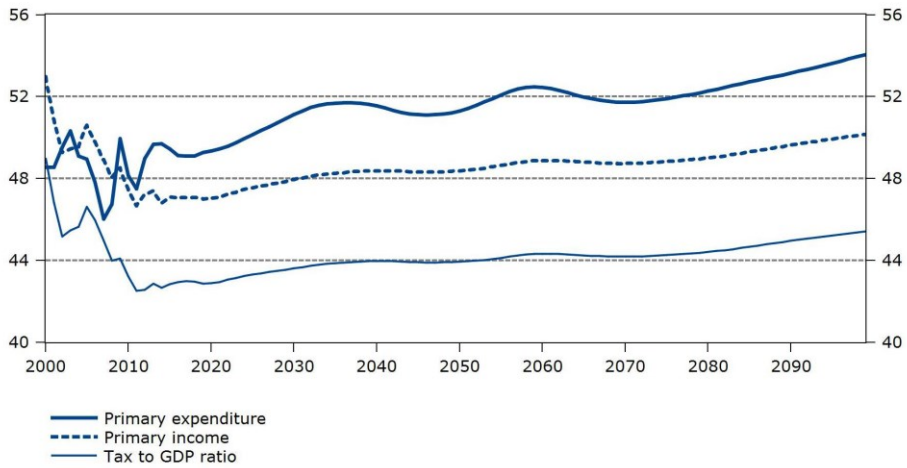
[14] See last year's report for a presentation and derivation of the S2 indicator: "Is an Unchanged Public Sector Commitment a Sustainable Commitment? An assessment of the long-term sustainability of Swedish public finances", *Occasional Studies No. 39*, March 2014, NIER.

[15] Both net exports and investments are assumed in the long term to remain unaffected by the development in household and public sector finances. Net exports will amount to around 1 per cent in the long term, which will finance the net outflows to other countries in the form of aid and EU contributions. This is a simplistic assumption. It is reasonable for net lending and the financial international net position to be affected permanently if taxes change. The rate of investment in the economy is assumed to maintain a constant capital stock size as a percentage of GDP (see Chapter 2).

[16] Increased tax on employment income may also reduce the supply of labour and hence GDP, which would further drive up the need to increase taxes.

Diagram 17 The public sector's primary income and expenditure
Percentage of GDP



Note: Relates to the base scenario with tax rates remaining unchanged.

Sources: Statistics Sweden and NIER.

THREE EXAMPLES OF TAX INCREASES TO FINANCE THE WELFARE COMMITMENT

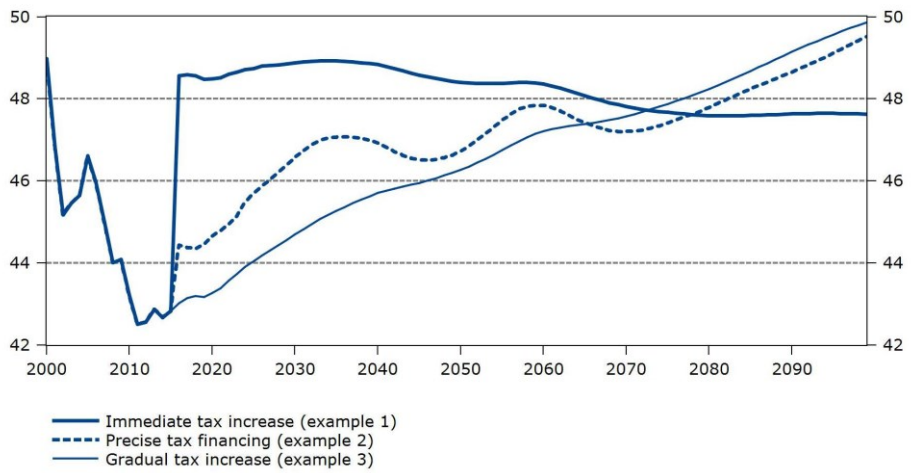
As a complement to the static S2 calculation, simulations were carried out to determine the extent to which taxes need to be increased in order to finance an unchanged public sector commitment and achieve balanced public finances in the long term. These simulations are based on an iterative process, increasing taxes, allowing the tax bases to develop with respect to this, and then calculating the S2 indicator. The tax increase expressed as a percentage of GDP which provides an S2 indicator of 0 can then be viewed as an adjusted S2 indicator, which we will term "S2+" here. There is an infinite number of ways in which to increase taxes in the scenarios which, given the developments in government expenditure, will generate an S2 indicator amounting to zero. Similarly, the expenditure can be adapted to unchanged taxes, of course, or else combinations of tax increases and slower expenditure increases can be studied, generating finances balanced in the long term. Three examples of tax increases are studied here which finance an unchanged public sector commitment and meet the criterion of public finances in long-term balance.

In the first example, taxes are increased immediately and permanently by a certain percentage of GDP. This can be said to be equivalent to the principle for the conventional S2 indicator. This example can be motivated by stating that it involves the highest possible degree of stability in the tax system and hence minimises the efficiency losses arising when taxation is changed. In the second example, taxes are adjusted in a way which finances expenditure precisely, year by year. This means that financial net lending is zero each year and thus meets a balance target for the public sector. Taxation can then be considered to reflect an even distribution between generations, but takes place at the expense of constantly varying taxes. The third example is a compromise between the other two examples and involves a gradual increase in taxes over time.

The simulation with an immediate tax increase (example 1) shows that the tax increase required to achieve public finances sustainable in the long term in the base scenario

amounts to 5.6 per cent of GDP (rather than 3.3 per cent, as indicated by the conventional S2 indicator). The tax ratio would then be increased from the current level of just under 43 per cent of GDP directly up to approximately 49 per cent (see Diagram 18). This is equivalent to the tax ratio which Sweden had in the late 1990s, although this was at its historically highest level at that time. The need for such a large tax increase follows on from the fact that the expenditure ratio in the public sector increases by no less than 5 percentage points in the base scenario, while at the same time the public finances show a primary deficit right from the outset (2015) of just over 2 per cent of GDP. The fact that the tax increase is so much greater than that provided by the conventional S2 indicator in the base scenario is due to the fact that household capital income does not develop in the unrealistic way as seen with unchanged tax rates.[17]

Diagram 18 Tax ratios for various tax increase methods (examples 1-3)
Percentage of GDP



Sources: Statistics Sweden and NIER.

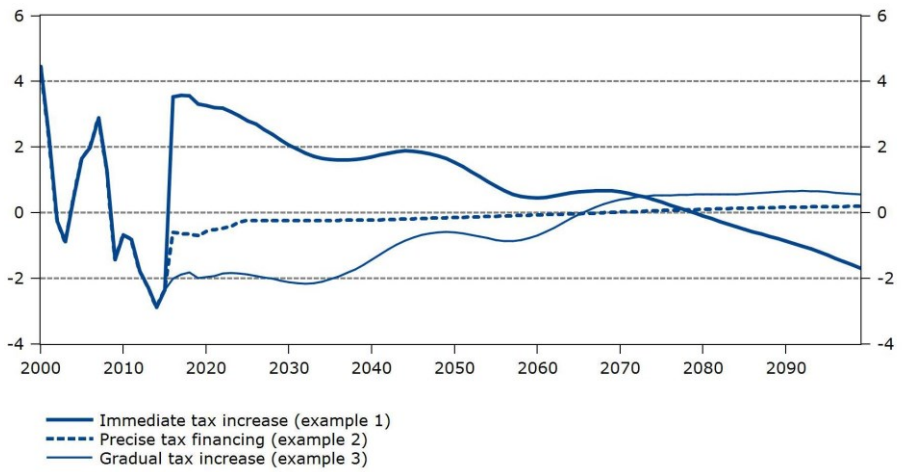
Initially, a tax increase of this kind would lead to major surpluses in the public finances. The primary surplus will then decline as demographic development increases the need for welfare services. The primary surplus will turn into a deficit by the end of the projection period (see Diagram 19). Even so, sustainability is achieved in the example as the large surpluses at the start of the projections mean that the public sector can accumulate large net financial wealth and achieve high financial net lending.

The assumptions which contribute to the large increase in the expenditure ratio for the public sector can, of course, be questioned. In Chapter 5, we will study how expenditure is affected by altered assumptions for both the need for welfare services and the tendency for people to work for longer into old age. But given the expenditure development in the base scenario, it is possible to query the plausibility of an immediate and permanent tax increase of almost 6 per cent of GDP. A large, immediate tax increase of this kind would not be implemented in practice. Not least, this would

[17] In example 1, with an immediate and permanent tax increase of 5.6 per cent of GDP, the tax ratio falls by approximately 1.5 percentage points in the long-term projections after the initial increase. This is due to the fact that households' financial wealth is gradually eroded as a consequence of the large tax increase. This leads to shrinking capital income for households, and in turn lower tax revenues from capital income taxation.

mean that people of working age, both today and for some time into the future, would make major sacrifices in order to finance growing welfare commitments that would arise well into the future.

Diagram 19 Government primary net lending (examples 1–3)
Percentage of GDP



Sources: Statistics Sweden and NIER.

In the second example as well, in which the tax increases are large enough to make net lending zero every year in the projections, taxes need to be increased relatively extensively immediately (2016). The increase is required in order to raise net lending from –1.8 per cent at present (2015) to 0 per cent in 2016. After that the tax rate increases gradually, from just over 44 per cent to almost 50 per cent at the end of the projection period. The tax burden here reflects the development of government expenditure year on year, which in turn largely reflects how government consumption develops in the scenario. Taxes rise gradually until the mid-2030s, then remaining almost unchanged until the early 2070s, after which a new period of tax increases takes over. The tax rate is higher at the end of the projection period in this example than in the example with an immediate tax increase, which is due to the fact that no major government financial wealth is built up which future generations can use in order to finance their welfare commitments. Financial net wealth remains more or less unchanged in the projection in this example.

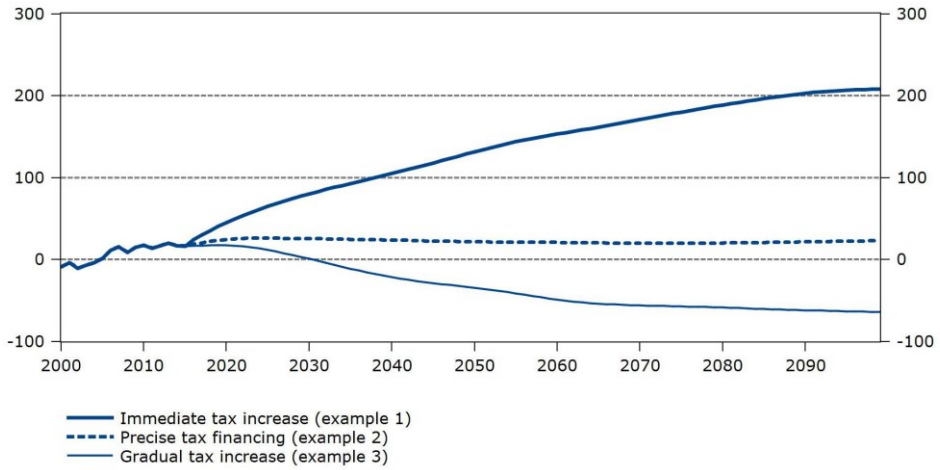
The example with precise tax financing means that no surplus or deficit occurs at all in the government finances, not even in the short term. It may seem unrealistic that the tax ratio should be adapted precisely to prevailing expenditure pressure year on year. In the third example of tax increases, which also involves long-term sustainability in government finances, taxes are increased gradually without taking into account temporary fluctuations in the expenditure ratio. In this example, there is no rapid tax increase straight away at the start of the projection; instead, a gradual increase in the tax ratio takes place throughout the entire projection period.

The final level of the tax ratio in this example is marginally higher than in the previous example as taxes are increased more slowly at the outset. Primary net lending would be negative far into the projection period, until the mid-2060s, which means a long period of debt accumulation. In this example, therefore, it can be stated that current

generations will partly finance their welfare commitment at the expense of future generations. The government financial net wealth will be consumed up to the early 2030s and then turn into a growing net liability which reaches 80 per cent of GDP at the end of the projection period (see Diagram 20). Therefore, it is possible to query this example of tax increases from a fairness perspective, in the same way as the example with an immediate large tax increase. In this example, future generations will be partly responsible for financing our welfare commitments; whereas in the earlier example, the opposite is true.

Diagram 20 Government financial net wealth

Percentage of GDP



Sources: Statistics Sweden and NIER.

There are many other examples of how taxes can be adjusted throughout the projection period in order to achieve long-term sustainability with the assumptions made concerning development of government expenditure. Even so, the message is largely the same; long-term sustainability requires the present deficit in the finances and the future expenditure increases to be financed with tax increases. With an initial deficit of over 2 per cent of GDP and an expenditure ratio in the base scenario which is increasing by 5 percentage points of GDP, the sustainability calculation requires a tax increase over the period equivalent to approximately the sum of these. With unchanged tax rates, the welfare commitment would need to be reduced instead, in the sense of reduced personnel density in certain welfare services.

Table 3 summarises the scope of the tax increases and the effects on government net lending and government wealth build-up in the three examples. The examples meet the criterion of finances sustainable in the long term in the sense that the intertemporal budget restriction is met (S2 = 0). The sustainability of these examples in a broader sense can of course be discussed. The first example of tax increases can be considered to fall to the criterion concerning political feasibility. Voters today would not accept sharing so much of their resources in order to finance the welfare commitments of future generations. The example with the gradual tax increase would involve negative government net lending throughout the entire projection period and be inconsistent with both present surplus targets and the demands of the Stability and Growth Pact for limited government debt and limited government budget deficits.

However, the purpose of studying these examples of tax increases is not to find the optimum method for tax increases, but to provide a nuanced illustration of the tax increases that would be needed given the expenditure increases taking place in the base scenario. In the next chapter, we will study the effects on government finances of deviating from the assumptions of constant labour market behaviour and an unchanged need for welfare services in all age groups.

Table 3 Three examples of tax increases which achieve sustainable government finances

Percentage of GDP

	Example	2015	2016	2099	Change, 2015–2099
Tax ratio	1 Immediate tax increase	42.8	48.6	47.6	4.8
	2 Precise financing	42.8	44.4	49.5	6.7
	3 Gradual tax increase	42.8	43.0	49.9	7.1
	Unchanged taxes	42.8	42.9	45.4	2.6
Primary net lending	1 Immediate tax increase	−2.3	3.5	−1.7	0.6
	2 Precise financing	−2.3	−0.6	0.2	2.5
	3 Gradual tax increase	−2.3	−2.0	0.6	2.9
		−2.3	−2.1	−3.9	−1.6
Financial net lending	1 Immediate tax increase	−1.8	4.2	7.2	9.0
	2 Precise financing	−1.8	0.0	0.0	1.8
	3 Gradual tax increase	−1.8	−1.4	−3.9	−2.1
		−1.8	−1.5	−23.3	−21.5
Net financial wealth	1 Immediate tax increase	16.6	24.4	208	191
	2 Precise financing	16.6	18.7	23.1	6.5
	3 Gradual tax increase	16.6	16.8	−64.0	−80.6
		16.6	16.7	−372	−389

Note: Example 1 involves an immediate and permanent tax increase (from 2016) in order to achieve S2 = 0. Example 2 involves tax adjustments which achieve financial net lending amounting to zero every year throughout the entire projection period (from 2016), thereby achieving S2 = 0. Example 3 involves a gradual tax increase throughout the entire projection period to achieve S2 = 0. 2015 values based on *The Swedish Economy*, December 2014.

Source: NIER.

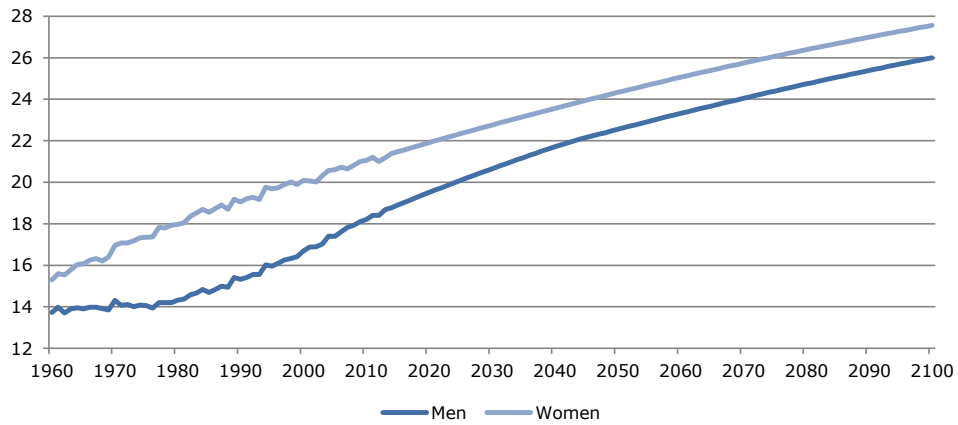
5 Alternative scenarios

In the base scenario, behaviour among different labour market groups is assumed to be the same in the future as at present. The employment rate among 50-year-old women, for example, is assumed to be the same in 2099 as it is at present. Likewise, the average age for withdrawal from the labour market – retirement – is assumed to remain the same over time. In the base scenario, the need for welfare services in various age groups is also assumed to remain constant over time. These assumptions may appear pessimistic, given the increase in expected average life expectancy found in Statistics Sweden's population forecast. The expected remaining average life expectancy for a 65-year-old was approximately 14 years in 1960, and has increased since then to approximately 20 years. This increase is expected to continue for the foreseeable future. Statistics Sweden estimates that by 2099, the expected remaining average life expectancy for a 65-year-old will have increased by a further seven years to approximately 27 years (26 years for men, 27.6 years for women; see Diagram 21).

One can make various assumptions on how the increased expected life expectancy comes about. A pessimistic assumption is that individuals' lives will be extended by "frail" years. The seven extra expected years of life for an average 65-year-old in 2099 would then be lived with the same state of health as today's individuals aged 85–92. The number of "healthy" years of life would be the same as present (this assumption can therefore be called "constant health"). One hypothesis behind such a development is that the prevalence of age-related chronic diseases would be about the same in the future as at present, but that medical advances would reduce the mortality rate from these diseases.[18]

Diagram 21 Expected remaining average life expectancy for 65-year-olds

No. of years



Source: Statistics Sweden.

A more optimistic assumption is that life will be extended by mainly "healthy" years. The extra expected years of life for 65-year-olds in 2099 would then involve more years with the health of a 65 or 70-year-old. Ill-health would then be postponed into old age so that the number of "frail" years would be equal to the number of years

[18] See Olshansky et al. (1991), "Trading off longer life for worsening health: The expansion of morbidity hypothesis", *Journal of Aging and Health 3*, 194–216.

experienced today (this assumption can therefore be called "constant disability"). The underlying hypothesis for such a development is that better lifestyles and improved healthcare will reduce the prevalence of chronic illnesses and delay their development, but also that – as in the scenario above – medical advances will lead to a reduction in mortality rate for people suffering from chronic illnesses.[19] An even more optimistic scenario is that the number of healthy years, by the same reasoning, will increase more than the expected increase in average life expectancy (a scenario which can be called "compressed disability").[20]

The relatively pessimistic assumption, with "constant health", can be considered consistent with a certain increase in the average retirement age. A given total of pension earned will give less pension per month over 27 years than over 20 years. If the expected pension is felt to be barely sufficient, this may mean that more people will choose to work for longer into old age, despite having the same health as for the respective age groups at present. At the same time, work environments and working conditions may change in a manner which makes it easier for people to go on working longer into old age. As regards the need for welfare services, it is more difficult to argue that the need would decline for a given age group in the constant health scenario.

With the optimistic assumption (constant disability), there are strong reasons to believe that both labour market behaviour and the need for welfare services among the elderly will be "rejuvenated" as the average life expectancy increases. Besides the fact that working conditions, work environments and financial incentives could conceivably encourage people to go on working for longer into old age, the significantly improved health for an average 70-year-old would also favour later withdrawal from the labour market. If the ill-health experienced by the average 80-year-old today is postponed until the age of 87, it may also be assumed that the need for welfare services will be postponed to a corresponding extent.

This chapter will study three alternative scenarios. In the first alternative scenario, it is assumed that withdrawal from the labour market over time will be postponed until further into old age. In the second, improved health is assumed to lead to a reduced need for welfare services among the elderly. In the third alternative scenario, the assumptions in the first and second scenarios are combined.

Table 4 Assumptions in the scenarios

	Retirement age	Need for welfare services
Base scenario	Unchanged	Unchanged
Alternative scenario I	Rising gradually by 5 years	Unchanged
Alternative scenario II	Unchanged	Declining gradually
Alternative scenario III	Rising gradually by 5 years	Declining gradually

[19] See Manton (1982), "Changing concepts of morbidity and mortality in the elderly population", *Milbank Quarterly 60*, 183–244.

[20] See Fries (2003), "Measuring and monitoring success in compressing morbidity", *Annals of Internal Medicine 139*, 455–459 and the Swedish Ministry of Health and Social Affairs (2010), "Den ljusnande framtid är vård – delresultat från LEV-projektet". For an extended discussion of various hypotheses relating to health and increased average life expectancy, see Batljan (2007), *Demographics and future needs for public long term care and services among the elderly in Sweden*, Stockholm Studies in Social Work 24, Department of Social Work, Stockholm University.

Alternative scenario I: Postponed withdrawal from the labour market

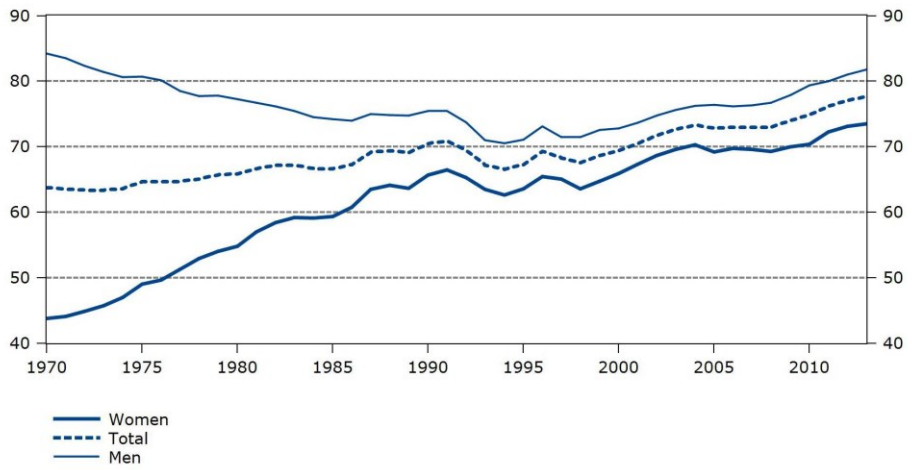
THE AGE FOR WITHDRAWAL FROM THE LABOUR MARKET HAS BEEN POSTPONED

Elderly people are participating in the labour market to an ever-increasing extent. Since the 1970s, labour force participation in the 55−64 group has gone from just under 65 per cent to almost 80 per cent in 2013 (see Diagram 22). Until the mid-1980s, this was explained entirely by a large increase in labour force participation among women. Labour force participation for men fell during the period. Since the mid-1990s, however, the increase in labour market participation has been largely equal between the sexes.

Labour market participation in the 55−64 age group, despite the increase, is still lower than in younger age groups, so there is a certain amount of potential for greater participation from this group. However, the most significant change occurs at the age of 65, when participation falls from about 50 per cent for 64-year-olds to just under 30 per cent for 65-year-olds. Although participation has increased in the over 65s group in the 2000s, the level of labour force participation in this group is still very low, which means significant potential for increased labour market participation in future.

Diagram 22 Labour force participation, people aged 55−64

Percentage of population aged 55−64



Source: Statistics Sweden.

The increase in labour force participation among elderly people which has been seen over the last few decades can be explained by a number of factors. Particularly important is women's entry to the labour market, as a high level of labour force participation late in life normally presupposes a high level of labour force participation earlier in life. The pension system has also been reformed to provide a system which, to a greater extent than before, encourages people to go on working for longer. In recent years, certain taxes also been adjusted in order to increase driving forces and opportunities for elderly people to remain in the labour market.

GRADUAL LATER WITHDRAWAL FROM THE LABOUR MARKET

The base scenario works on the basis of unchanged labour market behaviour according to the patterns which prevailed in 2013. These calculations use the KAMEL model, which distinguishes between labour market groups according to age (60 groups, 15−74 years), sex and national origin (Sweden, Nordic region, EU, outside EU), which means that there is a total of 60 × 2 × 4 = 480 labour market groups in the model. Each group is assumed in the base scenario to have constant labour market behaviour over time. With this assumption, all changes in the labour market if the projections are explained by demographic composition effects. If groups with a high employment rate grow more quickly than groups with a low employment rate, the level of employment as a whole increases in the projections. The other labour market variables are projected according to the same logic.

In this alternative scenario, the reference retirement age argument used by the Government Commission for Longer Working Life and Retirement Age is used as a basis.[21] The Commission proposes that a reference retirement age be introduced as a way of influencing the norm for the year at which men (voluntarily) retire. According to the Commission, this reference retirement age should be increased as the average life expectancy of the population increases. The reference retirement age is implemented in the proposal as a concept in 2019, standing at 66 years at that time. It would then be increased to 67 years in 2022, 68 years in the mid-2030s and then go on increasing as the expected life span rises. The Commission proposes that the reference retirement age be established according to the following principle:

$$R_t = 65 + 2/3 \cdot (ML_{t-5} - ML_{1997})$$

where R_t indicates the reference retirement age t and ML_t indicates the remaining average life expectancy for 65-year-olds in year t.[22] As Statistics Sweden's population forecast indicates that the remaining average life expectancy will increase by more than seven years until the end of the 2000s, the reference retirement age would increase by five years up to 2099.

In this scenario, all individuals aged 60−74 are assumed to gradually rejuvenate their labour market behaviour by five years until 2099. This means that an average 60-year-old in 2099 will behave like today's average 55-year-old in terms of labour market participation, employment, hours worked, etc. Likewise, the 65-year-old in 2099 will behave like today's 60-year-old, and the 74-year-old in 2099 will behave like today's 69-year-old. This change in behaviour is intended to correspond to the adaptation of pension behaviour implicitly proposed by the Government Commission for Longer Working Life and Retirement Age. The change in behaviour is assumed here to be a result of a change in individuals' preferences for work as a consequence of improved health and increased remaining life expectancy. The changing behaviour is thus assumed not to be a result of institutional changes.

The implication of the assumption is illustrated in Diagram 23. The employment level for 64-year-olds in 2015 stands at 50 per cent according to the KAMEL projections

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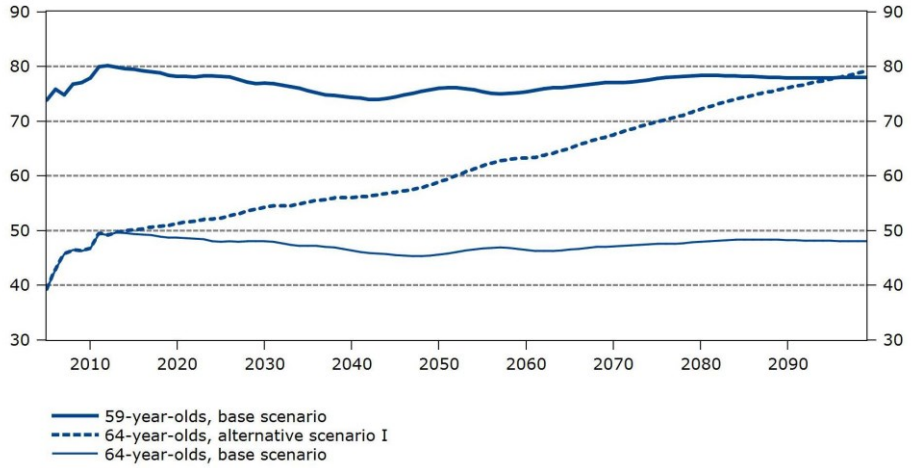
[21] Swedish Government Official Reports (2013), "Åtgärder för ett längre arbetsliv".

[22] The Commission uses a slightly different formula for the reference retirement age:
$R_t = 65 + 2/3 \cdot (ML_{t-1} - ML_{1997})$. The principle here is that the reference retirement age is calculated for year t but only implemented in year t+4.

(based on Labour Force Survey results for 2013). The employment level for 59-year-olds is around 80 per cent. The assumption for the alternative scenario means that 64-year-olds will gradually increase their employment level to approximately 80 per cent by 2099. The fact that the employment level among 64-year-olds in 2099 in the alternative simulation does not coincide precisely with the employment level for 59-year-olds in the regular projections is due to differences in the composition within the two groups as regards country of birth.

Diagram 23 Employment level for 59 and 64-year-olds

Percentage



Sources: Statistics Sweden and NIER.

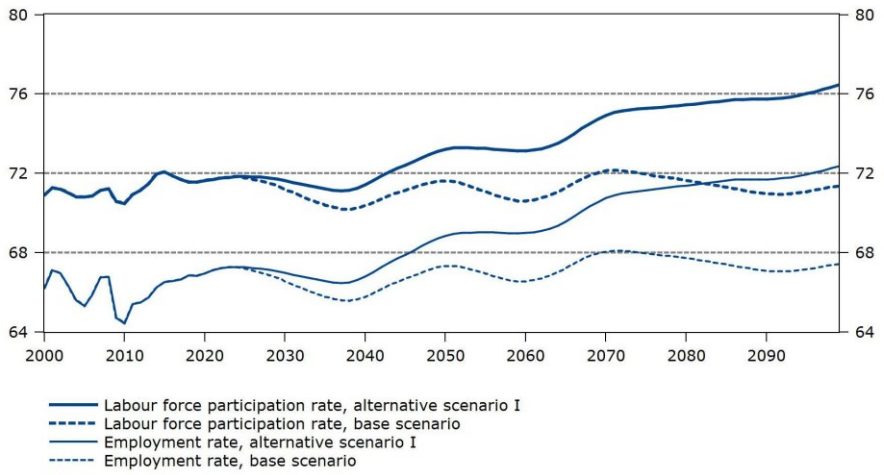
MORE HOURS WORKED GIVES HIGHER GDP

The alternative development on the labour market has major effects on the number of hours worked in the overall economy. Labour force participation and employment demonstrate an uptrend and reach more than 76 per cent and just under 72 per cent of the population respectively aged 15−74 by 2099 (see Diagram 24). This is approximately 5 percentage points higher than in the base scenario. The increased employment means that the economic dependency ratio peaks in the mid-2030s and then gradually falls back to approximately its current level from the 2070s onwards (see Diagram 25).

The number of hours worked will be 6 per cent higher in the scenario with an extended working life, while at the same time GDP will grow slightly more quickly; GDP will be 7 per cent higher in volume by 2099. The fact that the effect on GDP is greater than for the number of hours worked is due to the fact that the volume of public consumption is the same in both scenarios. This means that the additional hours are oriented towards the production of goods in industries with higher productivity than is the case with the production of welfare services. For example, household consumption grows faster than in the alternative scenario, but investments also need to grow more quickly in order to maintain the capital stock's percentage of GDP at the same level as in the base scenario.

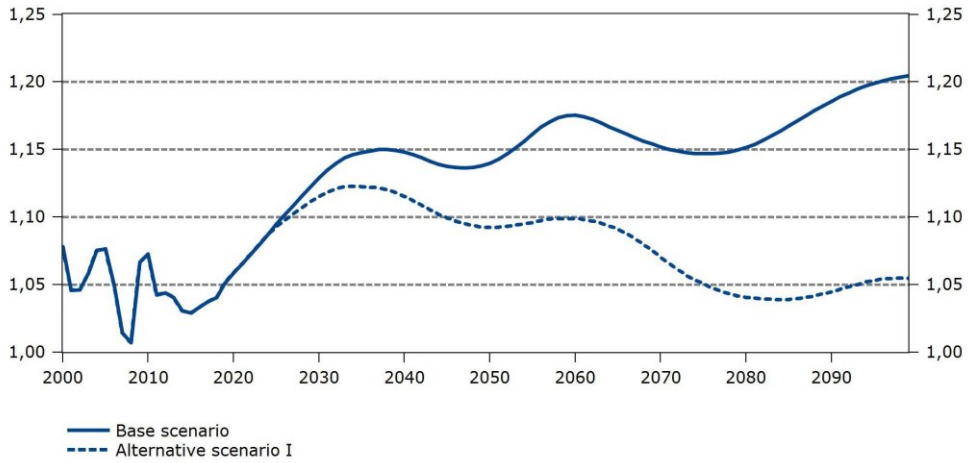
Diagram 24 Labour force participation and employment rate, people aged 15–74

Percentage of population



Sources: Statistics Sweden and NIER.

Diagram 25 Economic dependency ratio



Note: The economic dependency ratio refers here to the ratio between the number of non-working people in the population and the number of employed.

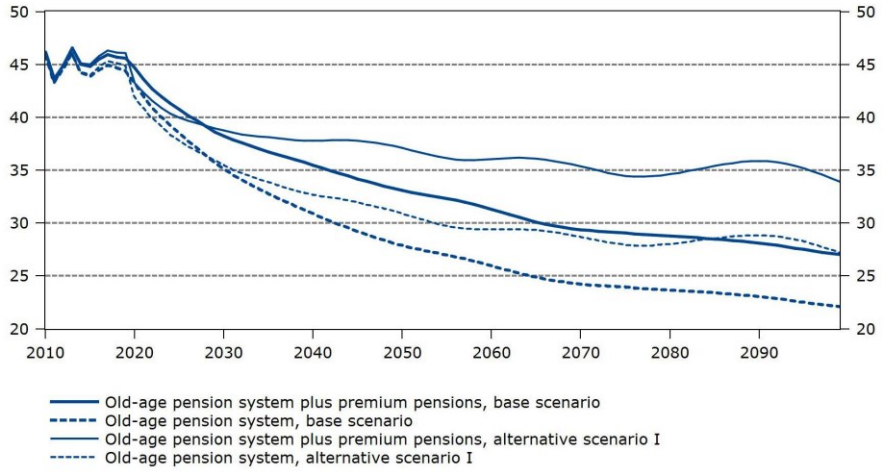
Sources: Statistics Sweden and NIER.

HIGHER PENSIONS WITH HIGHER RETIREMENT AGE

Later withdrawal from the labour market means higher pensions. This is partly due to the additional pension rights earned when working life is extended, and partly due to the fact that the pension is drawn for fewer years. This has significant effects on the pension system's replacement rate, roughly calculated as pension payments per pensioner in relation to average annual wage per person employed (see Diagram 26).

Diagram 26 Pension payments per pensioner

Percentage of average wage per person employed per year



Sources: Statistics Sweden and NIER.

SIGNIFICANTLY STRONGER PUBLIC FINANCES

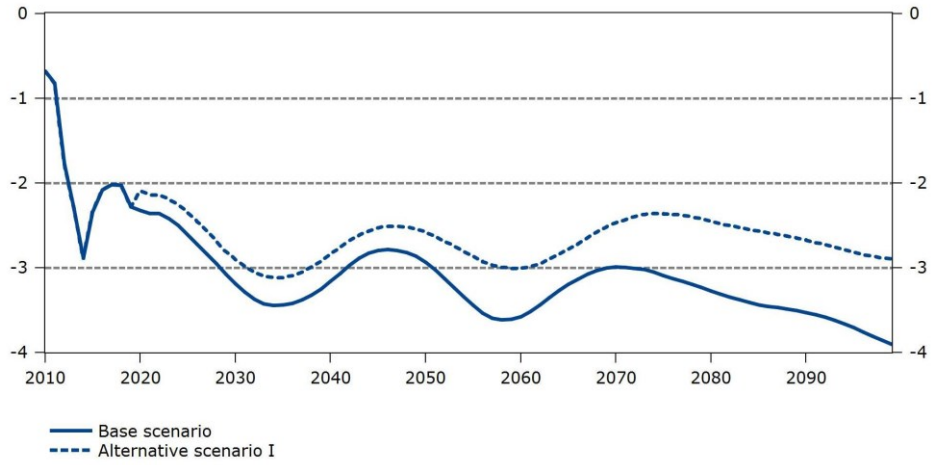
Postponed withdrawal from the labour market has a number of consequences on public finances. Tax revenues will be higher at a higher GDP level. This is due in part to important tax bases such as wages and profit increasing, and in part to the fact that higher household consumption gives higher value-added tax revenues. However, public sector income falls slightly as a percentage of GDP. Higher GDP is generally not associated with any change in the income share of GDP as the tax system is approximately proportional. Tax revenues thus normally increase in line with GDP. When the withdrawal age changes, however, certain implicit tax rates will fall due to composition changes in hours worked. This is due to the fact that existing tax rules mean that the taxation of the labour of the elderly (people aged over 65) is lower than for other age groups. After the age of 65, social security contributions are reduced as people aged over 65 cannot receive funding from unemployment or health insurance. Elderly people also have a higher earned-income tax credit and a different configuration for the basic deduction, which helps to ensure that the marginal tax revenue for the labour of the elderly is slightly lower than average.

The effects are less pronounced on the expenditure side. In SEK terms, postponed withdrawal from the labour market affects expenditure to a lesser extent. The exception to this is pension payments. These are lower initially, when retirements are postponed, but in the long term they are higher when the higher pensions earned during extended working life have to be distributed over a smaller number of years. Government consumption is significantly lower as a percentage of GDP throughout the period as a whole as GDP is higher. However, the government consumption level does not differ from the base scenario. This is due to the fact that the volume of government consumption is determined entirely by demographic development. Therefore, the fact that improved health allows people to work for longer is not assumed to reduce the need for healthcare and elderly care. Alternative scenario II calculates the effects on public finances of improved health reducing the need for care and elderly care, while alternative scenario III calculates the effect of an extended working life and a reduction in the need for care.

In all, government primary net lending will be higher if people go on working for longer. Towards the end of the 2000s, the difference will be equivalent to about 1 per cent of GDP (see Diagram 27). This means a reduced need for tax increases compared with the base scenario. In the example with precise tax financing, an extended working life means a reduced need for increased taxes of about 2 per cent of GDP towards the end of the calculation period (see Diagram 28).

Diagram 27 Government primary net lending

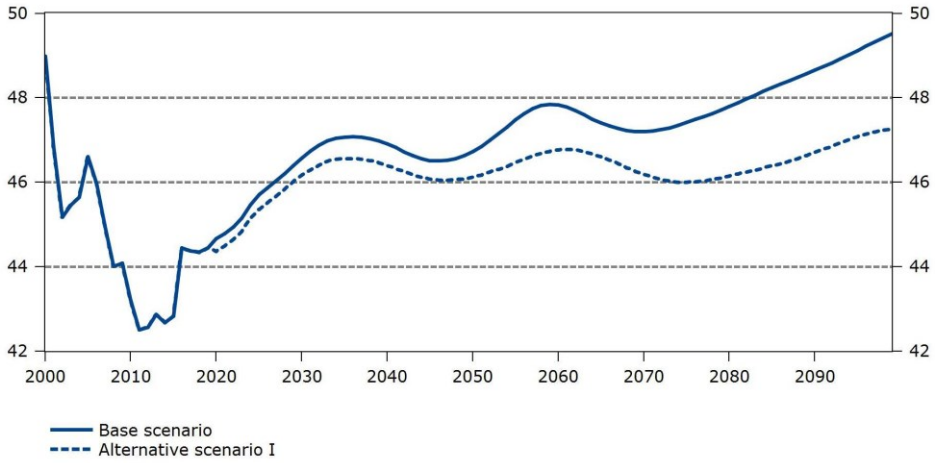
Percentage of GDP



Sources: Statistics Sweden and NIER.

Diagram 28 Tax ratio in the example with precise tax financing

Percentage of GDP



Sources: Statistics Sweden and NIER.

Note: Precise tax financing refers to tax adjustments which lead to zero government net lending every year in the projections until 2016 (cf. Diagram 18, Chapter 4).

Alternative scenario II: Decreasing need for welfare services

In the base scenario and alternative scenario I, the need for welfare services among various age groups is assumed to be the same in the future as it is at present. For example, in the base scenario an 85-year-old is assumed to use elderly care and health care to the same extent as the average 85-year-old today. This assumption can be said to correspond to the pessimistic hypothesis whereby the increase in average life expectancy leads to more frail years (constant health).

FIVE YEARS' REJUVENATED NEED FOR WELFARE SERVICES

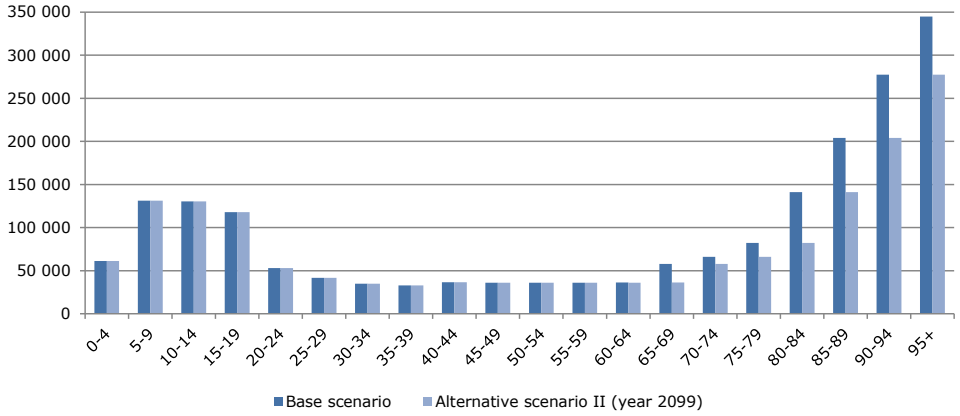
As an alternative to the base scenario's assumption of a constant need for welfare, alternative scenario II assumes that the need for welfare services among the elderly will gradually decline over time. More specifically, it is assumed that the need for all individual government consumption will be "rejuvenated" by five years throughout the projection period for individuals aged 60 and over. This means that on average, an 85-year-old in 2099 will consume the same amount of welfare services as the 80-year-old of today, that a 70-year-old in 2099 will consume the same amount of welfare services as the 65-year-old of today, etc. The need for welfare services is thus rejuvenated by two-thirds of the forecast increase in the remaining average life expectancy for a 65-year-old. The assumption of rejuvenation in the consumption of welfare services is thus a parallel to the assumption of rejuvenation on the labour market in alternative scenario I.[23] This assumption means that the percentage of users of welfare services in each age group will fall, not that the actual cost per hour of service will fall. Thus the principle of unchanged commitment and unchanged personnel density is applicable in this scenario as well. Personnel density is the same per actual user, but not per individual in the respective age groups.

The implication of the assumption is illustrated in Diagram 29, which includes two columns for each age group. The column on the left for each age group indicates the average cost, constant over time, for government consumption per person in the base scenario (the same as in Diagram 10, Chapter 3). The column on the right shows the equivalent cost in the alternative scenario when the "rejuvenation" of welfare consumption is complete in 2099. In other words, the need for welfare services for an 85-year-old will fall gradually from more than SEK 200,000 at present to around SEK 140,000 in 2099 (in fixed prices). Rejuvenation is assumed to take place in the same way for other groups aged 60 and over, including the group of the very oldest people.

[23] Unlike in alternative scenario I, alternative scenario II assumes that all individuals aged 60 and over will rejuvenate their behaviour, not just individuals up to the age of 74.

Diagram 29 Average cost per person for government consumption in various age groups

SEK per year



Note: The columns for alternative scenario II indicate the cost per person and age group applicable in the alternative scenario to 2099, i.e. when the "rejuvenation" of welfare consumption is complete. The cost per person for individuals aged 0–59 is the same in the alternative scenario as in the base scenario.

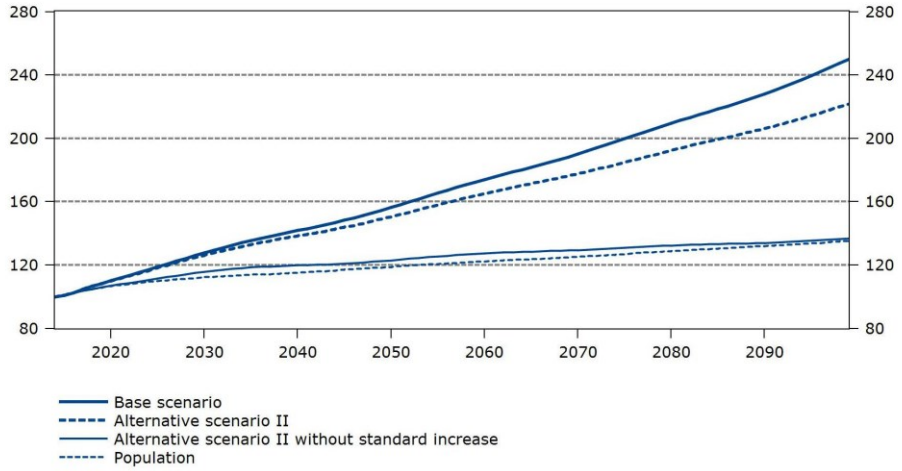
Sources: Statistics Sweden and NIER.

The effects of this alternative assumption on the development of government consumption are shown in Diagram 30, which indicates the cumulative growth in government consumption and population (cf. Diagram 11, Chapter 3). With the assumption of a gradually rejuvenated need for welfare services, demographically driven government consumption increases by 37 per cent until 2099, which is only marginally more than the population growth during the same period. This means that the change in population composition – with a growing percentage of elderly people – is counteracted almost entirely by the reduced need for welfare services in the alternative scenario.

As government consumption is assumed to grow more quickly than constant volume per user, however, the two upper curves in Diagram 30 are what we have to compare in order to draw conclusions on the effects of expenditure on government consumption.[24] The alternative scenario means cumulative growth in government consumption of 123 per cent until 2099, which is 30 percentage points less in than the base scenario. The difference from the base scenario relates primarily to social protection (elderly care), the cumulative growth of which is 170 per cent instead of the 360 per cent seen in the base scenario (see Diagram 31). The need for healthcare also develops more slowly in the alternative scenario compared with the base scenario, even though the difference is less pronounced (136 per cent cumulative growth instead of 153 per cent). There is no difference between the scenarios as regards the development for education (as consumption of this is non-existent among individuals aged 60 and over) or for collective government consumption (as this is not assumed to be affected by the age composition of the population).

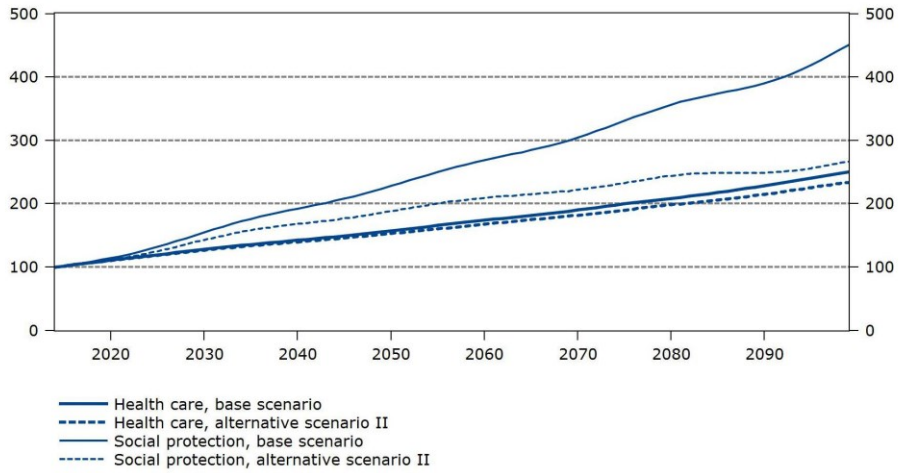
[24] In this report, government consumption is assumed to increase according to a demographically driven need plus an annual standard increase of 0.6 per cent (see Chapter 3).

Diagram 30 Government consumption and population
Index 2014 = 100



Sources: Statistics Sweden and NIER.

Diagram 31 Healthcare and social protection
Index 2014 = 100



Source: NIER.

PUBLIC FINANCES IN ALTERNATIVE SCENARIO II

The slower increase in the need for welfare services compared with the base scenario means a slower increase in government consumption as a percentage of GDP. As indicated in Diagram 32, government consumption as a percentage of GDP increases by approximately 3 percentage points to 29 per cent by the mid-2030s. This increase is linked with the relatively rapid increase in the demographic dependency ratio taking place during the same period. However, unlike in the base scenario, consumption as a percentage of GDP then levels out. The increase in the elderly dependency ratio which then takes place is offset in this scenario by the gradually rejuvenated need for welfare services, so that overall government consumption does not grow more quickly than GDP. These opposing effects – an increasing number of elderly people but a gradually rejuvenated need for welfare services – are particularly significant in the 80−95 age category. The population in this age range is expected to increase relatively

strongly, while at the same time the need for welfare services declines significantly at these ages.

As government investments in the local government sector are assumed to grow in line with municipalities' welfare commitments, these are also slightly lower in the alternative scenario than in the base scenario. Unlike alternative scenario I, expenditure on pensions and other social transfers develops in the same way as in the base scenario. All in all, primary government expenditure is around 4 percentage points lower in the alternative scenario than in the base scenario, 50 per cent instead of 54, at the end of the projection period. Thus the primary expenditure ratio at the end of the projection period is largely the same as at present.

The more moderate increase in government expenditure in the scenario leads to better public finances than in the base scenario. Certainly, government primary net lending while taxes remain unchanged is negative throughout the overall projection period, as in the base scenario, but at a higher level. The S2 indicator amounts to 1.1 in the scenario. The indicator which takes into account effects on the tax bases, which we refer to here as S2+, amounts to 1.8 in the scenario.[25]

Alternative scenario III: Postponed labour market withdrawal and a declining need for welfare services

The third alternative scenario combines the assumptions of rejuvenated labour market behaviour and a declining need for welfare services from the previous two alternative scenarios. It may be considered unlikely that improved health would affect behaviour on the labour market so extensively with no change taking place in the need for welfare services, and vice versa. Studying the assumptions separately in alternative scenarios I and II provides a perception of the partial effects of each assumption.

The increased number of hours worked in the economy following on from the rejuvenated labour market behaviour leads to higher GDP than in the base scenario. A reduced need for welfare services, as assumed an alternative scenario II, does not affect GDP in the projections (which are governed entirely by the development of hours worked), but merely affect the level of government expenditure. The two assumptions together lead to considerably more restrained development in government consumption as a percentage of GDP, and to significantly better development of public finances compared with the base scenario. As in the other scenarios, government consumption as a percentage of GDP increases until some way into the 2030s. This increase amounts to around 2.5 percentage points, up to 29 per cent. After that, there is a certain decrease in alternative scenario III to just under 28 per cent by 2099 (see Diagram 32).

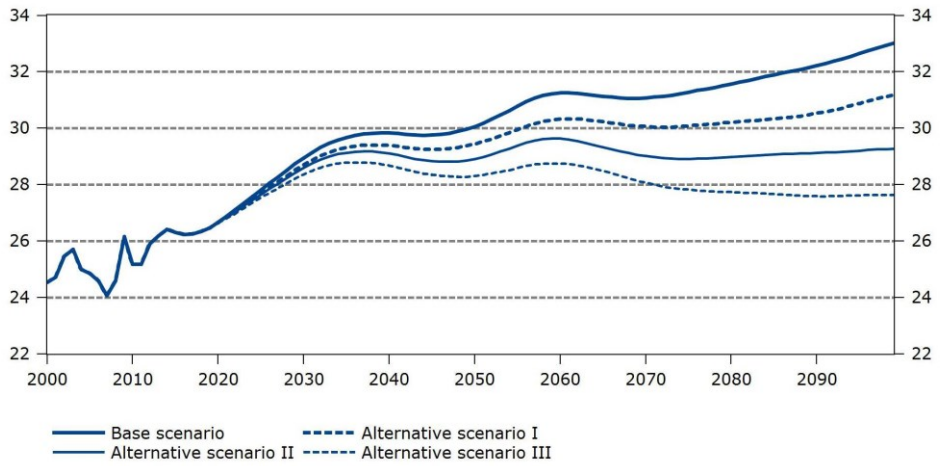
Alternative scenario III is the only scenario in which the primary expenditure ratio for the public sector is lower at the end of the projection period than at present (around 48 per cent compared with just under 50 per cent at present; see Diagram 33). It is

[25] The fact that there is less difference between the conventional S2 indicator and S2+ than in the base scenario is due to the fact that development in the alternative scenario is not as unbalanced. Households do not reach the same savings levels in the alternative scenario, which means that they do not accumulate financial net wealth to the same degree as in the base scenario.

also the only scenario in which government primary net lending is towards zero per cent with unchanged tax rates (see Diagram 34). According to the conventional S2 calculation, taxes need only be increased by approximately one-half of a percentage point of GDP to finance an unchanged commitment.

Diagram 32 Government consumption

Percentage of GDP

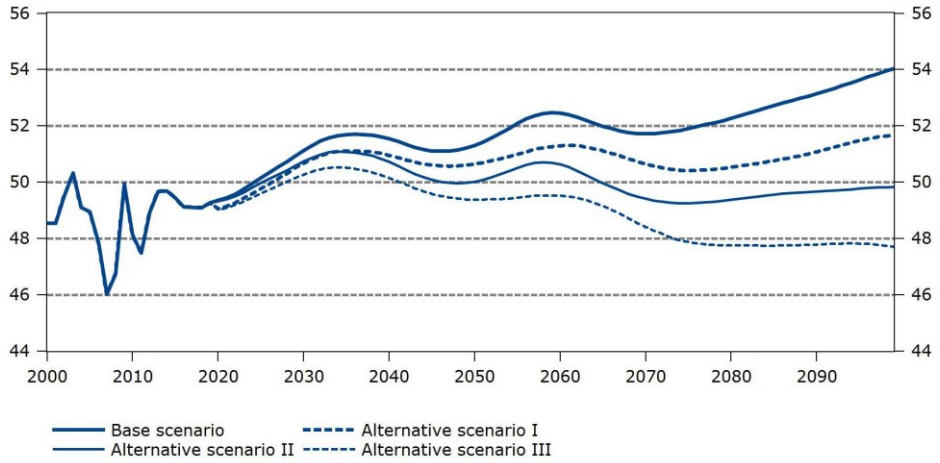


Note: The alternative scenarios consist of (I) rejuvenated labour market behaviour, (II) a declining need for welfare services and (III) both rejuvenated labour market behaviour and a declining need for welfare services.

Source: NIER.

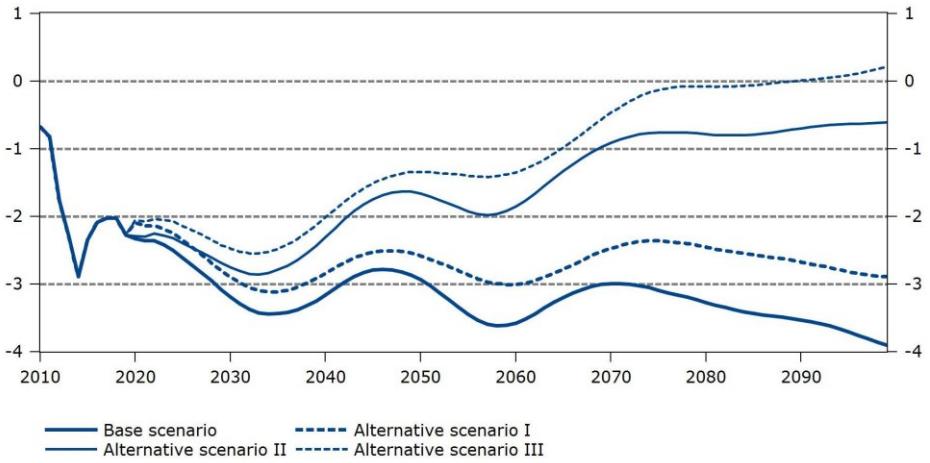
Diagram 33 Government primary expenditure

Percentage of GDP



Source: NIER.

Diagram 34 Government primary net lending (with tax rates unchanged)
Percentage of GDP



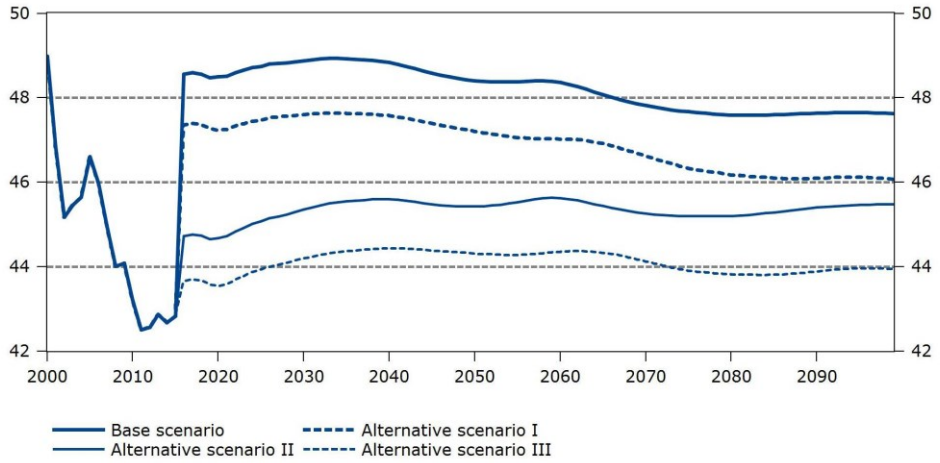
Source: NIER.

Diagram 35, Diagram 36 and Diagram 37 provide an extended illustration of the need for tax increases in the three alternative scenarios in order to secure finance for the welfare commitments of the future. The same examples of tax increases are provided here as it Chapter 4. The example with the immediate and permanent tax increase, which is illustrated in Diagram 35, corresponds to the calculation for "S2+" (the increase that will take place in 2016 corresponds to the value for S2+). As we noted in Chapter 4, the increase in the base scenario is no less than 5.8 per cent of GDP. The faster GDP growth in alternative scenario I makes the need for an immediate tax increase just over one percentage point lower as a percentage of GDP compared with the base scenario. The slower growth in government consumption prevailing in alternative scenario II reduces the need for tax increases to 1.9 percentage points of GDP. In the third alternative scenario, the corresponding increase is just 0.8 percentage points.

As in Chapter 4, the example with the immediate tax increase is contrasted with two other examples of tax increases which also comply with the intertemporal budget restriction in each scenario. The example with precise tax financing in the various scenarios is illustrated in Diagram 36. Here, taxes are increased equally in the scenarios initially, so as to directly achieve government net lending of zero per cent. After this, the tax changes correspond precisely to the expenditure changes occurring in each scenario. As the expenditure ratio in alternative scenario III is actually slightly lower at the end of the projection period than at the beginning, the tax ratio is also largely the same at the end of the period as at the beginning. In the third example, where taxes are increased gradually throughout the period in order to comply with the intertemporal budget restriction, the tax rate is approximately one percentage point higher in alternative scenario III at the end of the period compared with the beginning (see Diagram 37). This can be compared with the base scenario in which the tax ratio approaches 50 per cent at the end of the projection period, almost 7 percentage points higher than at present.

Diagram 35 Tax ratio in the event of an immediate tax increase

Percentage of GDP

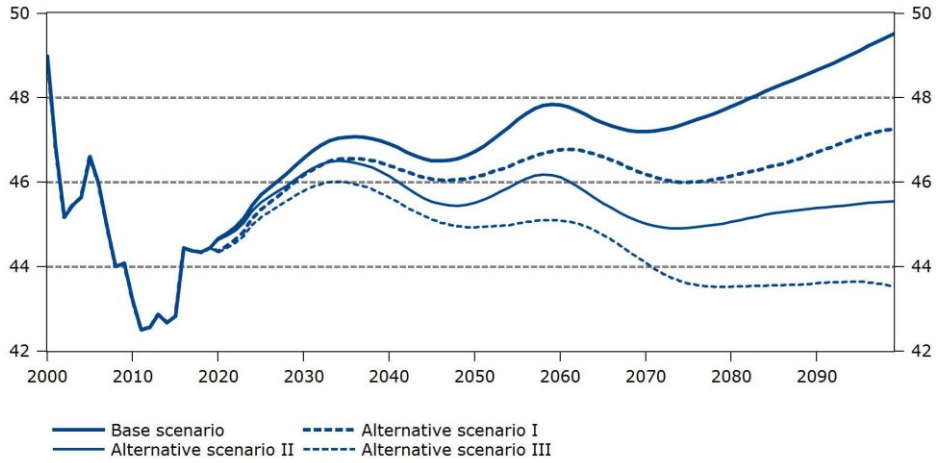


Note: "Immediate tax increase" refers to the tax increase needed in 2016 in order to comply with the intertemporal budget restriction given expenditure development in the scenario. See the previous chapter for a more detailed discussion on the three examples of tax increases.

Sources: Statistics Sweden and NIER.

Diagram 36 Tax ratio with precise financing

Percentage of GDP

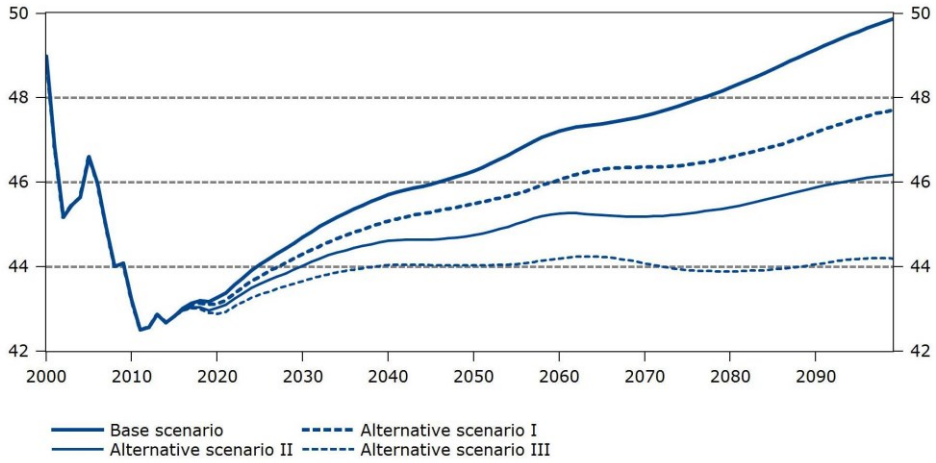


Note: Precise financing means adjusting the taxes in the scenario year on year so that government net lending is zero each year (which means compliance with the intertemporal budget restriction).

Sources: Statistics Sweden and NIER.

Diagram 37 Tax ratio in the event of a gradual tax increase

Percentage of GDP



Note: A gradual tax increase means that taxes in the scenario are increased gradually throughout the entire projection period so that there is compliance with the intertemporal budget restriction.

Sources: Statistics Sweden and NIER.

The S2 indicator: summary and comparison with other assessments

Table 5 provides a summary of the S2 indicator in the base scenario and three alternative scenarios. The table also shows the S2 indicator value from NIER's previous report concerning the long-term sustainability of Sweden's public finances.

The S2 indicator can be divided into three component terms. The first term indicates the increase in government net lending needed to cover expenditure for government net debt prevailing at the start of the projection period. As the net debt is negative (the financial net wealth is positive) and government capital income exceeds interest expenditure, net lending does not need to be reinforced for this reason. Quite the opposite; it can be reduced by 0.1 per cent of GDP, which is indicated in the top row in the table. The second term consists of the reinforcement of net lending required to cover primary deficits during the projection period (i.e. until 2099). This term differs from scenario to scenario depending on how government expenditure develops; the greater the increase in expenditure, the greater the effect on this term. The third term covers the deficits assumed to prevail after the end of the projection period.[26]

The NIER's previous report (2014) on the long-term sustainability of Swedish public finances, like this report, studies different scenarios with varying implications for public finances in the long term. In the scenario in the previous report which is most closely comparable with the base scenario in this report, the S2 indicator was 1.5 (S2+ was 2.0). A number of factors explain the fact that the S2 indicator is almost 2 units greater in the base scenario in this year's analysis. Firstly, the situation at the outset of the calculations has deteriorated. Primary net lending is −2.9 per cent of GDP initially (2014) in this analysis, compared with −2.0 per cent in the previous report (starting in

[26] Primary net lending is assumed to remain constant forever from 2100 onwards, at the same level as the last projection year (2099) in each scenario.

2013) By 2060, which was the final projection year in the previous report, the difference in primary net lending is 1.8 percentage points of GDP. The fact that net lending deteriorates more by 2060 in this year's analysis compared with last year's analysis is due to a slightly higher rate of increase in government consumption as a consequence of a new demographic forecast and new cost information for welfare consumption in various age groups. Extending the projection horizon from 2060 to 2099 accounts for approximately 0.3 units of the increase in the S2 indicator.[27]

Table 5 The S2 indicator in different scenarios

	Base scenario	Alternative scenarios I	II	III	Previous report
(1) Interest expense on net debt	−0.1	−0.1	−0.1	−0.1	−0.2
(2) Effect of primary deficits to 2099	1.6	1.3	0.9	0.7	0.4
(3) Effect of primary deficits, 2100 onwards	1.9	1.4	0.3	−0.1	1.2
S2 = (1) + (2) + (3)	**3.3**	**2.6**	**1.1**	**0.4**	**1.5**
S2+	5.6	4.4	1.8	0.7	2.0

Note: S2+ is an adjusted S2 indicator which takes into account tax base effects and shows the percentage improvement in primary net lending needed to produce an S2 indicator of zero with 2099 as the projection horizon. The previous report relates to NIER's 2014 assessment of the long-term sustainability of Swedish public finances (*Occasional Studies No. 39*, March 2014). At that time, the calculation horizon extended to 2060.

Source: NIER.

COMPARISON WITH OTHER ASSESSORS

The government carries out annual assessments of the long-term sustainability of Sweden's public finances in connection with the spring fiscal policy bill. The spring fiscal policy bill for 2014 reported an S2 indicator of −1.6. This report was supplemented with a range of sensitivity analyses, including assumptions of longer working life and improved health. In the government's calculations, the S2 indicator is improved (reduced) by almost 2 units with the assumption of a longer working life (compared with unchanged labour market behaviour as in the base scenario). In the improved health scenario, the S2 indicator improves by almost 4 units. The effects of these changed assumptions are thus almost twice as great as in this analysis. An S2 indicator of −1.0 was reported in the evaluation updated in the budget bill for 2015. The government motivated the revision of the indicator value with downward revisions in net lending in the medium-term forecast for 2019.

The S2 indicator in the base scenario in this report differs from the government's calculation on account of two factors: the short-term assessment of public finances and the method for the long-term projection of government consumption. In the government's spring 2014 calculations, government primary net lending amounted to 0.3 per cent of GDP in 2018. In the base scenario in this report, primary net lending amounts to –1.4 per cent in the same year. In the government's long-term calculation,

[27] The extension of the projection period is more important for S2+. In slightly simplified terms, the difference in S2+ between this assessment and the previous assessment can be explained as follows. In the previous year's report, primary net lending amounted to −2 per cent of GDP for the initial year 2013. The primary expenditure ratio for the public sector was 50.3 in the initial year and 50.6 in the final projection year, 2060. The total of negative primary net lending in the initial year and the increase in the expenditure ratio approximately explains the size of S2+ (2.0 in the previous assessment). In this year's analysis, government primary net lending is −2.9 per cent of GDP in the initial year 2014, while at the same time the primary expenditure ratio grows from 49.7 per cent in the initial year to 52.5 per cent by the final projection year 2099, representing an increase of 2.8 percentage points of GDP.

there is a slight reduction in government consumption as a percentage of GDP (from 25.8 per cent in 2018 to 25.2 per cent in 2100). In the base scenario in this report, government consumption as a percentage of GDP increases instead by more than 6 percentage points over the period. The fact that government consumption development differs to such an extent in the analyses is explained by the fact that the government does not adopt any standard increase in government consumption over time (it is assumed in this report that this stands at 0.6 per cent per year).[28]

Every three years, the European Commission carries out an extensive evaluation of the long-term sustainability of the finances of each EU country. The latest evaluation was published in December 2012. Sweden was given an S2 indicator of 1.7, which indicates a need for permanent fiscal tightening. This was the eighth-lowest S2 indicator out of 26 member states. The European Commission's scenario for Sweden includes an increase in age-related government consumption expenditure equivalent to 2.7 percentage points of GDP in the long term. This is approximately half as great an increase as in the base scenario in this report, but equivalent to the increase in alternative scenario II with a declining need for welfare services. The Commission's next report is expected later this year.

[28] See Appendix 2 for a description of the standard increase in government consumption.

6 Conclusions

PESSIMISTIC BASE SCENARIO GIVES STRONG EXPENDITURE PRESSURE

In the base scenario of the report, public finances develop in a manner unsustainable in the long term. The primary government expenditure increases by 5 percentage points of GDP which, if tax rates remain unchanged, will extend the current deficit in the public finances to approximately the same degree. Elderly care is more than tripled in scope and accounts for the greatest increase, while the need for healthcare and education increases to a much smaller extent. There is reason to view the base scenario as pessimistic, as the anticipated increase in average life expectancy is not assumed at all to influence either retirement age or the need for welfare services. The three alternative scenarios in the report together provide a perception of the effects on public finances of an extended working life and a gradually reduced age-related need for welfare services.

SUSTAINABLE PUBLIC FINANCES WITH HEALTH IMPROVEMENTS

In the first of the three alternative scenarios in the report, there is a change to the restrictive assumption that behaviour on the labour market (such as the average age for withdrawal from the labour market) will remain unchanged in the future. There is reason to believe that the increased average life expectancy will lead to more people working for longer into old age. When labour market behaviour is gradually rejuvenated by five years among individuals aged 60 and over, the labour supply will develop more favourably in the economy compared with the base scenario. This will reinforce GDP development, which will make the financing of welfare commitments less arduous than in the base scenario. In the second alternative scenario, the increase in average life expectancy is assumed to go hand-in-hand with improved health so that the need for welfare services is postponed until later in life. This assumption has major effects on public finances. Instead of almost 7 percentage points higher government consumption as a percentage of GDP, the increase will be just under 3 percentage points at the end of the projection period. The third alternative scenario, which combines the assumptions in the first and second alternative scenarios, provides a view of public finances in long-term balance and with minor tax increase requirements.

GREATEST CHALLENGES IN THE NEXT 20 YEARS

For the next two decades, the scenarios show that there will be structurally increasing expenditure pressure in the public sector, equivalent to 1−2 per cent of GDP, if it is to be possible to keep the welfare commitment at its present level. In this regard, the various assumptions in the alternative scenarios will only have time to have a limited effect on public finances. How the expenditure pressure develops after that, from 2040 onwards, will be determined by how the increased average life expectancy affects retirement age and dependency on welfare services. Maintaining balance in the public finances over the next 20 years, in the sense of net lending remaining at approximately zero every year, would involve an increase of 3−4 percentage points in the tax ratio, given the present structural deficits in the public finances. Such tax increases are of course perceptible, even if they take place over a longer period. Thus it is not unlikely that welfare commitments will be reduced to a certain extent during the period when the demographic dependency ratio rises most quickly, in the 2020s and parts of the 2030s, at least in the sense that personnel density cannot be expected to remain unchanged in all forms of welfare service.

Appendix 1. Alternative scenario with unchanged rules to 2019

In the short-term projections (2015−2019), public expenditure in the base scenario and the three alternative scenarios develops according to the NIER forecast in *The Swedish Economy*, December 2014. This means that expenditure includes an unchanged public sector commitment at 2015 level, which will require active political decisions on expenditure measures.

This appendix studies the development of public finances in a supplementary scenario in which expenditure in the short-term projections, through to 2019, is based on unchanged rules. The projections after this, between 2020 and 2099, are based on the same method as in the base scenario, which means that the public sector commitment will be maintained at the 2019 level in this scenario. The assumption of unchanged rules in the short-term projections aids comparison with the government's sustainability calculations in the spring fiscal policy bill.

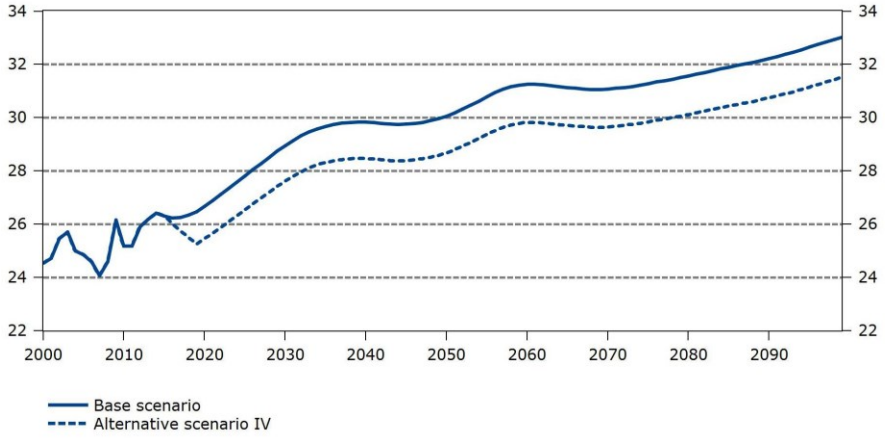
In the base scenario, government consumption grows by 1.8 per cent on average between 2016 and 2019; in this scenario, average growth in government consumption amounts to just 0.5 per cent. This means that government consumption as a percentage of GDP is 1.2 percentage points lower than in the base scenario prior to the start of the long-term projections in 2020. As the growth rate in government consumption is then the same as in the base scenario, the difference is made permanent in the share of GDP (see Diagram 38).

As a consequence of the lower level of government consumption, and a slightly lower expenditure level for social transfers and government investments as well, the government primary deficit is not as great as in the base scenario. Net lending will increase rapidly until 2019 as a result of the relatively slow development in consumption, combined with the unchanged tax rates. The conventional S2 indicator is 2.3 in this scenario, which is just over 1 unit lower than in the base scenario. The difference is explained by the better public finances both during and after the projection period (see Diagram 39). The size of the S2 indicator in the case of endogenous tax bases (S2+) is 3.9, which means that the immediate and permanent tax increase required would be 3.9 per cent of GDP (compared with 5.6 per cent in the base scenario).

The tax increase consistent with finances sustainable in the long term can be formulated in various ways, as discussed in Chapter 4. Diagram 40 illustrates tax increases according to the same three examples as in Chapter 4 (cf. Diagram 18). In the example with an immediate tax increase (according to the method for calculation of "S2+"), the tax ratio increases immediately to just over 47 per cent and then falls gradually to around 46 per cent by the end of the projections, which is approximately the same level as seen in 2006. In the example with tax increases which generate net lending of zero per cent each year, as in the example with gradual tax increases, the tax ratio increases to about 47.5 per cent at the end of the projection period. This is approximately 2 percentage points lower than the corresponding example in the base scenario.

Diagram 38 Government consumption

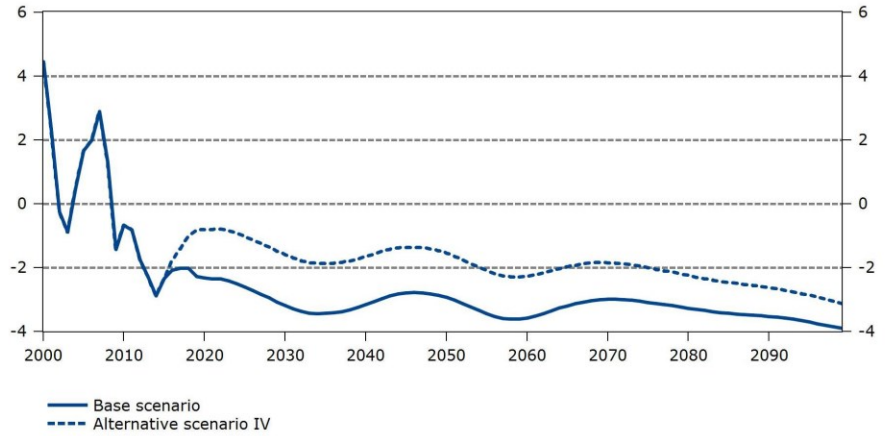
Percentage of GDP



Source: NIER.

Diagram 39 Government primary net lending

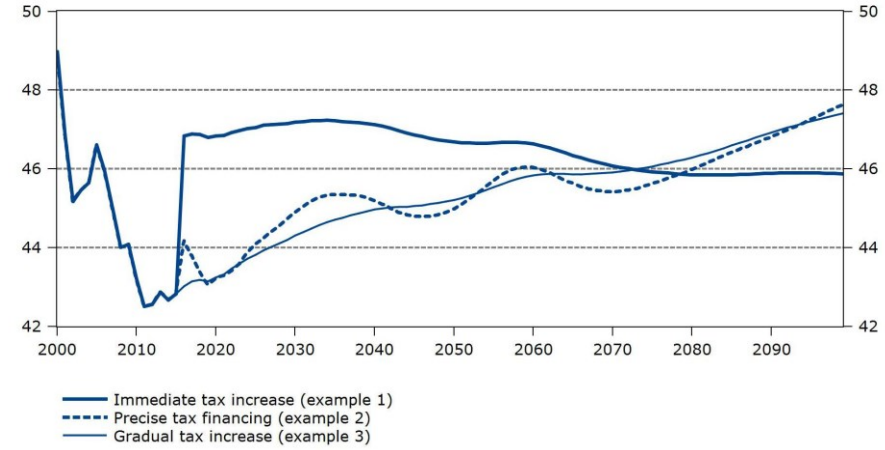
Percentage of GDP



Source: NIER.

Diagram 40 Tax ratio in alternative scenario IV for various tax increase methods

Percentage of GDP



Sources: Statistics Sweden and NIER.

Appendix 2. Extended description of various model assumptions

A number of NIER models are used in the calculations for Sweden's public finances in the long-term scenarios: KAMEL for the projection of labour market variables, DEMOG for the projection of demographically driven public consumption, KAVEL for the macro scenario and FIMO for the development of public finances and net lending in other sectors of the economy. This appendix describes the KAVEL macromodel in brief. See last year's report for a description of the other models.

KAVEL is used to produce internally consistent projections of long-term macroeconomic scenarios. The model is a simple macroeconomic model without behavioural effects, where supply and demand are determined by demographic developments and exogenous assumptions about productivity. In the base scenario, the labour supply is constant in the different demographic groups and is calculated using the labour market model KAMEL. All calculations are performed in both current and fixed prices. GDP in fixed prices is calculated as a chain index based on the four components of total demand less imports.

DEVELOPMENTS IN DEMAND DETERMINED BY DEMOGRAPHICS

Household consumption grows with the overall population and a constant rise in standards reflecting productivity growth across the economy. Household consumption per capita therefore increases over time. Government consumption grows at different rates in the different scenarios. The different growth rates for government consumption mean that household consumption as a percentage of GDP develops differently in the different scenarios.

Investment is calculated in such a way that the capital stock in current prices grows at the same rate as GDP in current prices, giving a constant capital-output ratio (capital stock as a percentage of GDP). Because hours worked are exogenously determined by demographics, and nominal value added per hour worked rises at a constant rate, the entire path of GDP in current prices is known in advance. With the help of a depreciation factor for the capital stock that takes account of the consumption of fixed capital and changes in relative prices, the necessary investment in current prices can be calculated so that the capital-output ratio is constant. Each demand component generates imports and domestic value added in accordance with fixed input-output coefficients. The import content of the demand components is calibrated on the basis of the national accounts for 2011, but scaled up proportionally to give the same forecast for total imports in 2019 as predicted in *The Swedish Economy*, December 2014 (see Table 6).

Demand for consumption and investment, together with the import coefficients, determines the amount of labour employed to produce exports. Exports are thus the residual that balances supply and demand. In the very long term, it is reasonable for net exports, adjusted for transfers to and from abroad, to approach zero in a simple model. In this model, it is assumed that EU contributions and development aid will hold at around 1 per cent of GDP, which motivates positive net exports. The growth

in household consumption per capita (improvement in standards) is therefore calibrated so that net exports approach one per cent of GDP in the long term.[29]

MOVEMENTS IN PRICES REFLECT PRODUCTIVITY AND THE INFLATION TARGET

The four demand components generate imports and value added in the various sectors of the economy. With the help of input-output tables, four sectors are constructed that produce the different demand components. Productivity (labour productivity) and capital intensity are assumed to be the same in the four sectors. However, growth in total factor productivity (TFP) is assumed to differ – for example, TFP growth in the production of government consumption is lower. This lower growth in TFP, and thereby labour productivity, is fully offset by higher price rises. The differences in productivity growth between the four sectors are based on their average productivity growth during the period 1994−2013. Ideally the calculations would be based on the entire period from 1981 to 2013, as the NIER's long-term productivity assumption for the overall economy is an increase in productivity at the same average rate as during this period. However, data for productivity in the individual sectors are not available at the necessary level of detail. Productivity in the four sectors is therefore scaled down proportionally to give an overall level of productivity growth in the aggregate economy (GDP per hour worked) of just under 1.8 per cent during the period 2019−2099, which is approximately the same rate of increase as the average for 1981−2013. Productivity growth in the domestic production of goods and services included in the government consumption basket is assumed to be 0.25 per cent per year.[30]

The level of value added per hour worked in current prices is the same and moves at the same rate in all sectors. This assumption greatly simplifies the model and fits well with the data. Changes in the composition of demand do not therefore affect nominal productivity. The composition of demand does, however, affect the proportions of nominal value added attributable to price changes and volume changes. Productivity growth (in fixed prices) in the overall economy therefore varies somewhat over time in the different scenarios. The rate of increase in the GDP deflator varies slightly with the composition of demand and is just under 2.1 per cent on average, which means that nominal productivity rises by about 3.9 per cent per year.

Relative price movements between the different demand components are determined by differences in productivity growth and import content. Import prices are assumed to increase by 0.9 per cent per year, which is somewhat below the average rise of 1.2 per cent since 1995. This is motivated partly by the first decade of the new millennium seeing an exceptional surge in oil prices and a certain weakening of the nominal exchange rate, which is not expected to be repeated in the long-term projections. Given these movements in productivity and import prices, wage growth in the overall economy is adjusted so that the deflator for household consumption rises by 1.9 per cent

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[29] The increase in standards varies between 1.7 and 1.9 per cent in the scenarios, depending on development in government consumption.

[30] In the previous year's report, productivity growth in the production of goods and services included in the government consumption basket was assumed to be 0.39 per cent per year. A slight productivity growth in both government and private production of welfare services was assumed. In this report, productivity growth in government production is assumed to be zero in the future, which is based on developments over the last ten years. In other words, it is assumed to be possible to trace the 0.25 per cent productivity growth per year back to the private sector.

per year. Wage growth is assumed to be the same in all sectors (3.9 per cent), and labour costs' share of value added is constant over time.

The price deflator for government consumption is therefore determined by the value-added deflator (3.60 per cent) weighted by the import deflator (0.90 per cent). The value-added deflator, in turn, is determined by wage growth (3.86 per cent) less productivity growth (0.25 per cent).

Table 6 Assumptions in the macroeconomic projections in the base scenario, 2020–2099

Percentage change or per cent

	Productivity[1]	Deflator, expenditure	Deflator, value added	Import content
Household consumption	1.62	1.88	2.20	24.7
Government consumption	0.25	3.27	3.60	12.0
Investments	2.14	1.39	1.68	37.4
Exports	3.39	0.63	0.45	39.4
Imports	..	0.90	..	..
GDP[2]	1.76	2.06	2.06	..

[1] Productivity denotes the productivity growth that can be attributed to domestic production's share of each component of total demand.

[2] The values for the overall economy (GDP) have not been calibrated but denote the average for the period 2020–2099 from the other model parameters. Relates to the base scenario.

GOVERNMENT CONSUMPTION: UNCHANGED PERSONNEL DENSITY AND CONSTANT DISTRIBUTION OF COSTS

With unchanged demographics, government consumption expenditure increases in the scenarios at the same pace at which wages increase. This follows from the assumptions of constant personnel density and constant distribution of costs for production factors and input goods. The development of government consumption expenditure (in current prices) can be expressed as:

$$G_t = (1 + d_t) \cdot (1 + w) \cdot G_{t-1} \qquad (1)$$

where G_t is government consumption expenditure in year t, d_t is the demographically driven growth rate in government consumption, and w is the constant rate of wage increase.

Without the assumption of constant distribution of costs, constant personnel density could be achieved at a total cost which grows more slowly than wages (with constant demographics; $d_t = 0$). This is because the prices of input goods are assumed to increase more slowly than wages. In the long term, however, a constant volume of input goods per working hour would mean that personnel costs would approach 100 per cent (and the distribution of costs for input goods would be 0 per cent), which would be unrealistic.

The assumption of constant distribution of costs means that expenditure for input goods increases at the same pace as personnel costs (which in turn increase in line with wage development, when demographics remain unchanged). As the price increase is slower than the wage increases, the volume of input goods per working hour increases over time. The increased volume of input goods in turn means that the vol-

ume of government consumption per user increases. Therefore, in the model government consumption *in fixed prices* increases as follows:

$$g_t = (1 + d_t) \cdot (1 + s) \cdot g_{t-1} \tag{2}$$

where g_t indicates government consumption in fixed prices in year t, d_t is defined as above and s indicates the annual constant standard increase. The standard increase (volume increase per user) amounts, in purely calculation terms, to the difference between the wage increase rate (3.86 per cent) and the government consumption deflator (3.27 per cent), i.e. around 0.6 per cent. This standard increase can be viewed as a result of productivity growth in the domestic production of welfare services, and of the fact that the increase in the price of imported input goods is relatively slow. The standard increase is given by:

$$s = (1 - m^g) \cdot pr^g + m^g \cdot pr^m \tag{3}$$

where m^g indicates the percentage of import content in government consumption, pr^g indicates productivity growth in domestic production of welfare services and pr^m is productivity growth which can be traced back to the production of imported goods. The standard increase of 0.6 per cent in the projections arises as follows:

$$s = (1 - 0{,}12) \cdot 0{,}25\% + 0{,}12 \cdot 2{,}96\% \approx 0{,}6\% \tag{3'}$$

The first term means that 0.22 percentage points of the standard increase come from productivity growth in the domestic production of welfare services. The second term means that the rest of the standard increase (0.36 percentage points) comes about as a result of an increased volume of imported input goods. The volume increase in imported goods amounts to the difference between the wage increase (3.86 per cent) and the deflator growth for import goods (0.9 per cent). The rate of increase corresponds to the productivity growth overseas in the production of our imports.

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