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Fiscal Sustainability Report 2016

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Foreword

As part of its mandate, the National Institute of Economic Research (NIER) is to produce long-term fiscal projections and assess the long-term sustainability of public finances. The government sets out the framework for this work each year in its grant award. The assessment is to be quantitative and include a number of scenarios.

This is the NIER's fifth fiscal sustainability report. The previous report was published in March 2015 as *Occasional Studies 43*: "The long-term sustainability of Sweden's public finances". This year's report, like its two predecessors, has been translated into English and forms part of the NIER's *Occasional Studies* series.

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

The NIER would like to extend its sincerest thanks to the reference group that monitored work on this year's report and provided valuable opinions. The group comprised Lisa Brouwers (Public Health Agency of Sweden), Niklas Frank (Swedish Fiscal Policy Council), Annika Sundén (Swedish International Development Agency), Marianne Svensson (Swedish Agency for Health and Care Services Analysis) and Annika Wallenskog (Swedish Association of Local Authorities and Regions). The reference group does not necessarily share the conclusions drawn in this report, nor is it responsible for any errors in the report.

Stockholm, 1 March 2016

Mats Dillén
Director-General

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SPECIAL ANALYSES

Summary

The NIER assesses the long-term sustainability of Sweden's public finances annually at the government's request. Public finances can be considered sustainable if government income under current rules is sufficient to fund future expenditure to maintain the public sector commitment. The assessment is based on long-term projections of government income and expenditure under various assumptions. The projection horizon generally extends to 2040, but the report also contains projections through to the year 2100. The aim of sustainability assessments of this kind is not to produce long-term forecasts but to identify potential future imbalances in public finances at an early stage.

Net lending and net wealth the key assessment criteria

Long-term unsustainable public finances are characterized by growing government deficits and a long-term decline in net financial wealth, defined as the public sector's financial assets less its liabilities. Government deficits, or negative net lending, normally lead to higher debt and so reduced net financial wealth. For this reason, developments in net lending and net financial wealth in the long-term scenarios are key when assessing the sustainability of public finances.

One sustainability criterion is that net financial wealth must *stabilise as a percentage of GDP* in the longer term. This is consistent with the intertemporal budget constraint used to calculate the S2 sustainability indicator. A stricter criterion is that net wealth must be more or less *unchanged at current levels*. This means that resources are not systematically transferred from one generation to another and so ensures a fair distribution between generations. A balanced budget in the longer term will meet these sustainability criteria under reasonable assumptions.

Current taxation insufficient to fund unchanged public sector commitment

The sustainability analysis is based on long-term scenarios where government income and expenditure are calculated under the assumption that the tax system is unchanged and the public sector commitment is maintained. An unchanged public sector commitment means here that personnel density in the provision of welfare services is kept constant and that replacement rates for social transfers are maintained.

The analysis focuses on one base scenario and two alternative scenarios. The base scenario includes an assumption of a rising retirement age and a decreasing need for welfare services among the elderly. In this scenario, government consumption increases from 26.1 per cent of GDP in 2015 to 28.6 per cent in 2040. This is due mainly to demographics, with a growing share of elderly people in the population. With unchanged taxes, this means that today's government deficits will gradually increase. In the base scenario, net lending deteriorates to −3 per cent of GDP in 2040, and net financial wealth to −16 per cent of GDP. This scenario is not therefore sustainable based on the criterion of unchanged net financial wealth relative to GDP.

In the first alternative scenario *(unchanged behaviour)*, the retirement age is assumed to be constant, as is the need for welfare services in different age groups. In this relatively pessimistic scenario, government consumption climbs to 29.6 per cent of GDP in

2040, with the result that net lending falls even further than in the base scenario to −4.4 per cent of GDP.

The second alternative scenario *(reduced personnel density)* assumes that personnel density decreases by 0.3 per cent per year. Otherwise the assumptions are the same as in the base scenario. In this alternative scenario, which entails an erosion of the public sector commitment, net lending gradually improves to −0.5 per cent of GDP in 2040, while net financial wealth falls relative to GDP but is still positive in 2040.

In neither the base scenario nor the two alternative scenarios are public finances sustainable in the sense of balanced net lending or net financial wealth holding at current levels. Long-term sustainability can be achieved by reducing expenditure or raising taxes. To fund an unchanged public sector commitment while keeping net lending balanced, the tax-to-GDP ratio will need to increase by 2.7 percentage points in the base scenario from 43.1 per cent in 2016 to 45.7 per cent in 2040. In the alternative scenario with unchanged behaviour, the tax-to-GDP ratio has to climb more than 3.7 points to achieve a balanced budget in 2040. In the alternative scenario with reduced personnel density, the ratio needs to rise by just 1 percentage point.

Sustainability analyses intended as a basis for adjusting fiscal frameworks rather than steering current policy

Fiscal sustainability analyses cannot be used to steer current policy. Any imbalances identified may nevertheless form a basis for discussion of how policy should be adjusted over the longer term. The considerable uncertainty associated with the calculations necessitates judicious interpretation, but they remain an important input when formulating or updating intermediate fiscal policy targets such as the surplus target.

1 Introduction

This report looks at the long-term sustainability of Sweden's public finances. Public finances can be considered long-term sustainable if today's tax system is still capable of funding the public sector's current commitment to welfare in the future. Assessing whether this is the case requires long-term projections of government revenue and expenditure. The purpose of an assessment of long-term sustainability is to identify potential imbalances in public finances at an early stage so that adjustments can be made before issues arise. Fostering long-term sustainability is a way of preventing problems with public finances and avoiding emergency measures in the form of far-reaching tax hikes and/or spending cuts. The focus in this report is on the period until 2040, but the analysis includes projections through to 2100.

SHORT- AND LONG-TERM CHALLENGES FOR PUBLIC FINANCES

Sweden's public finances face challenges in both the short and the long term. The number of asylum seekers in Sweden is record-high for the modern era. Sweden received 163,000 asylum seekers in 2015, and the Swedish Migration Agency's February 2016 forecast suggests that a further 400,000 may arrive in 2016−2020. This forecast is, of course, associated with very considerable uncertainty. The influx of asylum seekers meant that in autumn 2015 the Migration Agency announced a need for increased funding of SEK 140 billion in the period 2016−2019 to cover increased migration costs. This increase in expenditure will result in larger central government budget deficits over the next few years, but also re-prioritisation between areas of expenditure and possibly various tax rises.

The NIER believes that the increase in expenditure due to the refugee influx will largely be temporary. As the asylum seekers receive residence permits and become established in the labour market, migration and integration costs will fall, and tax revenue will rise. In the longer term, it is instead the growing proportion of elderly people in the population that will present a challenge to public finances. Demographic developments in Sweden favoured public finances for a long period, with a growing working-age population in relation to the population as a whole. This trend reversed a decade ago, and there has since been a growing share of people who are not of working age, primarily elderly people. In the early 1990s, the over-80s made up around 4 per cent of the population. By 2040, this figure is expected to have doubled to around 8 per cent. As the share of elderly people in the population increases, so will the need for welfare services, above all in the form of elderly care. If personnel density remains the same as today, the need for personnel in the welfare sector will increase by 30 per cent between now and 2040. At the same time, government consumption will grow as a share of GDP by several percentage points.

ASSESSMENT BASED ON CURRENT POLICY, NOT A FORECAST

The question of whether fiscal policy is sustainable requires an assessment of the public sector's financial commitments and future revenue. Future expenditure will consist mainly of consumption and transfers, but also to some extent investment. How this spending will develop in the future is, of course, difficult to predict. It will be determined to a great extent by demographics, but also by technological developments, movements in wages and prices, and so on. Primary revenue – chiefly tax revenue –

depends mainly on incomes in the economy, which are largely determined by future GDP growth, which, in turn, depends partly on demographics. These factors are taken into account in this report.

Besides these factors, the population's preferences for future policy also play a role, such as the standard of welfare services and the generosity of the transfer systems. But an analysis of fiscal sustainability is not intended as a forecast. Instead, the question is, in principle, whether an *unchanged commitment* on the expenditure side can be financed by *current* tax rules. This question requires an interpretation of what an unchanged commitment entails – in other words, a definition of today's commitment, which is discussed later in the report. The sustainability analysis in this report does not aim to answer questions about what tomorrow's electorate will expect by way of welfare services and transfers, nor does it attempt to predict future political preferences when it comes to taxation. Instead, the calculations constitute a consequence analysis of current policy.

ANALYSIS FOCUSED ON THREE SCENARIOS

The analysis in this report centres around three scenarios. The *base scenario* assumes that the age of exit from the labour market – the retirement age – gradually increases. It also assumes that the need for welfare services among the elderly gradually decreases somewhat over time. Contrasting with this base scenario is an alternative scenario referred to as *unchanged behaviour*, where the retirement age is constant, and the need for welfare services in each age group is assumed to be the same in future as it is today. This scenario provides an illustration of how much higher government expenditure will be if increasing life expectancy affects neither the retirement age nor the need for health and social care among the elderly. The other alternative scenario in the report is referred to as *reduced personnel density* and is based on the same assumptions as the base scenario except that personnel density in the provision of welfare services declines by 0.3 per cent per year.

STRUCTURE OF THE REPORT

Chapter 2 contains a discussion of the long-term sustainability of public finances, of how the degree of sustainability can be quantified, and how the fiscal framework can help foster long-term sustainability. Chapter 3 looks at future demographic developments and the macroeconomic scenario underlying the long-term projections. Based on these demographic developments, Chapter 4 then examines developments in government expenditure until 2040 in the base scenario and two alternative scenarios. Chapter 5 presents a consequence analysis for public finances based on expenditure in the different scenarios. It looks partly at how public finances move with unchanged taxes, and partly at what tax increases would be needed to fund an unchanged commitment through to 2040 with balanced public finances. Chapter 6 extends the horizon for the analysis to 2100 and draws tentative conclusions about fiscal sustainability with an infinite horizon, partly using the S2 indicator. Chapter 7 then presents the report's main conclusions. There are two appendices: the first provides further information on the macroeconomic scenario on which the projections are based, while the second presents tables providing an overview of key data for public finances in the various scenarios.

2 The long-term sustainability of public finances

BALANCE BETWEEN REVENUE AND EXPENDITURE ESSENTIAL

The sustainability of public finances is about the government sector's long-term ability to fulfil its financial commitments. These commitments consist partly of current government debt, which will result in future interest costs, and partly of future expenditure on welfare services, transfers and investment (primary expenditure).

Fiscal sustainability can be said to exist when the government's revenue, primarily taxes, is sufficient to fund the expenditure resulting from its commitments. A *minimum requirement* for fiscal sustainability is that the ratio of government net debt to GDP does not grow constantly but stabilises in the long term.[1] A constantly growing net debt-to-GDP ratio is not sustainable, because sooner or later the government will be unable to pay interest on this debt.

Whether debt stabilises in the long run depends on (i) the initial level of net debt, (ii) the difference between the nominal interest rate and nominal GDP growth, and (iii) future primary net lending, defined as net lending excluding capital income and interest costs. An initial net debt position implies a need for future primary surpluses to fund interest payments on this debt. The size of these surpluses depends not only on the size of the initial net debt but also on the difference between the interest rate and the growth rate. This is because, on the one hand, a higher interest rate means higher interest payments. On the other hand, higher growth means that debt relative to GDP will be reined in by the increase in output. If there is no difference between the interest rate and the growth rate, these effects will cancel each other out – the erosion of the debt-to-GDP ratio due to output growth will be exactly equivalent to the interest payments. In this case, a balanced primary budget in the long term is a sufficient condition to stabilise the debt-to-GDP ratio.[2]

In Sweden's case, the situation is such that a balanced primary budget in the long term will be sufficient to stabilise the ratio of government net debt to GDP. The sector currently has negative net debt, or *net financial wealth*, equivalent to almost 20 per cent of GDP. On the face of it, this would present scope for persistent primary deficits. But with the interest-growth differential assumed in this report, this corresponds to a long-term primary deficit of less than 0.1 per cent of GDP. One necessary condition for government net debt to stabilise relative to GDP is thus that the primary balance in the long term is close to zero. This means that a minimum requirement for fiscal sustainability is that primary revenue (mainly tax) matches primary expenditure in the long run. In countries with high net debt, such as Greece, the initial debt burden is more significant. In those countries, the interest rate is often much higher than the

[1] Net debt is the government sector's gross debt less its financial assets. Net debt is the same as net financial wealth with the sign reversed.

[2] For the interest rate to correspond exactly to the growth rate is, of course, a special case, but the difference between them can still be expected to be small going forward.

growth rate, due partly to the debt issue, which risks exacerbating the sustainability problems.

STABLE DEBT IN THE LONG RUN NOT A STRICT SUSTAINABILITY CRITERION

The purpose of long-term fiscal sustainability analyses goes beyond calculating whether net debt will stabilise. There is a risk that imbalances worthy of consideration could "fly below the radar" if the sustainability assessment focuses one-sidedly on a criterion that considers only developments in the very long run. Net debt stabilising as a share of GDP is not a particularly strict sustainability criterion. It does not say at what level debt should stabilise. This means that a situation where net debt stabilises at 100 per cent of GDP and one where it stabilises at −100 per cent of GDP can be considered "equally sustainable" despite a difference equivalent to 200 per cent of GDP. A stable net debt-to-GDP ratio in the long run is therefore compatible with very different paths for public finances. Debt may stabilise in the long term despite substantial imbalances in the shorter term. Since they span a period normally of many decades, the calculations are very uncertain, and the uncertainty can reasonably be expected to increase with the horizon. There are therefore grounds to look at the complete path for net debt and net lending in a sustainability analysis, and to set stricter conditions for an imbalance than constantly growing net debt.

FISCAL POLICY OBJECTIVES PLACE LIMITS ON DEBT LEVELS

An alternative sustainability criterion might be one that not only requires a stable net debt-to-GDP ratio but also limits the *level* of net debt relative to GDP. Such a criterion can be seen in the light of the fundamental objectives of fiscal policy. A path that makes the fulfilment of fiscal targets much more difficult cannot be considered sustainable.

In general terms, fiscal policy can be said to aim at delivering public services and transfers in an economically efficient way with a desirable redistribution policy profile. Fiscal policy must also be pursued in a way that leaves scope for economic stabilisation measures. These fundamental objectives of fiscal policy limit the level of net debt more tangibly than the requirement of a stable long-term debt-to-GDP ratio.

Economic efficiency is closely tied to the design of the tax system. One starting point here is that tax rates should be as even as possible over time in order to minimise the distortions that taxation often gives rise to. A path that leads to stable net debt but requires an upward trend in the tax burden is not appropriate in this regard. It is a moot point whether such a path is even possible, as the distortive effects of taxation could at some point become so great that revenue no longer increases when taxes are raised.

When it comes to redistribution policy, the government has stressed in various contexts that an even distribution of resources between generations is desirable. This objective means that government net debt should not trend up or down for long peri-

ods, as such variations would entail a redistribution of wealth from one generation to another.[3]

The objective of being able to use fiscal policy for economic stabilisation purposes also puts a limit on the level of net debt. This is because such a policy requires leeway to increase net debt temporarily, which can only be done if debt is not excessive in the first place.

There are other complex factors that place greater restrictions on net debt than the requirement that it stabilises in the long run. As mentioned earlier, stable net debt based on a constantly growing tax burden may be unsustainable. But it is difficult to tell where to draw the line for when higher taxes reduce the labour supply to the point where higher taxes no longer result in an increase in government revenue. This depends partly on which taxes are raised and what the revenue is to finance.[4] Another aspect is whether a sharp rise in taxes is *politically* sustainable – whether it is achievable in practice. The interest rate may move away from the economy's growth rate if debt levels are excessively high. If lenders consider debt to be too high, they may require compensation for risk in the form of a higher interest rate. This can increase the interest-growth differential, both through higher interest rates and through the lower growth that this may entail. Such a situation could lead to an unsustainable spiral where a larger interest-growth differential leads to increased debt, which, in turn, pushes risk premiums up further, and so on. It is, however, very difficult to gauge at what level Sweden's debt would start to attract substantial risk premiums.

Although these fundamental fiscal policy objectives and other factors limit the level of net debt that can be considered unsustainable, it is not easy to set straightforward criteria for what constitutes an unsustainably high level of debt. This is due partly to preferences for equality between generations and stabilisation policy ambitions, as well as how interest on the national debt and the labour supply react to developments, which is difficult to assess. This is an argument for analysing developments over the entire time period rather than focusing on any particular summary measure or indicator.

FISCAL FRAMEWORKS SUPPORT SUSTAINABILITY AND FUNDAMENTAL OBJECTIVES

To ensure that public finances stay in line with the fundamental objectives of fiscal policy, many countries – including Sweden and the EU – have formulated specific fiscal targets, such as targets for net lending (the Swedish surplus target) or government debt (part of the EU's Stability and Growth Pact).

These *intermediate* targets do not have any intrinsic value but aim to make it easier to achieve the more fundamental objectives of fiscal policy. A target for net lending, such as Sweden's surplus target, will limit growth in net debt if the target is met. Fiscal targets that are met also increase the transparency and credibility of fiscal policy. A broad

[3] Some variation in net debt over time can, however, be motivated by temporary demographic variations, such as demographic "humps" where a particular generation is unusually large.

[4] It can, for example, be claimed that taxes to fund public services such as preschools are less constraining on the labour supply than, say, taxes to finance interest payments on the national debt.

consensus that the government can and will fulfil its commitments is a fundamental pillar of fiscal sustainability. A lack of fiscal credibility can make it harder to collect taxes and can push up the government's borrowing costs.

Fiscal sustainability analyses cannot be used to steer current policy. Any imbalances identified may nevertheless form a basis for discussion of how policy should be adjusted. Such adjustments can, of course, be made on both the revenue and expenditure sides, through higher taxes or lower spending. Alternatively, if the calculations point to growing surpluses, they will, in principle, provide a measure of how much the welfare commitment can be increased without requiring tax rises, or how far taxes can be cut with an unchanged welfare commitment. The considerable uncertainty associated with the calculations necessitates judicious interpretation, but they remain an important input when formulating or updating intermediate fiscal policy targets such as the surplus target.

3 Demographic developments and long-term macroeconomic scenario

3.1 Demographic developments

According to Statistics Sweden's autumn 2015 population forecast, the Swedish population will grow from 9.8 million in 2015 to 12.2 million in 2040 and 13.3 million in 2060.[5] This means that the population is set to expand by around 25 per cent over the next 25 years, which can be compared with an increase of just over 14 per cent over the past 25 years. This relatively rapid population growth is due mainly to the current influx of refugees. Over the next five years, Statistics Sweden anticipates annual population growth of almost 2 per cent, compared with an average of just 0.5 per cent per year since 1950 (see Diagram 1).

In the long run, a growing population means both increased revenue and increased expenditure in the government sector. Practically all members of the population contribute to tax revenue to some degree, either directly in the form of income tax on labour or indirectly through value-added tax and other indirect taxes. A larger population also means a greater need for welfare services in the form of education, health and social care, and increased government expenditure on social transfers such as child allowance, sickness benefit and pensions.

GROWING SHARE OF ELDERLY PEOPLE

Whether a person makes a positive or a negative net contribution to public finances in a given period depends to a great extent on that person's age. The young and the old generally consume more welfare services than they pay in taxes, while the reverse is true for those of working age. This means that the age composition of the population generally has greater implications for government net lending than the population increase itself.

One measure that illustrates the age composition of the population is the *demographic dependency ratio*. This is the number of young and old in relation to the number of people of working age (defined here as ages 20−64). This ratio fell in the 1980s and 1990s and the early 2000s but has since risen again. According to Statistics Sweden's population forecast, it will trend upwards for the rest of the century (see Diagram 2). In 2005, the dependency ratio was 0.70, which means that there were 70 young and old people per 100 of working age. It is forecast to rise to 0.93 in 2060 and 0.96 in 2100.

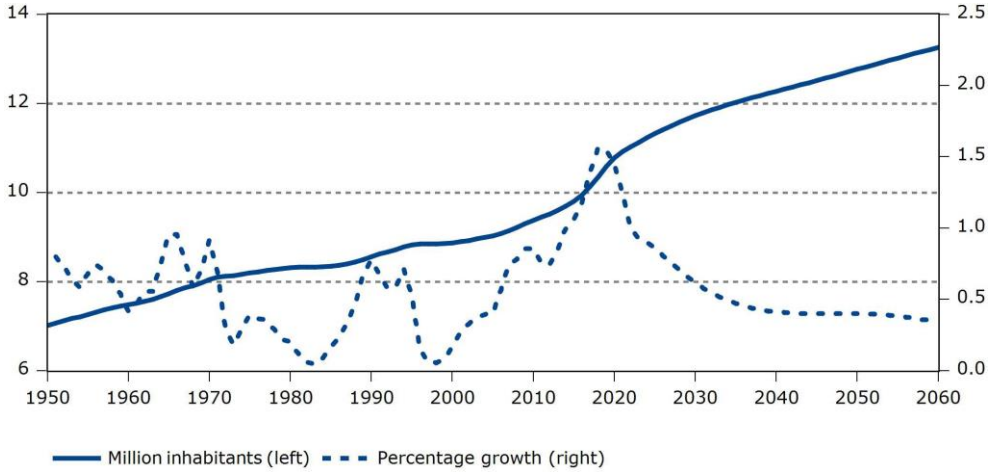
It is primarily a growing elderly population that will push up the dependency ratio. The old-age dependency ratio, which is the ratio of over-65s to the population aged 20−64, is forecast to climb from 0.34 today to 0.52 in 2100. The child dependency ratio is expected to rise somewhat in the coming decade but is not expected to trend

[5] The population forecast underlying this report is the updated forecast commissioned by the Ministry of Employment in October 2015. The figures are estimated annual means.

upwards after that. Statistics Sweden's population forecast shows 44 children (ages 0–19) per 100 people of working age after 2030.

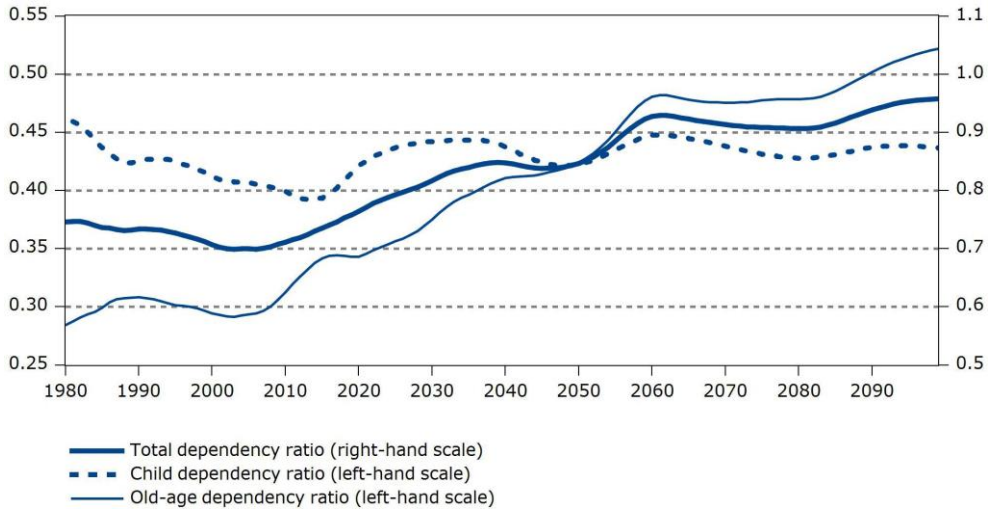
Diagram 1 Sweden's population, 1950–2060

Millions and percentage annual change



Source: Statistics Sweden.

Diagram 2 Demographic dependency ratio, 1980–2100



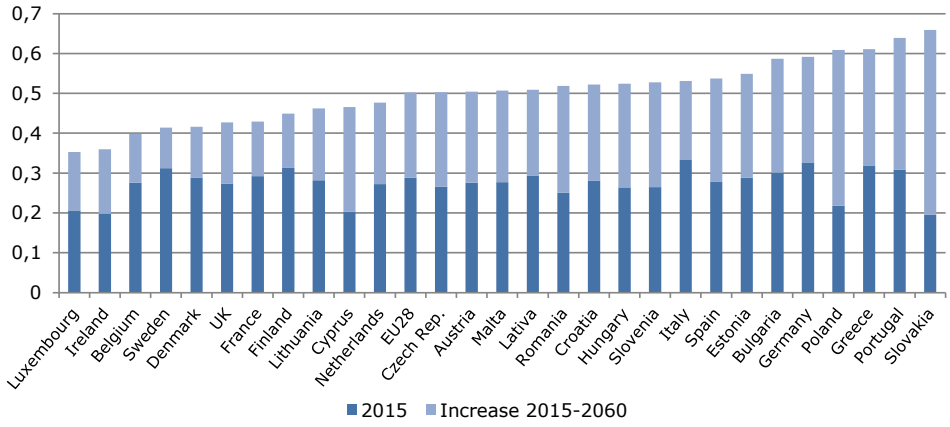
Note: The demographic dependency ratio refers here to the ratio between the number of people who are not of working age to the number of people who are. Working age is defined here as 20–64 years. The diagram shows the total dependency ratio divided into the child dependency ratio (the number of people aged 0–19 relative to the working-age population) and the old-age dependency ratio (the number of people aged 65 and over relative to the working-age population).

Source: Statistics Sweden.

The population aged 65–79 has grown rapidly in recent years and accounts for the bulk of the increase in the dependency ratio over the past decade. The proportion of people aged 80 and over has fallen slightly since 2005, but it will mainly be this group that grows as a share of the population in future. The over-80s are forecast to increase from around 5 per cent of the total population today to just over 9 per cent in 2060, while those aged 65–79 will grow only from 15 to 16 per cent of the population.

Sweden is far from alone in having an ageing population. Similar demographic trends can be seen in most other EU countries. In fact, the predicted rise in the old-age dependency ratio in Sweden is small compared to many other countries. According to Eurostat's population forecast, Sweden will have one of the lowest old-age dependency ratios in 2060 (see Diagram 3). This is due largely to the relatively high levels of immigration into Sweden, as the immigrants are younger on average than the existing population.

Diagram 3 Old-age dependency ratios in the EU



Note: The dark part of the bars indicates the old-age dependency ratio in 2015, while the full height of the bars is the old-age dependency ratio in 2060. In this diagram, working age is defined as 15–64 years, which means that the definition of the old-age dependency ratio differs somewhat from that used in Diagram 2.

Source: Eurostat.

3.2 Labour market assumptions

The size and productivity of the labour force largely determine how a country's aggregate output (GDP) will develop in the long term. The size of the labour force depends, in turn, on the size of the working-age population and on different age groups' labour force participation rates.

PROJECTIONS BASED ON CURRENT LABOUR MARKET STRUCTURES

In the short term, through to 2020, the labour market scenario is based on the NIER's forecast in *The Swedish Economy*, December 2015. This means that the participation rate and the employment rate falls slightly over the next few years, while unemployment climbs to 7.5 per cent in 2020. The slight decrease in the employment rate in the coming years is due primarily to the current influx of refugees, as it will take a relatively long time for many of them to become established in the labour market.

During the 2020s, it is assumed that these immigrants will increasingly be integrated into the labour market. By the early 2030s, they have approximately the same employment rate as non-Europeans currently have in the Swedish labour market.[6] This

[6] The absence of cyclical effects and a lower level of immigration at this horizon are expected to result in a slightly higher employment rate for all population groups than in 2015.

helps the employment rate to rise again, and unemployment to fall during the 2020s. In the longer term, from 2033 onwards, the NIER's long-term labour market model KAMEL has been used for the labour market projections. In this model, labour market variables are influenced by changes in the composition of the population in terms of gender, age and origin.[7] Different population groups have different characteristics, including labour force participation rates, employment rates and average hours worked by those who are in employment. These characteristics are generally expected to persist in the model's projections. If, for example, a group associated with a high employment rate grows in size relative to the other groups, this will therefore have a positive effect on the overall employment rate.

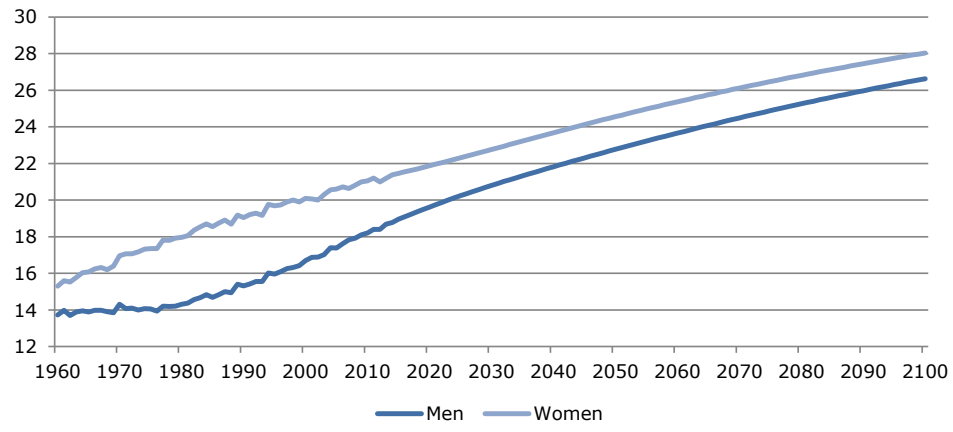
RISING LIFE EXPECTANCY POINTS TO LONGER WORKING LIFE

The base scenario departs from the assumption of unchanged behaviour in the labour market. The exit age – the age when people retire from the labour market – is expected to rise gradually. This assumption can be seen as a gradual "rejuvenation" of the over-60s' labour market behaviour by four years in the period through to 2100. This means that 60-year-olds in 2100 will, on average, behave like 56-year-olds today in terms of participation rate, employment rate, hours worked and so on. This also means that the average exit age from the labour market is assumed to increase by four years by 2100 from its current level of 63.8 years. By 2040, the average exit age is assumed to have risen by around 1.2 years. This assumption contrasts with one of the alternative scenarios, in which labour market behaviour is constant in all age groups.

The assumption of a rejuvenation of behaviour in the labour market is due mainly to Statistics Sweden's forecast for life expectancy. Today, the life expectancy of a 65-year-old is around 20 years. This increases to 23 years in 2040 and almost 27 years in 2100 in Statistics Sweden's demographic forecast (see Diagram 4). The base scenario is based on the hypothesis that this increased life expectancy translates into better health at a given age.

Diagram 4 Life expectancy at age 65

Number of years



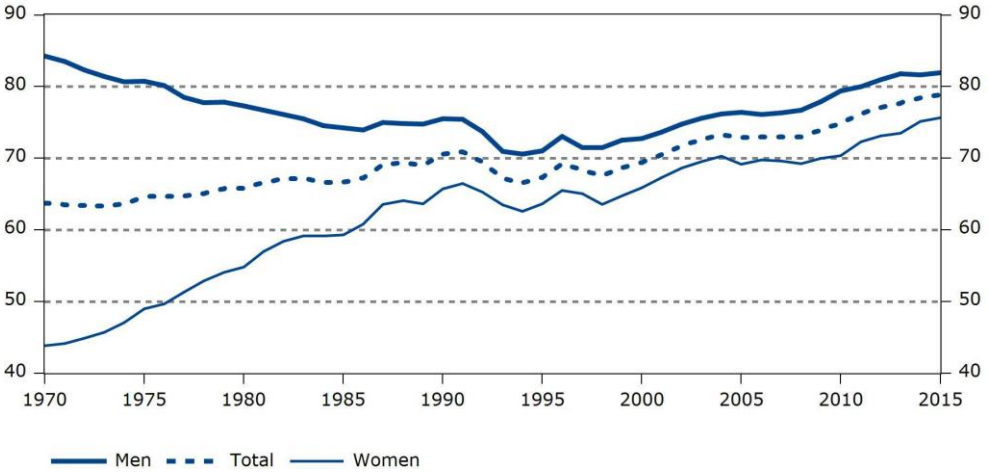
Source: Statistics Sweden.

[7] In this model, 480 different groups in the labour market are defined on the basis of gender, 60 age groups (15-74 years) and four categories of origin (Sweden, other Nordic, other European and non-European).

If 65-year-olds in 2100 are, on average, healthier than 65-year-olds today, this suggests a rejuvenation of their behaviour in the labour market in the form of increased participation at advanced ages and retirement at a greater age. A rising average labour market exit age would also be a continuation of an existing trend. Labour force participation in the 55–64 age group has been trending upwards since the 1970s. Until the early 1990s, this was due to higher participation rates among women. Since then, participation has increased among both men and women in that age group (see Diagram 5).

Diagram 5 Labour force participation, ages 55–64

Percentage of population aged 55–64



Source: Statistics Sweden.

Participation in the 65–74 age group has increased among both men and women since at least 2001, when Statistics Sweden again began to include this age group in its Labour Force Survey. In 2015, 16.8 per cent of this age group participated in the labour market, against 9.5 per cent in 2001 (see Diagram 6).[8] This increased labour force participation among older people has contributed to an increase in the average exit age, from 62 in the late 1990s to almost 64 in 2014 (see Diagram 7). Given these historical developments, the assumption in the base scenario of an increase in the retirement age of 1.2 years by 2040 may well be on the conservative side.

The average age of entering and exiting the labour market in 2014 was 22.5 and 63.8 years respectively. If a 65-year-old has a life expectancy of 20 years, this means that, on average, people's retirement is roughly half as long as their working life. The assumption of a rejuvenation of behaviour by four years by 2100 means that the balance between working life and retirement is kept fairly constant.[9]

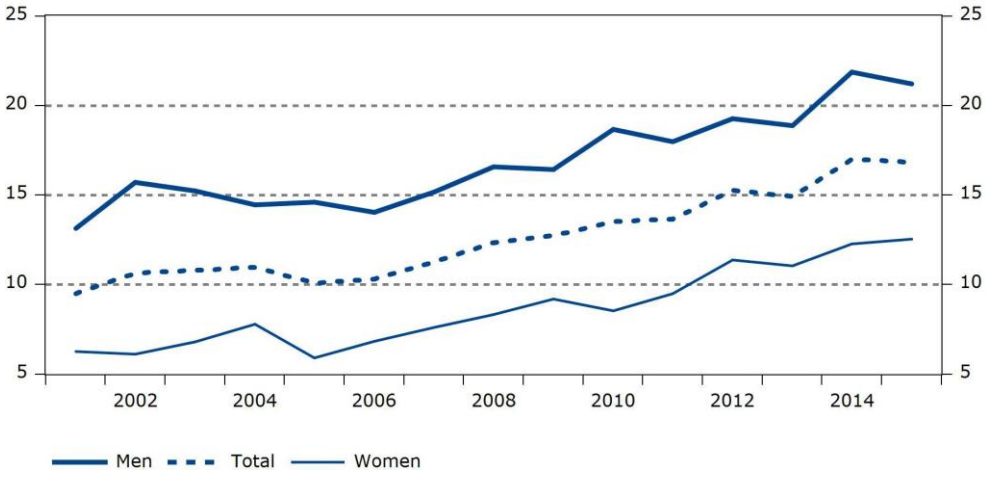
[8] In the 1970s, there was a downward trend in the participation rate in this group. Statistics are unavailable for labour market behaviour in this age group from the mid-1980s through to 2000, but there were relatively small differences in the participation rate between 1985 and 2001.

[9] The increase in the retirement age in the base scenario as a result of the assumption of a rejuvenation of behaviour coincides to a large extent with developments in the guideline retirement age proposed by the Retirement Age Commission. See Swedish Government Official Reports (2013) "Åtgärder för ett längre arbetsliv" [Towards a longer working life], SOU 2013:25.

One driver that is at least as important for the rise in the exit age is that the Swedish pension system in its current form provides an incentive to stay in work longer. The pension payable per year rises the later retirement is taken, as the pension entitlements earned will then be distributed over a smaller expected number of remaining years of life. For some vocational groups, especially those with physically demanding work, however, the design of the pension system may be less significant for the decision to retire. It may then be more a case of no longer being physically capable of continuing to work beyond a certain age. Technical aids, such as those that reduce heavy lifting, will probably reduce demands on physical capacity in the labour market in future. There may nevertheless be a need for increased flexibility in the labour market if the majority are expected to work to a greater age, in terms of both options for reduced working hours and switching to less physically demanding duties at a more advanced age.

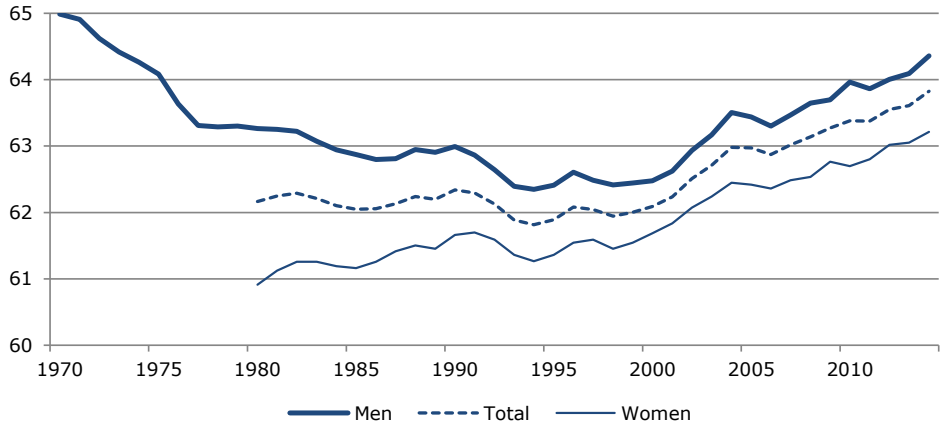
Diagram 6 Labour force participation, ages 65–74

Percentage of population aged 65–74



Source: Statistics Sweden.

Diagram 7 Average labour market exit age



Note: Exit age is defined here as the age of retirement for those participating in the labour force at age 50.

Source: Swedish Pensions Agency.

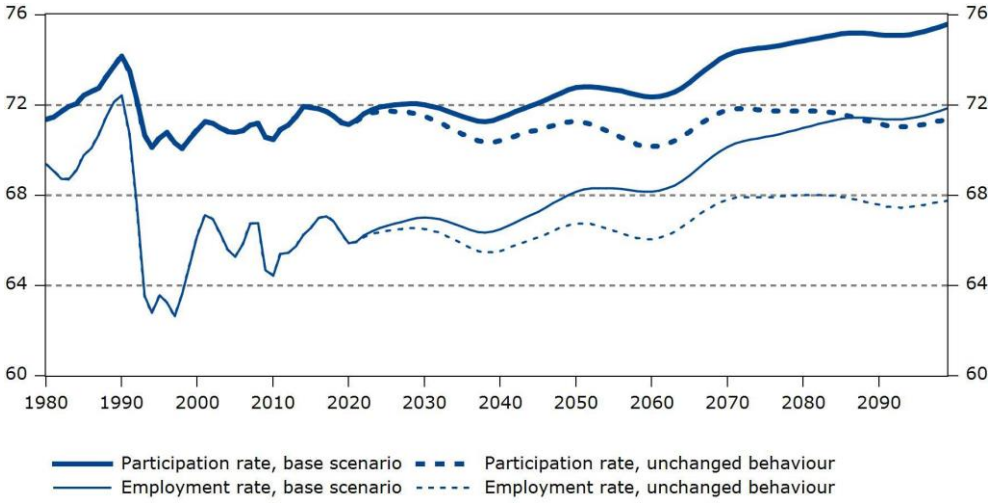
CONSTANT DEPENDENCY BURDEN REQUIRES LONGER WORKING LIFE

The assumption of a rejuvenation of behaviour among older people in the labour market means that the participation rate in the 65−74 age group more than doubles from 17 per cent in 2015 to 38 per cent in 2100. In the 15−74 age group as a whole, the assumption of a rejuvenation of behaviour means that the participation rate and the employment rate are more than 4 percentage points higher in 2100 than with unchanged behaviour. By 2040, the effect of this assumption is around 1.5 percentage points (see Diagram 8).

The base scenario means that labour force participation will be approximately the same in 2040 as it is today, or around 72 per cent. The projections for the period after that show an increase in participation, due to a combination of higher participation among older people and relatively rapid growth in groups with high participation rates. The employment rate – the number of people in work relative to the population of working age – follows a similar path.

Diagram 8 Labour force participation rate and employment rate, ages 15−74

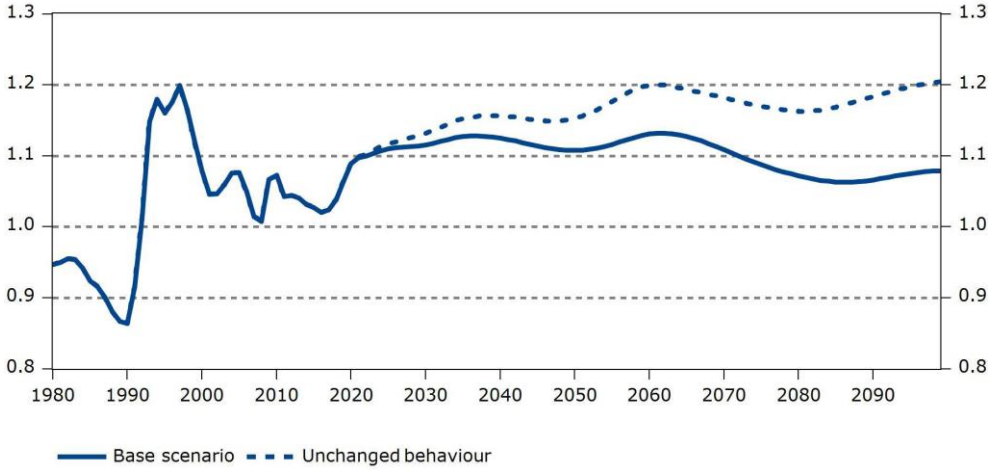
Percentage of population aged 15–74



Source: Statistics Sweden and NIER.

The demographic dependency ratio presented in the previous section underestimates the dependency burden that the working population faces if the employment rate is relatively low among relatively large groups of the working-age population. The *economic dependency ratio* takes this into account by placing the number of economically inactive (non-working) people in the population in relation to the number of employed. This ratio is currently close to 1, which means that there are roughly equal numbers of economically active and inactive people. The ratio will rise relatively quickly over the next few years as a result of a continuing influx of refugees. The population will grow much more quickly than the number of employed. As these immigrants become established in the labour market, employment will increase and the economic dependency ratio will more or less stop rising. In the base scenario, the ratio is then virtually constant at 1.1 in the projections. In the alternative scenario with unchanged labour market behaviour, however, the ratio continues to climb through to 2060, by which time it is 1.2 (see Diagram 9).

Diagram 9 Economic dependency ratio



Note: The economic dependency ratio is defined here as the ratio between the number of economically inactive (non-working) people in the population and the number of employed.

Source: Statistics Sweden and NIER.

HIGH EMPLOYMENT DESPITE COMING CHALLENGES

The long-term scenario for the labour market should be viewed as a scenario based on simplified assumptions and not as a long-term forecast. It is, for example, highly likely that there will be further swings in the economy similar to those during the crisis of the early 1990s and the financial crisis, albeit perhaps of a lesser magnitude. Cyclical effects of this kind are not taken into account in this scenario. Nor, apart from demographic effects, does the base scenario include structural changes that will affect the labour market in the long term.

Future structural shocks or trends in the labour market with lasting effects on employment cannot be ruled out. But it is only possible to speculate how such shocks might occur and what effects they might have. Here we discuss briefly two such potential trends/shocks: structural change in the form of automation and digitalisation replacing various forms of labour, and a reduced labour supply due to increased demand for leisure.

Structural change: technology and labour are complementary

In the 1970s and 1980s, unemployment in Sweden averaged just over 3 per cent. During the crisis of the early 1990s, the unemployment rate shot up to more than 10 per cent. The number of employed fell by more than 500,000 between 1990 and 1993, and the employment rate fell seemingly permanently to a lower level. The bulk of the jobs that disappeared were in manufacturing. Although unemployment subsequently fell back, and employment picked up, the early 1990s crisis brought a permanent increase in structural (equilibrium) unemployment. The NIER estimates that structural unemployment climbed from 4 per cent in the late 1980s to more than 7 per cent in the mid-1990s, and it has since averaged 7 per cent.

It is impossible to rule out the possibility of structural changes in the economy pushing structural unemployment up again in the future. History suggests, how-

ever, that the jobs wiped out by structural change are replaced with new jobs, not that demand for labour will decrease permanently. One fundamental argument for this is that technological advances have both substitution and income effects when it comes to demand the labour. Technological advances may mean that routine tasks previously carried out by humans are taken over by computers, robots and other electronics. This *substitution effect* reduces the demand for workers carrying out routine tasks.

At the same time, these labour savings – due to routine tasks being automated – mean that the individual employer can increase staffing in other parts of the business. This *income effect* on labour demand associated with technological advances can be extrapolated to the economy as a whole. As automation and digitalisation reduce the need for workers to perform routine tasks, labour demand can instead focus on jobs that better reflect humans' comparative advantages over computers and robots. As examples of such comparative advantages, Autor (2015) mentions the capacity for interaction with other people (customers and patients), flexibility, adaptability and problem-solving skills.[10] In this way, technology tends to complement labour rather than act as a substitute.

With structural change of this kind, there is, of course, a risk in the short term that those whose jobs are replaced with computers or other machines will not possess the skills that are required instead. Matching problems of this kind in the labour market can be prevented and mitigated by providing appropriate training programmes for those losing their jobs, and giving young people the skills that are in demand in the labour market. A growing share of the labour force not being "needed" in the labour market despite having the right qualifications is considered to be an unrealistic future scenario.

Unchanged working week in the future

One factor that could impact the labour supply negatively is if rising incomes push up demand for leisure. In other words, as our purchasing power increases, we need to work fewer hours to meet our consumption needs and can therefore choose to devote more of our time to activities other than work. This would mean a reduction in the average working week, or annual hours worked. Historically, higher incomes seem to have had only a limited effect on working hours. Among men, the average working week has indeed decreased by more than seven hours over the past 50 years, from 45.8 in 1965 to 38.3 in 2015. Much of this decrease took place before 1980, however, when the average working week had already fallen to 40 hours, due mainly to changes in labour market legislation.[11] From 1980 to 2000, the average working week among men was largely constant around 40 hours, and only since the turn of the millennium has there been a slight decrease of around a tenth of an hour per year. Among women, the aver-

[10] Autor (2015) "Why are there still so many jobs? The history and future of workplace automation", *Journal of Economic Perspectives 29(3)*.

[11] See Björklund, Edin, Holmlund and Wadensjö (2006) *Arbetsmarknaden* [The Labour Market], 3rd edition, SNS Förlag.

age working week fell from 35 hours in 1965 to 33.8 hours in 2000 and has since been largely constant.

The fact that the average working week has decreased by less than 4 per cent among men and even increased slightly among women over the past 35 years, while real disposable income per capita has grown by more than 60 per cent, suggests that the relationship between income and working hours is weak – at least at an aggregated level. This may be because the income effect of higher real wages (which, other things being equal, will increase the individual's demand for leisure) has generally been the same size as the substitution effect (which, other things being equal, will mean that an individual increases his or her supply of labour if real wages are higher).

Another factor contributing to such a small increase in average working hours despite growing purchasing power may be that the length of the working week (working year) is so well established. In the same way that a retirement age of 65 has long been a well-established norm, the standard 40-hour working week has probably had a strong effect on individual working hours. Although many people now have the economic means and terms of employment that allow them to work shorter hours, it is possible that the length of the standard working week still plays a significant role in their choice of working hours. The strength of this norm may decline in the future in the same way that a retirement age of 65 has become less standard over the past 15 years. It is not a given, however, that a weaker norm would lead to shorter average working hours. While some groups might reduce their working hours in the absence of such a norm, others might choose to increase their working hours. Against this background, it is assumed that average working hours in the various groups are unchanged going forward.

3.3 Macroeconomic assumptions

The macroeconomic scenario is based on the forecast in *The Swedish Economy*, December 2015. The slump in the Swedish economy after the financial crisis erupted in 2008 is now considered to be largely over. Resource utilisation in the economy is expected to normalise in 2016 and largely remain normal over the next few years. The long-term macroeconomic scenario for 2021 onwards is based on the simplified assumption that the economy continues to operate at capacity. GDP growth is then determined by demographically driven developments in hours worked and the technological advances that, together with capital formation, give aggregate productivity growth.

SLIGHTLY LOWER PRODUCTIVITY GROWTH

The annual rate of productivity growth in the economy as a whole has averaged 1.7 per cent per year since the early 1980s (see Table 1). It is expected to be somewhat lower over the next 15 years. Productivity has grown slowly in recent years, averaging just under 0.4 per cent per year from 2011 to 2014. From 2016 to 2025, productivity growth in the respective sectors is expected to return to the historical average. This results in long-term productivity growth of 1.5 per cent per year, which is slightly below the historical average. The lower productivity growth ahead is due to a shift in

demand away from sectors with strong productivity growth (such as the export industry) in favour of sectors with lower productivity growth (such as welfare services and other government consumption).

The number of hours worked will rise rapidly over the next few years for cyclical reasons, by an average of 1.4 per cent per year in 2016–2020. Growth in hours worked is also expected to be high by historical standards in the 2020s, averaging 0.7 per cent per year, which can be explained by the current influx of immigrants gradually becoming established in the labour market. The rate of growth in the labour supply then slows and is slightly below the average for the past 25 years in the period from 2040 to 2100.

GDP growth, which can be approximated as the sum of the rate of growth in hours worked and the rate of growth in productivity, will be boosted by the relatively strong growth in the labour supply in the 2020s and average 2.3 per cent per year. GDP growth then falls again as growth in the labour supply slows. From 2030 onwards, GDP growth is 1.9 per cent per year in the base scenario.

GDP per capita, which can be viewed as a rough measure of the standard of living, will rise in line with productivity growth with an unchanged economic dependency ratio. In periods with a rising dependency ratio, growth in GDP per capita will instead lag behind productivity growth. Since the coming 15-year period features both relatively low productivity growth and a rising dependency ratio, growth in the standard of living will also be relatively slow, with GDP per capita growing by just 1.2 per cent per year on average in 2015–2030. The rate of growth will then recover as productivity picks up and the economic dependency ratio stops rising.

Table 1 Hours worked, productivity and GDP

Average annual percentage change, geometric mean between years indicated

	1981–2014	2015–2030	2031–2040	2041–2100
Population	0.5	1.2	0.5	0.4
Labour force	0.5	0.9	0.4	0.4
Employment	0.3	0.9	0.4	0.4
Hours worked	0.5	0.9	0.4	0.4
Productivity	1.7	1.4	1.5	1.5
GDP, constant prices	2.1	2.4	1.9	1.9
Household consumption	1.8	2.6	2.3	2.2
Government consumption	1.2	1.9	1.1	0.9
GDP per capita, constant prices	1.7	1.2	1.5	1.6
GDP, current prices	5.8	4.6	4.2	4.2

Source: Statistics Sweden and NIER.

CONSUMPTION DRIVEN BY DEMOGRAPHICS

Government consumption is driven mainly by demographic developments in the projections. Personnel density in public welfare services is assumed to be constant at today's levels, which reflects the assumption of an unchanged public sector commitment. The rising dependency ratio then means that an increasing share of existing

resources in terms of hours worked in the economy has to be made available for the production of welfare services. Together with the assumption that personnel costs make up a constant share of consumption expenditure, this means that government consumption trends upwards relative to GDP through to the end of the 2030s in the base scenario (see next chapter).

Investment has been projected on the basis of an assumption of a constant capital stock relative to GDP in the long run. Investment rises relatively quickly over the next few years as the economy recovers and is almost 25 per cent of GDP in the coming years before falling again somewhat.

Coming demographic developments entail a shift in the population away from a high share of middle-aged people with a high propensity to save, in favour of elderly people who save less. This motivates lower net lending to the rest of the world and is expressed by a continued decline in the trade surplus relative to GDP. In the long run, a balanced macroeconomic scenario requires Sweden's primary net lending to the rest of the world as a share of GDP to be close to zero. This rules out an unrealistic situation where Sweden accumulates steadily growing assets or liabilities vis-à-vis the rest of the world as a share of GDP. Net exports therefore trend down until the mid-2030s and then hold around 1 per cent of GDP on average in the projections through to 2100. The trade surplus is motivated by the sum of EU contributions and development aid being assumed to correspond to roughly this level.

Household consumption is assumed to rise with population growth and an increase in standards due to productivity growth. Thus household consumption per capita grows at a constant rate. This reflects households preferring an even consumption profile over their life cycle. The increase in household consumption per capita is affected by the level of government consumption, as GDP is supply-driven and investment and net exports relative to GDP follows the above assumptions. More government consumption therefore means less household consumption, and vice versa. In the base scenario, household consumption per capita grows by 1.9 per cent per year, which is somewhat more than the historical average of 1.4 per cent per year in 1981−2014. The strong growth in aggregate consumption – in other words, the sum of household and government consumption – is a result of demographic developments, with a growing share of elderly people. The growth in total final consumption as a percentage of GDP and reduced net lending to the rest of the world, via lower net exports relative to GDP, are therefore two sides of the same coin.

4 Government expenditure until 2040

Public finances are long-term sustainable if the current design of the tax system is capable of generating sufficient government revenue in the future to finance an unchanged welfare commitment. This chapter studies how government expenditure might develop through to 2040 with an unchanged public sector commitment. The following chapter then looks at how government revenue develops in the long term with the current tax system. This will provide a picture of how public finances might develop with an unchanged public sector commitment and an unchanged tax system.

The analysis in this and the following chapter is mainly limited to the period until 2040. The longer the projection horizon, the more uncertain the demographic forecast becomes. Assessing the long-term sustainability of fiscal policy on the basis of population projections and macroeconomic scenarios too far into the future could lead to conclusions that overshadow imbalances and challenges in public finances much closer ahead in time. This chapter begins with a brief overview of current and historical government expenditure. The projections for the various areas of expenditure are then presented in more detail, looking first at government consumption, followed by government investment, payments from the old-age pension system and, finally, other social transfers.

4.1 Government expenditure – an overview

GOVERNMENT EXPENDITURE 50 PER CENT OF GDP

Government expenditure amounted to 50.2 per cent of GDP in 2014.[12] More than half of this was government consumption, consisting largely of welfare services in the form of education, health and social care. Government consumption also includes collective goods such as justice, defence and maintenance of the national road and rail networks. The local government sector – municipalities and county councils – provides the bulk of welfare services, while the central government sector largely accounts for collective side of government consumption.

Social transfers paid by government to households make up just under a third of government expenditure. These can be divided into two roughly equal parts: payments of income pensions from the old-age pension system, and social transfers paid by central government and, to some extent, municipalities. Government investment accounts for just under a tenth of expenditure, while the final tenth consists of business subsidies, EU contributions, international aid and interest costs.

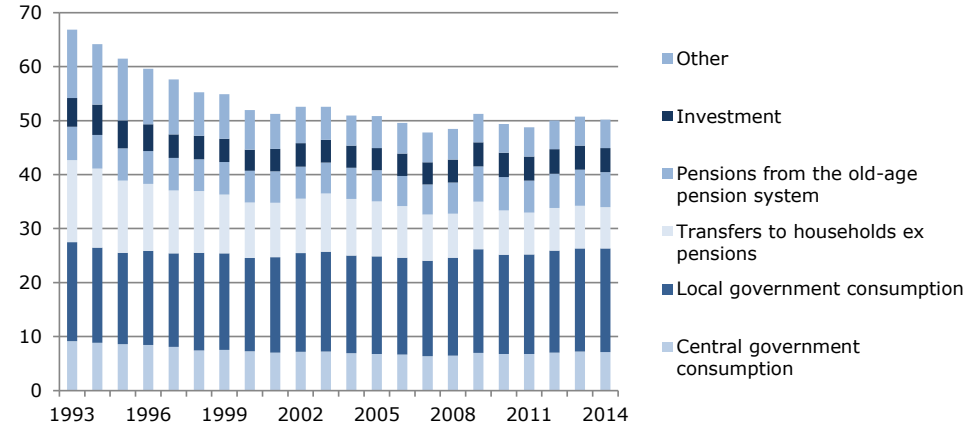
Government expenditure has been largely constant as a share of GDP since the turn of the millennium. The expenditure-to-GDP ratio exceeded 60 per cent for a few years in the 1990s but rapidly fell back following the austerity programmes and economic recovery in the second half of the decade (see Diagram 10). Spending on social transfers, excluding income pensions, amounted to around 15 per cent of GDP in the

[12] In this report, the government sector is that which Statistics Sweden defines as public services in accordance with ESA 2010.

early 1990s in the wake of the severe economic downturn of the time. Today, this spending accounts for only half as much of GDP. Besides cyclical effects, the relative decline in transfer spending is due to falling replacement rates for a number of transfers (see Section 4.4). Interest on the national debt also made up a substantial slice of public expenditure in the mid-1990s. It has since trended downwards, both due to a falling government debt and a falling interest rate. Central government interest costs were below 1 per cent of GDP in 2014, compared with more than 5 per cent in the mid-1990s.

Diagram 10 Government expenditure 1993–2014

Percentage of GDP



Source: Statistics Sweden.

UNCHANGED PUBLIC SECTOR COMMITMENT: A SCENARIO, NOT A FORECAST

The projections of government expenditure in this report are based on the assumption of an *unchanged public sector commitment*. This projection principle relates to the concept of long-term fiscal sustainability. The key issue is whether the current commitment to welfare can be maintained given today's tax system and future demographic developments. The assumption of an unchanged public sector commitment should be taken neither as a recommendation nor as a forecast for the future size of the public sector. It should be seen instead as a calculation assumption for the assessment of long-term sustainability.

There is no standard definition of exactly what an unchanged public sector commitment is. In this report, it is taken to mean that personnel density in the provision of welfare services remains the same, that replacement rates in the benefits systems are maintained, and that government investment increases in line with the overall economy. With this definition, an unchanged commitment will not result from unchanged rules. Instead, active political decisions to increase expenditure will be required so that the commitment is not eroded over time. A narrower interpretation of unchanged rules could mean that grants and social transfers that are nominally adjusted are unchanged and become extremely small in real terms in the long run. Such an approach would not be especially informative, however, about whether current levels of welfare services and income protection can be funded with the current tax system. Unchanged rules are therefore interpreted here more as unchanged ambitions in the government sector's overall commitment to citizens.

A constant personnel density in the provision of welfare services does not necessarily mean that citizens will perceive the public sector commitment as unchanged or, for that matter, sufficient. If citizens believe that the standard of welfare services is lagging behind the rest of the economy, this could be seen as an erosion of the welfare commitment. This could happen, for example, if patients did not benefit from the latest health care technology.

An alternative way of defining an unchanged public sector commitment is to have spending per user of welfare services increase at the same rate as *GDP per capita*. The welfare commitment is then placed in relation to developments in the rest of the economy. With this definition, the standard of welfare services rises when economic growth exceeds population growth, but falls in periods when the economy grows more slowly than the population. At the same time, personnel density in the provision of welfare services will vary with the economic dependency ratio: it will fall when the dependency ratio rises, and vice versa.[13] This approach to the public sector commitment turns the spotlight onto government expenditure relative to GDP rather than the real need for resources associated with demographic developments. To some extent, fiscal sustainability is then interwoven into the very definition of an unchanged public sector commitment. If economic growth during a period is negative, the public sector commitment will, by definition, be unchanged even if there are extensive cutbacks. This supports defining the public sector commitment in terms of the real need for resources rather than relative to the size of the rest of the economy.

4.2 Government consumption

WELFARE SERVICES A LARGE PART OF GOVERNMENT CONSUMPTION

Government consumption accounts for more than half of government spending and is the category of expenditure that is most affected by demographic changes. Welfare services, which are the largest part of government consumption, are sometimes referred to as *individual* consumption. Individual government consumption can be divided broadly into health, education and social protection based on the standard Classification of the Functions of Government (COFOG). Each of these categories accounts for almost a quarter of government consumption. Social protection covers children's homes, after-school child care, daytime child care, active labour market programmes and, above all, elderly care.[14]

The remaining part of government consumption, which cannot be attributed to specific users, is known as *collective* consumption. The breakdown of government consumption between these different areas has been relatively stable over the past 20 years. The biggest exception is spending on defence, which almost halved from 1993 to 2013 (see Diagram 11).

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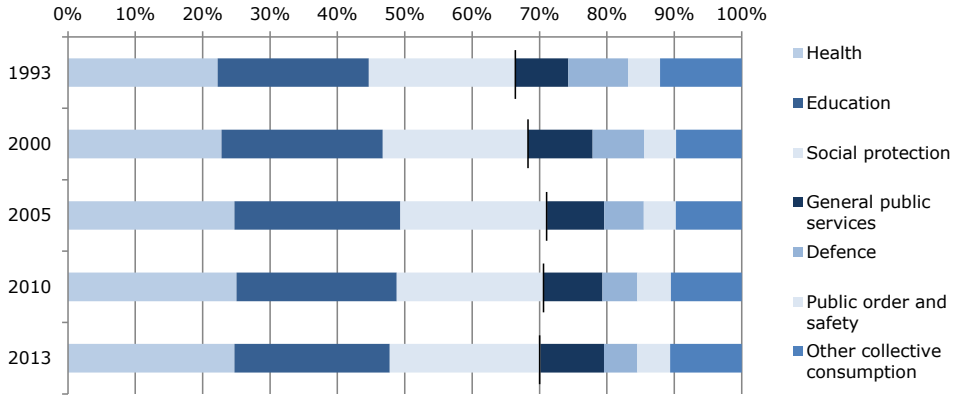
[13] For a more detailed analysis of public finances using this definition of an unchanged commitment, see NIER (2014) "Is an unchanged public sector commitment a sustainable commitment? An assessment of the long-term sustainability of Swedish public finances", *Occasional Studies 39*.

[14] Social transfers are not included in this concept because transfers do not constitute government consumption (see Sections 4.4-4.5).

Diagram 11 Government consumption by purpose, 1993–2013

Percentage of government consumption



Note: The three left-hand categories make up individual government consumption, while the remaining categories constitute collective government consumption.

Source: Statistics Sweden.

AGE COMPOSITION A KEY FACTOR FOR GOVERNMENT CONSUMPTION

The projections of government consumption assume that collective consumption is dependent on overall population growth. Individual consumption is projected on the basis of developments in different age groups in the population, as the consumption of welfare services varies considerably with age.

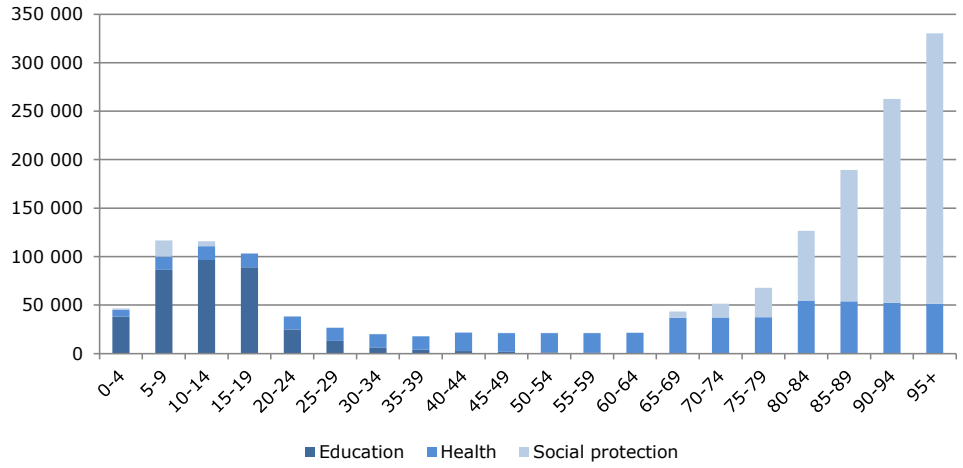
Diagram 12 shows the average cost per person and age group for the three categories of welfare services: education, health and social protection. With children and young people, education accounts for the bulk of the cost of government consumption. In the 5–9 age group, there is also a cost for after-school childcare which averages almost SEK 16,000 per child per year but is classified as social protection rather than education. Expenditure on welfare services for those of working age is relatively low: the average cost of welfare services in the 25–64 age group was just over SEK 20,000 per person per year in 2012 according to Statistics Sweden's calculations.

The average cost per person for welfare services increases substantially from the 65–69 age group upwards. In this age group, the average cost for individual government consumption is already twice as high as for the 60–64 age group, and it is more than three times as high in the 75–79 age group. Health care costs increase until around the age of 80 but are then constant at just over SEK 50,000 per person per year. Social protection in the form of elderly care increases considerably with age, however, and averaged almost SEK 280,000 per person per year in the oldest age group (95 and over) in 2012.

The cost profile for welfare services over our life cycle means that government consumption expenditure will grow faster than GDP when the numbers of young and elderly increase quickly relative to the rest of the population. There is therefore a close relationship between developments in the demographic dependency ratio and developments in government consumption as a share of GDP with an unchanged welfare commitment.

Diagram 12 Average cost of welfare services per person in 2012 by age group

SEK per year



Note: Costs are estimated by Statistics Sweden on the basis of survey data and database sources. Summing these costs for the population in each age group will not fully correspond to the total cost of individual government consumption in the national accounts for that year.

Source: Statistics Sweden.

REDUCED NEED FOR WELFARE SERVICES IN THE BASE SCENARIO

The base scenario assumes that the need for welfare services is constant over time among the under-65s. This means that people in each age group below the age of 65 are assumed to make the same use of welfare services in the future as they do today (see Diagram 12 above). Among the over-65s, the need for welfare services is assumed to decrease gradually as life expectancy increases. This reduced need for welfare services is assumed to be reflected in a gradual rejuvenation of needs by five years in the period through to 2100. This means that the average 65-year-old in 2100 is assumed to need the same volume of welfare services as today's 60-year-old, the average 70-year-old in 2100 has the same needs as today's 65-year-old, and so on. By 2040, the level of rejuvenation is assumed to be around 1.5 years. This assumption implies that the proportion of users of welfare services in each age group will decrease, but that each user will encounter the same personnel density. Thus the principles of an unchanged commitment and unchanged personnel density apply.

The life expectancy of a 65-year-old is expected to increase by almost seven years by 2100 (see Diagram 4 in the previous chapter). This means that the rejuvenation of the need for welfare services corresponds to approximately two-thirds of the increase in the life expectancy of a 65-year-old. In empirical research, there is no clear picture of the relationship between increased life expectancy and the need for welfare services. A preliminary conclusion based on an overview of the literature by Lindgren (2016) is that the evidence for a future reduction in costs per user is less strong for health care than for elderly care (see explanatory box below). As can be seen from Diagram 12 above, however, the average cost per user for health care is fairly even in the age groups above 65 years – the big increase is in elderly care (social protection). This means that the assumption of rejuvenation of needs when it comes to health care has little impact on the calculations.

UNCERTAIN HOW INCREASED LIFE EXPECTANCY WILL AFFECT NEED FOR HEALTH AND ELDERLY CARE[15]

In Statistics Sweden's population forecast, the life expectancy of a 65-year-old will increase by almost seven years from 20 years today to 27 years in 2100. The equivalent increase for a newborn is nine years (see diagram below). The question is what this increase in life expectancy will mean for the health of the elderly population, and how this, in turn, will affect the need for health and elderly care.

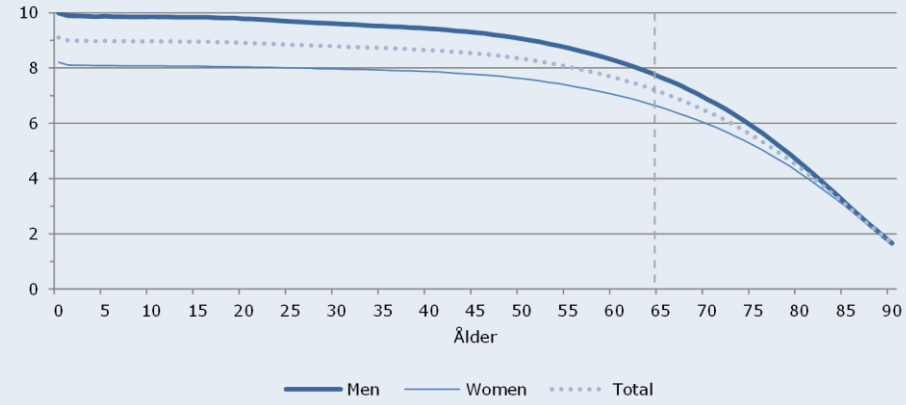
More years of good health in the base scenario

The rejuvenation of needs assumed in the base scenario in this report means that a 65-year-old in 2100 is expected to need the same amount of health and elderly care as a 60-year-old today. This assumption applies to all of the five-year age groups from 65 upwards. This five-year rejuvenation of needs corresponds to around two-thirds of the increase in life expectancy for a 65-year-old.

The assumption of a decreasing need for welfare services is based on the hypothesis that the extra years that we can be expected to have in future will largely consist of additional years of good health. Ill health is pushed back in time so that the number of years of ill health is the same as today (a hypothesis we can call *constant disability*). The underlying hypothesis for this scenario is that improved health care delays the onset of chronic diseases, and that medical advances lead to milder symptoms and reduced mortality among those with chronic diseases.

Diagram B1. Projected increase in life expectancy, 2015–2100, by age

Number of years



Source: Statistics Sweden.

The report's alternative scenario based on an unchanged need for welfare services ("unchanged behaviour") can be related to a more pessimistic hypothesis. This hypothesis, which we can call *constant health*, means that the extra years of life due to increased life expectancy are mainly years of ill health. One hypothesis for such a situation is that the risk of developing chronic diseases is approxi-

[15] This explanatory box is based largely on Lindgren (2016) "The Rise in Life Expectancy, Health Trends among the Elderly, and the Demand for Health and Social Care", *NIER Working Paper 142*.

mately the same in the future as it is today, but that medical advances reduce mortality from these diseases. If medical advances generally bring greater opportunities for extending life but not for curing disease, more people will live longer but, under this hypothesis, with impaired health.

Chronic diseases more prevalent but easier to live with

Empirical research shows that the incidence (frequency of new diagnoses) of chronic diseases in different age groups in the population has not decreased but increased. As life expectancy in the population rises, this means that the prevalence (proportion of cases in the population) of chronic diseases among the elderly will grow. At the same time, medical advances have meant that chronic diseases are easier to survive – and live with – thanks to medicines and other forms of health care. Health is a multifaceted concept and does not necessarily mean simply freedom from chronic disease. A person's health status can also be seen as a person's perceived health or assessed on the basis of disabilities or the ability to cope with everyday life. Research shows that disabilities have generally been pushed back in age and that elderly people of a given age have a greater capacity than before to live independently. This can be explained by better treatments for chronic diseases, access to better technical aids, and better access for those with disabilities in public places. When disability and capacity for independent living are used to define health, greater life expectancy can be said to go hand-in-hand with more years of good health. This, in turn, is consistent with the optimistic hypothesis of constant disability.

Unchanged need for health care but decreasing need for elderly care?

It is not obvious what these research findings imply for the need for health and social care among tomorrow's elderly. One interpretation is that the need for *health care* will be approximately the same as it is today in a given age group, given that the risk of having chronic diseases will be largely the same. The need for *elderly care* at a given age, on the other hand, will decrease in future if treatments for chronic diseases make the symptoms easier to live with. The need for elderly care may decrease further if the provision of technical aids increases and if both domestic and public environments are adapted to further assist those with disabilities. Based on this conclusion, it can be envisaged that the rejuvenation of needs in the base scenario will extend only to elderly care (social protection) and not to health care. As can be seen from Diagram 12, however, the average cost per user for health care among the elderly is substantially smaller than the cost of elderly care. An assumption of a rejuvenation of the need for health care therefore has little impact on the calculations.

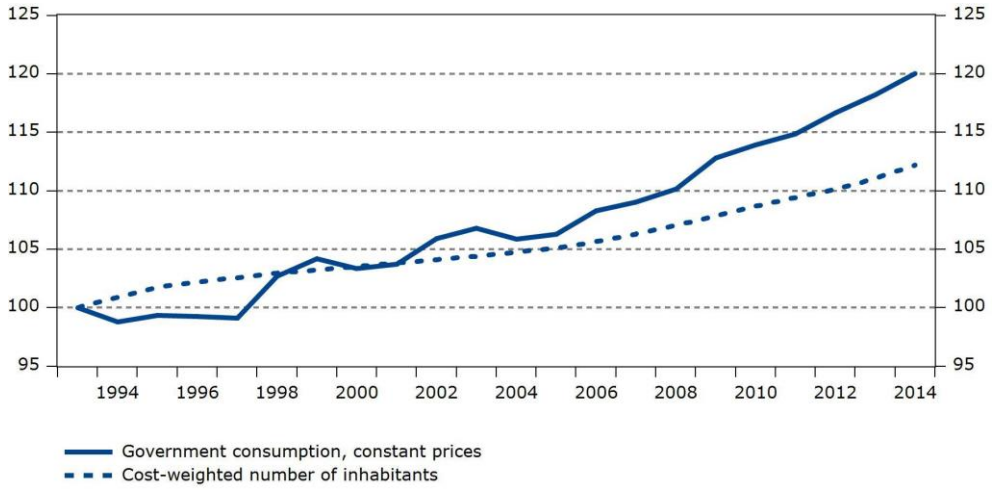
CONSTANT PERSONNEL DENSITY MEANS INCREASED CONSUMPTION PER USER

As discussed earlier in this chapter, it is not a given that citizens will view unchanged personnel density as an unchanged *standard* of welfare services. The standard of welfare services is not a well-defined concept, but one indicator of standards is how the volume of government consumption (in the national accounts) per cost-weighted inhabitant moves over time. The NIER estimates that the average volume increase in government consumption per capita has been around 0.4 per cent per year since 1993. This is based on government consumption in constant prices having increased by 20 per cent cumulatively from 1993 to 2014. At the same time, the NIER estimates that

the cost-weighted number of inhabitants (in other words, the number of users) increased by just under 12 per cent (see Diagram 13).[16]

Diagram 13 Government consumption and cost-weighted population

Index (1993 = 100)



Note: The cost-weighted number of inhabitants is estimated on the basis of the cost distribution in Diagram 12.

Source: Statistics Sweden and NIER.

The projections of government consumption are based not only on an assumption of unchanged personnel density but also on personnel costs accounting for a constant share of government consumption. Historically, personnel costs have made up around two-thirds of the total cost of government production, with relatively little variation.[17] Since prices for equipment and input goods for the production of welfare services are assumed to rise more slowly than wages, the assumption of a constant cost distribution means that, in time, personnel will have more and/or better equipment and input goods to work with. The combination of constant personnel density and a constant cost distribution is therefore assumed to mean that the volume of government consumption grows slightly more quickly than the number of users of welfare services. This volume increase per user amounts to 0.6 per cent per year in the base scenario and can be viewed as indirect productivity growth in the production of welfare services to the benefit of users.

As an alternative to the base scenario, we study an alternative scenario with half this level of volume growth per user per year. The reduced growth in government consumption is assumed to come through a reduction in the allocation of resources in terms of both personnel and input goods. In this alternative scenario, referred to here as *reduced personnel density*, personnel resources grow 0.3 percentage point more slowly than is required for an unchanged personnel density. This results in a gradual erosion

[16] Over the period as a whole, consumption increased 8 per cent more than the number of users, which can be taken as the standard of government consumption having increased by a total of 8 per cent during the period. An increase of 8 per cent over 21 years is equivalent to around 0.4 per cent per year. The calculation is based on users' needs having been constant during the period and is therefore sensitive to the choice of reference year (here we use information from 2012; see Diagram 12).

[17] Government consumption also includes goods and services produced in the private sector. The share of personnel costs in government production does, however, provide an idea of the distribution of costs in the overall production of goods and services consumed by the government sector.

of the public sector commitment as defined in this report. The assumption of reduced personnel density also means that government consumption falls relative to GDP with an unchanged age structure in the population. This implicitly means that citizens' preferences gradually shift away from publicly funded welfare services and other government consumption in favour of private consumption.

Hence the analysis considers two alternative scenarios besides the base scenario (see Table 2). In one alternative scenario (*unchanged behaviour*), the need for welfare services is assumed to be unchanged in all age groups in the projections, while the volume increase in government consumption per user is the same as in the base scenario. In the other alternative scenario (*reduced personnel density*), the volume increase is halved to 0.3 per cent per year per user, while the need for welfare services is expected to undergo the same rejuvenation as in the base scenario.

Table 2 Overview of scenarios

	Labour market exit age	Need for welfare services	Personnel density
Base scenario	Gradually decreases	Gradually decreases among the elderly	Constant
Alternative scenario: unchanged behaviour	Unchanged	Unchanged	Constant
Alternative scenario: reduced personnel density	Gradually decreases	Gradually decreases among the elderly	Decreases by 0.3 per cent per year

BIG INCREASE IN GOVERNMENT CONSUMPTION OVER THE NEXT FEW YEARS

In the base scenario, government consumption increases from 26 per cent of GDP in 2015 to around 28.5 per cent in 2040. Much of this increase takes place in the next five years. Based on the NIER's December 2015 forecast, government consumption will amount to 27.8 per cent of GDP in 2020. This rapid increase is due mainly to the current influx of refugees, which, based on the Migration Agency's forecasts, will continue over the next few years. Government consumption expenditure will increase not only as a result of higher migration and integration costs but also as a result of strong population growth over the next few years.

The current surge in immigration has changed the outlook for government consumption somewhat relative to the previous fiscal sustainability report. In the long term – after 2025 – the picture is largely the same as presented in the equivalent scenario in last year's report.[18] The outlook for the coming decade, however, is different. Government consumption as a percentage of GDP has been revised up by 1.2 points in 2020 relative to the equivalent scenario in last year's report (see Diagram 14). By 2025, however, government consumption relative to GDP is at the same level as in the previous report, which reflects the assumption that the additional migration and integration costs are largely temporary (see the explanatory box at the end of this chapter for a more detailed analysis of the effects of the refugee influx on public finances).

This means that the gradual increase in government consumption relative to GDP presented in the previous report has been replaced by a very rapid increase over the

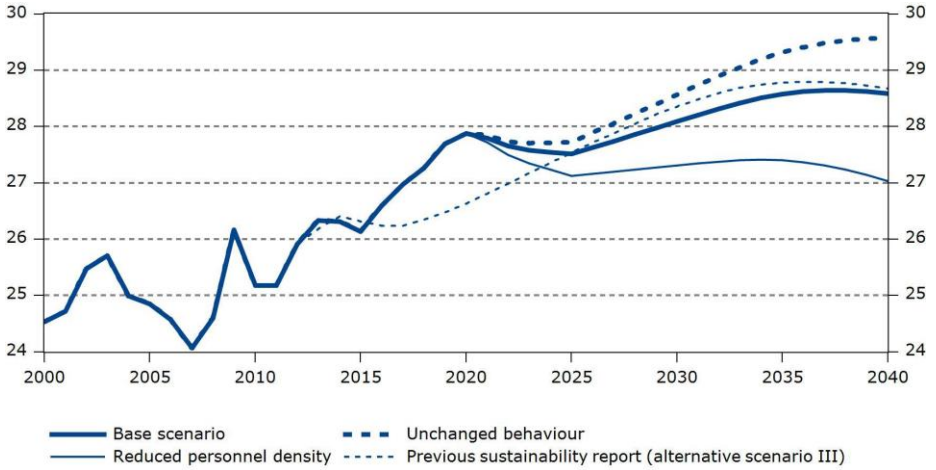
[18] The base scenario in this report corresponds to alternative scenario III in the previous report.

next five years, after which the rise in government consumption relative to GDP is relatively moderate in the base scenario (an increase of 0.7 per cent of GDP from 2021 to 2040). Developments in government consumption from the mid-2020s through to 2040 are closely related to developments in the demographic dependency ratio, which climbs through to the end of the 2030s in the population forecast (see Diagram 2 in the previous chapter).

In the alternative scenario with unchanged behaviour (which includes an unchanged need for welfare services), government consumption rises by around 1 percentage point more through to 2040 than in the base scenario and is around 29.5 per cent of GDP at the end of the 2030s. The difference between this scenario and the base scenario gives an idea of the effects on public finances of better health among the elderly. In the base scenario, the rejuvenation of the need for health and elderly care reaches around 1.5 years in 2040. Once this rejuvenation hits five years in 2100, the difference in government consumption between this alternative scenario and the base scenario is almost 5 per cent of GDP (see next chapter). Somewhat simplified, we can say that each year of rejuvenation of needs reduces government consumption by 1 per cent of GDP in the projections.

Diagram 14 Government consumption

Percentage of GDP



Note: Previous sustainability report refers to scenario III of the 2015 NIER fiscal sustainability report, "The long-term sustainability of Sweden's public finances", *Occasional Studies 43*.

Source: Statistics Sweden and NIER.

If personnel density decreases instead, as in the other alternative scenario, the rise in government consumption is limited to 1 per cent of GDP from 2015 to 2040. Compared with the level in 2025, when migration and integration costs are assumed to have normalised, government consumption relative to GDP is largely unchanged in 2040 at around 27 per cent in this scenario. In this scenario, productivity gains are used to cut back on personnel and input goods rather than exclusively benefiting the users of welfare services as in the base scenario. For government consumption to account for the same share of GDP in 2040 as it does today, the cutbacks would need to be even greater – approximately twice the 0.3 per cent per year assumed in the alternative scenario. In other words, it is only when the whole of the implicit productivi-

ty gains of around 0.6 per cent per year are used to reduce costs and personnel density that government consumption can be held at its current levels in 2040.

Government consumption increases by around 47 per cent in constant prices from 2015 to 2040 in the base scenario (see Table 3). During the same period, the population is estimated to grow by 25 per cent, and the number of employed by 19 per cent. With an unchanged personnel density in the provision of welfare services, this implies an increase in personnel needs of around 30 per cent. When it comes to elderly care (social protection), a personnel increase of no less than 50 per cent is needed for an unchanged personnel density in 2040. The reason why the need for personnel does not climb as far as the volume of government consumption (as reported in the national accounts) is that part of the volume increase is a result of productivity gains.

Table 3 Government consumption and need for personnel in the welfare sector until 2040

Percentage increase 2015–2040

	Base scenario	Unchanged behaviour	Reduced personnel density
Government consumption, constant prices	**46.9**	**50.3**	**38.9**
Need for personnel	**30.5**	**34.0**	**18.8**
Purpose			
Health	28.3	30.8	16.8
Education	30.0	30.0	18.4
Social protection	49.7	70.7	36.4
Collective consumption	25.2	25.2	14.0
Subsectors			
Municipalities	36.6	42.9	24.4
County councils	28.0	30.4	16.6
Local government, total	33.8	38.8	21.8
Central government	22.8	22.8	11.8

Note: Government consumption is in constant prices. The need for personnel is hours worked in the production of government consumption (in both the public sector and the business sector). According to Statistics Sweden's population forecast, the Swedish population will grow by 25.2 per cent from 2015 to 2040.

Source: NIER.

Table 3 also shows how consumption and the need for personnel develop in the two alternative scenarios. Since the alternative scenario with unchanged behaviour (unchanged need for welfare services) relates to age groups over the age of 65, it is primarily the need for elderly care that differs from the base scenario. The need for personnel for elderly care increases by more than 70 per cent in this alternative scenario. In the other alternative scenario, where personnel density in the provision of welfare services gradually decreases, government consumption still grows faster than the population, but less far than in the other two scenarios. Since personnel density decreases by 0.3 per cent per year, the need for personnel increases by just under 19 per cent by 2040 in this scenario, which is approximately the same as the increase in the number of employed in the economy as a whole during that period.

GROWING NEED FOR INVESTMENT AT MUNICIPALITIES

Buildings, plant and other physical equipment are in many cases a necessary complement to personnel in the production of welfare services and collective goods. If the need for teachers grows by 10 per cent during a particular period, it is reasonable to assume that the need for classroom space will also grow by around 10 per cent during that period. The relationship between the need for personnel and real capital is not as clear for all welfare services. For example, it is not a given that the big increase in the need for personnel for elderly care will be matched by an equivalent need for investment in the elderly care sector. The need for investment may be smaller if elderly care is increasingly provided in the home. The projections assume that municipal investment grows at the same rate as consumption expenditure. This implies a slightly increasing real capital stock per municipal employee, as the price of investment goods is assumed to rise more slowly than wages. Since municipal consumption accounts for a growing share of GDP in the projections, municipal investment will also increase slightly relative to GDP, from 2.2 per cent in 2015 to 2.6 per cent in 2040.

Since central government's commitment is characterised more by collective goods that benefit both citizens and the business sector, central government investment is assumed to rise in line with GDP rather than with the population. Taken together, this means that government investment climbs from 4.4 per cent of GDP in 2015 to 4.8 per cent in 2040.

4.3 Pensions

PENSION SYSTEM DESIGNED FOR LONG-TERM SUSTAINABILITY

The old-age pension system is designed to be financially sustainable in the long term. The system's revenue consists mainly of contributions paid in but also of capital income. In 2014, contributions totalled SEK 237 billion and capital income came to almost SEK 27 billion, while SEK 250 billion was paid out in pensions.

The pension system is financially sustainable so long as future pension payments can be financed by future contributions and the financial wealth in the system. This financial wealth comprises the national pension funds (AP funds 1−4 and 6), collectively known as the buffer funds. The system is financially sustainable if the value of the buffer funds plus the present value of all future contributions are at least equal to the present value of all future pension payments. To ensure that this condition is met, the pension system has been equipped with a balancing mechanism – a "brake" – to hold back the flow of pension payments if the condition is not met. This brake has been activated since 2010 and is expected to remain so until 2018. When the balancing mechanism is activated, pensions per recipient will be lower than normal.

LOWER PENSION EXPENDITURE RELATIVE TO GDP DESPITE MORE ELDERLY

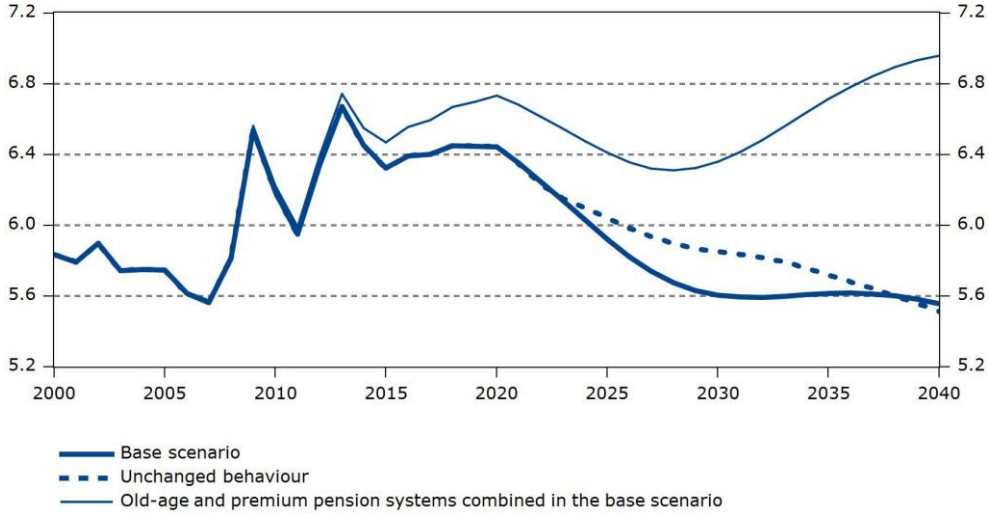
Payments from the old-age pension system have averaged 6 per cent of GDP since the mid-1990s. In recent years, however, they have risen slightly to around 6.5 per cent due to a relatively sharp increase in the number of people entitled to a pension.

The projections of pension payments until 2040 are based on the current design of the pension system. As soon as the balancing mechanism in the system is deactivated, the individual pensioner's pension will rise in line with an income index minus 1.6 percentage points. This income index reflects average growth in incomes in the economy and is assumed to rise by 3.8 per cent per year in the projections, which is the same rate of growth as for wages. These projections, which are based on the Swedish Pensions Agency's pension model, also take account of the fact that those born before 1954 still have pension rights based on the previous ATP system. ATP was a defined-benefit system and, on average, more generous than the new pension system in terms of replacement rates. In the base scenario, the rejuvenation of labour market behaviour described in the previous chapter means that the average exit age rises by 1.2 years by 2040. This contrasts with the alternative scenario where labour market behaviour is assumed to be completely unchanged from today.

Although the old-age dependency ratio trends upwards through to 2040, payments from the old-age pension system do not increase as a share of GDP. They actually fall slightly to 5.6 per cent in 2040 (see Diagram 15). There is not an especially big difference between the base scenario and the alternative scenario with unchanged behaviour. A lower exit age from the labour market (than in the base scenario) means that the number of pensioners at any given time is slightly higher, but also that payments per pensioner are lower on average.

Diagram 15 Payments from the pension system

Percentage of GDP



Source: Statistics Sweden and NIER.

Part of the reason why pension payments fall relative to GDP despite a growing proportion of elderly people in the population is that there is a gradual decrease in the proportion of pensioners covered by the previous ATP system. The *premium pension system*, which is formally outside the old-age pension system, will also account for a growing share of pension payments in future. Taken together, payments from the old-age pension system and the premium pension system will actually increase slightly as a percentage of GDP. Since the premium pension system is accounted for as part of the

business sector, outside the government sector, these payments do not result in any government expenditure.

HIGHER RETIREMENT AGE NEEDED FOR AN UNCHANGED REPLACEMENT RATE

In an overview of the pension system in 2013, the Expert Group on Public Economics (ESO) found that the pension system is financially sustainable but may be perceived as inadequate in the longer term.[19] In the Pensions Agency's base scenario (unchanged retirement age), the replacement rate – in other words, pensions as a percentage of final pay – for income pensions (including any remaining ATP) falls from just under 50 per cent for those retiring at 65 today to around 42 per cent for those retiring in 2060.[20] This is because the pension earned needs to be distributed over more and more years as average life expectancy increases. For the replacement rate to be constant, the age of exit from the labour market needs to rise by around two-thirds of the increase in life expectancy, based on the Pensions Agency's calculations. This roughly corresponds to the increase in the retirement age in the base scenario in this report. For the pension system also to be sustainable in the long term in the sense that it provides a largely unchanged replacement rate for pensioners, there will therefore need to be a change in behaviour corresponding to the base scenario in this report.

4.4 Other transfers to households

DOWNWARD TREND IN SOCIAL TRANSFERS OVER THE PAST 20 YEARS

Pensions from the old-age pension system account for almost half of total expenditure on social transfers from the government sector (see Diagram 10 at the beginning of the chapter). The remainder is paid mainly by central government and includes sickness benefits, child benefits, student grants, parental benefits and guaranteed pensions. Municipal expenditure on social transfers consists mainly of financial assistance.

Expenditure on social transfers (excluding pensions from the old-age pension system) has almost halved as a percentage of GDP since the early 1990s, from just over 16 per cent in 1993 to 8.6 per cent in 2014 (see Diagram 16). Labour market benefits, which were very high in the mid-1990s, account for almost 3 percentage points of this decrease. Benefits relating to ill health fell from a peak of 3.7 per cent of GDP in 2003 to 2 per cent in 2014, which can be explained partly by tougher eligibility criteria but also by falling replacement rates during the period. The "other transfers" category in Diagram 16 includes student grants and student assistance, social assistance and assistance (disability) benefit. Expenditure on assistance benefit has increased steadily since it was introduced in 1994 and amounted to more than SEK 28 billion in 2014, or 0.7 per cent of GDP.

The projections of transfers to households are based on an assumption of unchanged replacement rates – in other words, benefits grow in line with wages. The proportion of the population in receipt of benefits is assumed to be constant in the various age

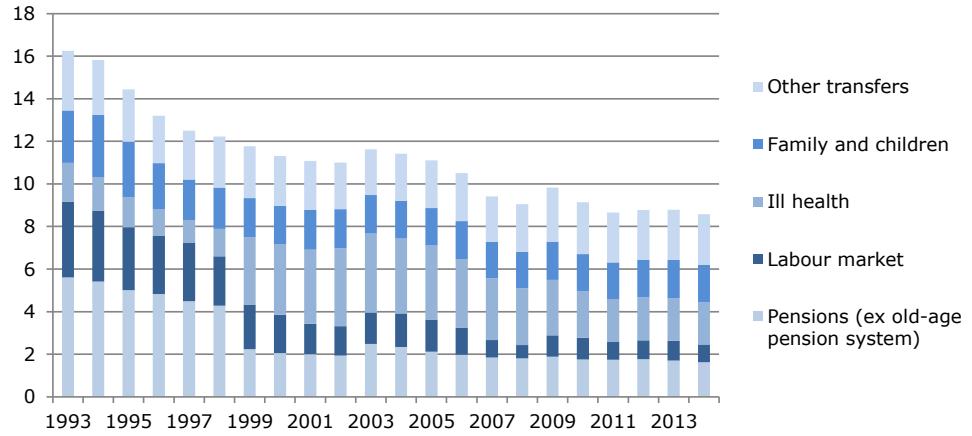
[19] Barr (2013) "The pension system in Sweden", *Expert Group on Public Economics (ESO) Report 2013:7*.

[20] Swedish Pensions Agency (2015) *Orange Report 2014*.

groups that are potentially entitled to the different forms of support. The projections mean that transfers to households (excluding pensions from the old-age pension system) fall slightly from 7.4 per cent of GDP in 2015 to 6.8 per cent in 2040. The current influx of refugees is expected to have a much smaller impact on transfer payments than on government consumption. The upward revision of expenditure on social transfers (excluding payments from the old-age pension system) relative to the previous report is 0.3 per cent of GDP in 2020 (see explanatory box below).

Diagram 16 Transfers to households by purpose

Percentage of GDP



Note: *Pensions* refers to income pension, supplementary pension, guaranteed pension, survivor's pension, central government occupational pensions and housing supplement for pensioners. *Labour market* covers unemployment benefits, labour market programme benefits and salary guarantee. *Ill health* refers to sickness and rehabilitation benefit, activity and sickness compensation, work injury compensation and disability allowance. Activity and sickness compensation formed part of pensions (early retirement pension) until 1998. *Family and children* comprises parental benefit, child allowance, care allowance and housing allowance. *Other transfers* include student grants, student assistance, social assistance, assistance benefit, asylum benefit, elderly support and various other transfers to households.

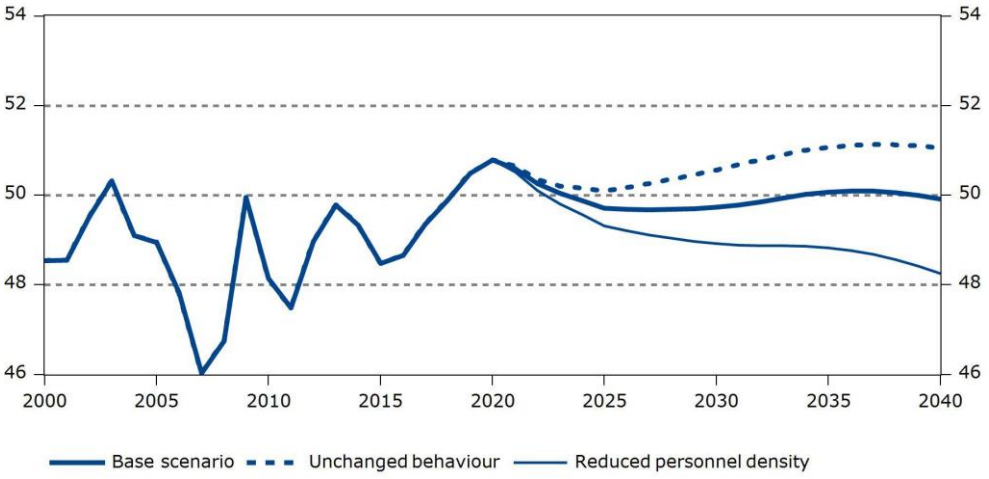
Source: Statistics Sweden.

All in all, general government primary expenditure rises by 1.4 per cent of GDP from 2015 to 2040 in the base scenario, from 48.5 to 49.9 per cent (see Diagram 17). Primary expenditure is defined as total government expenditure excluding interest costs.[21] Government consumption increases by 2.5 percentage points relative to GDP, while payments from the old-age pension system fall by 0.8 percentage point during the period. As described above, there is also a small decrease in payments of other transfers relative to GDP. In the alternative scenario with unchanged behaviour, primary expenditure in 2040 is around 1 per cent of GDP higher than in the base scenario. Higher government consumption accounts for most of the difference. If there is a rejuvenation of the need for welfare services through to 2040 as assumed in the base scenario, the reward will therefore be a reduction in government expenditure of around 1 per cent of GDP. In the alternative scenario with reduced personnel density, the expenditure ratio declines from the early 2020s onwards to just over 48 per cent in 2040.

[21] The next chapter shows how interest on the national debt is affected by developments in government revenue and expenditure. The larger the deficits in public finances, the larger the national debt and the higher the interest costs. Because interest costs are therefore dependent on the assumptions made on the revenue side, expenditure in this chapter is reported net of interest costs.

Diagram 17 General government primary expenditure

Percentage of GDP



Note: Primary expenditure is defined as total expenditure less interest costs.

Source: Statistics Sweden and NIER.

EFFECTS OF HIGHER REFUGEE NUMBERS ON PUBLIC FINANCES

The projections in this report are based on Statistics Sweden's October 2015 population forecast. This is based, in turn, on the Swedish Migration Agency's forecast, published just beforehand, of the number of asylum seekers coming to Sweden in 2015–2019. The Migration Agency's autumn 2015 forecast assumes 135,000 asylum seekers in 2016 and 95,000 in 2017. As these asylum seekers receive residence permits and become registered in Sweden, they will be included in the Swedish population. The population is therefore expected to grow at record pace in the coming years, by an average of 2 per cent per year in 2017–2020 (see Diagram B2). This forecast is, of course, associated with considerable uncertainty. The political action now being taken to slow the influx of asylum seekers into Sweden may mean that the forecast changes drastically.[22]

Accommodation for asylum seekers the greatest cost in the short term

The influx of refugees is resulting not only in growing government expenditure on migration and integration, but also in growing expenditure as a result of the population increasing and so having a greater need for welfare services in the form of education, health and social care.

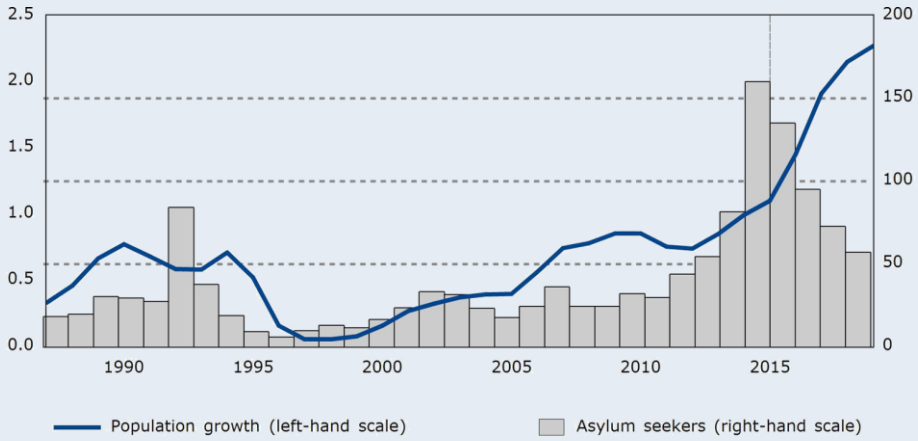
Compared to last year's sustainability report, government expenditure has been revised up throughout the period 2017–2024 and by 1.8 per cent of GDP in 2020 (see Diagram B3). Last year's projections were based up until 2019 on the NIER's December 2014 economic forecast. Since then, a number of factors have changed, and it is not only the revised migration forecast that has contributed to the revisions. The biggest revisions were, however, made in the NIER's

[22] This explanatory box is based mainly on the special analysis "Effects of the increase in refugees coming to Sweden" in *The Swedish Economy*, December 2015. In February 2016, the Migration Agency published a new forecast of the number of asylum seekers in Sweden in 2016-2020. In its main scenario, the number of asylum seekers in 2016-2019 was revised down from 360,000 to 325,000.

December 2015 forecast relative to the previous forecast in August 2015. These revisions were due largely to the Migration Agency's revised forecast for asylum seekers.

Diagram B2. Asylum seekers and population growth

Thousands and per cent, respectively

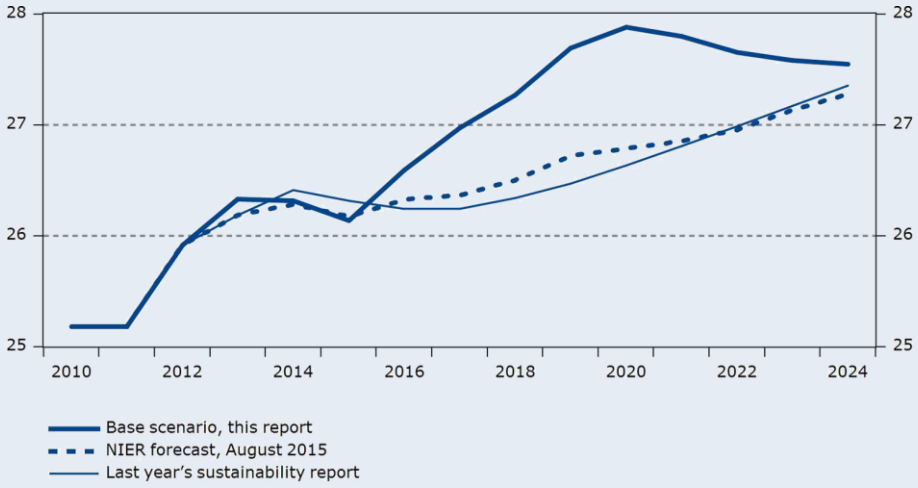


Source: Swedish Migration Agency and Statistics Sweden.

The revision of government primary expenditure from August to December 2015 amounted to 1.4 per cent of GDP in 2020. This revision consists mainly of increased government consumption. In 2020, when the revision is greatest, government consumption is around SEK 90 billion higher in the base scenario (the same as the NIER's December economic forecast) than in the August 2015 forecast. The main migration-related cost is accommodation for asylum seekers. Accommodation accounts for more than half of total government consumption expenditure relating to the refugee influx in 2016. The reception of unaccompanied minors is particularly expensive. The revision of government consumption in 2020 relative to the August 2015 forecast amounts to 1.1 per cent of GDP.

Diagram B3. Government consumption in different forecasts

Percentage of GDP



Source: Statistics Sweden and NIER.

Increase in transfer expenditure delayed by a few years

Expenditure on social transfers resulting from the influx of refugees will increase substantially less than government consumption expenditure. This is because transfer payments to asylum seekers are initially low. A single adult in asylum accommodation where food is provided is entitled to only SEK 24 per day. As asylum seekers receive residence permits, however, transfer expenditure is expected to increase. They will then receive an integration allowance of around SEK 5,000 per month (SEK 231 per day, five days per week). Expenditure on general benefits such as child, housing and parental benefits is also expected to rise as the population grows. All in all, transfers excluding pensions in 2020 were revised up by around SEK 25 billion from the August forecast to the December forecast. After 2020, the revisions diminish as the refugees become established in the labour market.

Net contribution to public finances in the longer term dependent on how well immigrants are integrated into the labour market

In the short term, government expenditure on refugees will exceed government revenue from the refugees. How the balance between revenue and expenditure in relation to immigration changes in the longer term depends largely on how well the immigrants are able to become established in the labour market and contribute tax revenue. The base scenario in this report assumes that the refugees arriving now and in the coming years will eventually have the same labour market profile as the current foreign-born population, a process which is assumed to take 15 years. These assumptions do not in themselves permit any analysis of the net cost of immigration.

In an appendix to *The Long-term Survey 2015*, Flood and Ruist (2015) present lifecycle analyses for immigrants' net impact on public finances.[23] According to their calculations, a Swedish-born person returning to Sweden in 2014 makes an average (discounted to present value) net contribution of around SEK 1.7 million to the public sector. The equivalent figure for a person arriving from Europe (excluding the Nordic countries) is around SEK 540,000, while those coming from elsewhere in the world make a negative net contribution of around SEK 370,000. The main reason for the negative net contribution from non-European immigrants is the low employment rate relative to the other groups that is assumed in the calculations. In an alternative scenario where non-European immigrants have the same employment rate as European immigrant groups, the net contribution is instead slightly positive at SEK 10,000 per person.

The next chapter contains an explanatory box showing how improved integration of immigrants into the labour market leads to improved public finances relative to the base scenario, and a reduced need for tax increases to fund an unchanged public sector commitment.

[23] Flood and Ruist (2015) "Migration, en åldrande befolkning och offentliga finanser" [Migration, an ageing population and public finances], Appendix 6 to Swedish Government Official Reports (2015) *Långtidsutredningen 2015* [The Long-term Survey 2015], SOU 2015:95.

5 Public finances until 2040

5.1 The sustainability of public finances with a finite horizon

The long-term sustainability of public finances is often evaluated with an infinite horizon. Sustainability is then said to exist if the so-called *intertemporal budget constraint* is satisfied – in other words, future government expenditure can be financed by future revenue and current net financial wealth. This sustainability criterion cannot be used with a finite horizon. Calculations of whether the constraint is satisfied are also highly sensitive to the assumptions made about demographics, economic growth and so on.

With a finite horizon, the sustainability of public finances can instead be assessed on the basis of how revenue and expenditure during the period impact on government debt or net financial wealth. If revenue during the period systematically falls short of expenditure, this will normally lead to increased debt. What is sustainable or unsustainable is a matter of judgement. If developments in revenue and expenditure mean that government debt grows quickly and trends upwards, or if net financial wealth deteriorates rapidly, a preliminary conclusion should reasonably be that public finances are not long-term sustainable. Such a situation would normally mean that the current generation lives at the cost of future generations by transferring to them a growing burden of debt.

CHANGES IN NET WEALTH AN INDICATOR OF SUSTAINABILITY

Rising government gross debt as a percentage of GDP may be an indicator that public finances are headed in an unsustainable direction in the longer term. The European Commission, for example, uses the so-called S1 indicator as a measure of the extent to which public finances need to be tightened so that a country's government gross debt does not become excessive. The Commission starts with a debt ceiling of 60 per cent of GDP, which is the limit set in the Growth and Stability Pact, and a given final year. A high S1 value means that public finances may be headed in an unsustainable direction and a relatively large amount of tightening will be required for debt to meet the 60 per cent target in the final year.

Using government gross debt to assess whether public finances are sustainable does have its limitations. Gross debt does not take account of the government's financial assets. *Net financial wealth* – the net of financial assets and debt – provides a better overall picture of the government sector's financial position and long-term payment capacity.[24] For one thing, gross debt can increase without this being a result of budget deficits. This happened, for example, in 2009 and 2013 when the Swedish National Debt Office borrowed almost SEK 200 billion to lend to the Riksbank, which had decided to shore up its foreign exchange reserves. This did not entail any change in the government sector's net financial wealth, as the increase in debt was matched by

[24] Government net debt consists of gross debt less financial assets and is therefore the same as net financial wealth with the sign reversed. Net debt thus contains the same information as net financial wealth.

an equivalent increase in assets. For another, deficits can, in principle, be funded by selling off financial assets, where available, rather than by borrowing, so avoiding an increase in gross debt.

By studying net financial wealth, a clearer and more complete picture of the government sector's financial position is obtained than when studying gross debt. However, net debt too is affected by factors other than the budget balance. Financial assets, especially shares, can rise and fall substantially in value. For example, the value of the old-age pension system's shareholdings dropped from SEK 566 billion in 2007 to SEK 451 billion in 2008 following the outbreak of the financial crisis. Viewed over a longer period, the government sector's financial position has improved considerably. Since the mid-1990s, it has gone from net debt of 27 per cent of GDP to net wealth of 19 per cent in 2014. This is due mainly to large increases in the value of the shares held by both central government and the old-age pension system. The value of assets can change for purely technical accounting reasons as well. Debt and net wealth as a percentage of GDP are also affected by the rate of growth in output.

The following section looks at how public finances develop with unchanged tax rates through to 2040. This allows an assessment of the degree to which public finances are sustainable over this horizon, given that the public sector commitment is unchanged. We then present calculations of the size of the tax increases needed to balance the government budget through to 2040.

5.2 Public finances with unchanged taxes

Government revenue consists mainly of taxes and duties. Capital income in the form of interest and dividends contributes further revenue of 1.5−2 per cent of GDP. The national accounts also include revenue of an accounting nature, with the result that total government revenue exceeds tax revenue and capital income by a few percent of GDP.

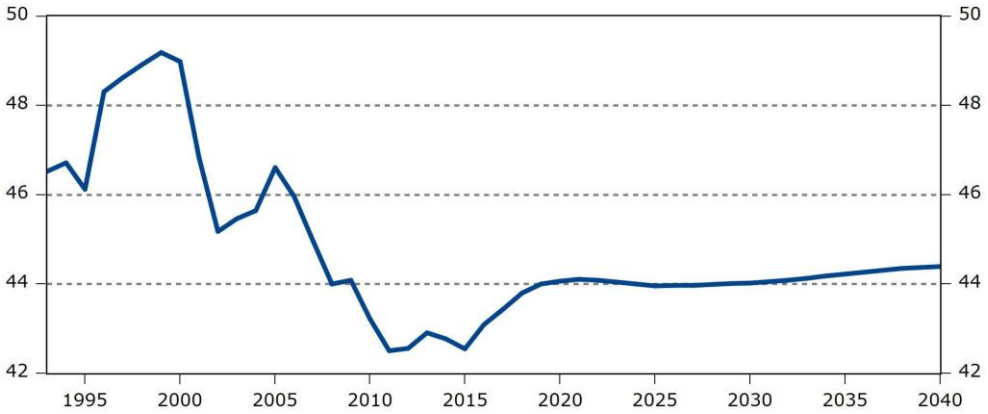
The tax-to-GDP ratio – total government revenue from taxes and duties as a percentage of GDP – has fallen by more than 6 percentage points since the turn of the millennium and was 42.8 per cent in 2014 (see Diagram 18). It fell by almost 4 points between 2000 and 2002 alone, from 49 to 45 per cent of GDP, which can be explained partly by reduced taxation of pension contributions. Wealth taxes such as inheritance and gift tax were also reduced at that time. When the alliance government came into power in 2006, the tax-to-GDP ratio continued to decline, due mainly to the earned-income tax credit and lower employer contributions. The projections of tax revenue are based on the decisions set out in the government budget for 2016. Due to the phasing out of lower employer contributions for young people, and various other tax increases, the tax-to-GDP ratio will rise slightly in 2016 to 43.1 per cent.

It will then climb an additional point to 44.1 per cent in 2020, based on the NIER's calculations.[25]

In the long-term projections beyond 2020, the tax-to-GDP ratio is largely constant around 44 per cent given the current design of the tax system. The differences between the base scenario and the two alternative scenarios are very limited in this respect. With unchanged tax rules, tax revenue will generally grow in line with GDP.[26] Departures from this rule of thumb can occur if the composition of GDP shifts rapidly away from relatively heavily taxed components (such as household consumption) in favour of less heavily taxed components (such as exports).

Diagram 18 Tax-to-GDP ratio with unchanged taxes

Taxes and duties as a percentage of GDP



Note: The tax-to-GDP ratios in the alternative scenarios with unchanged tax rates do not differ notably from the base scenario and so are not shown in this diagram.

Source: Statistics Sweden and NIER.

GROWING DEFICITS WITH UNCHANGED TAXES

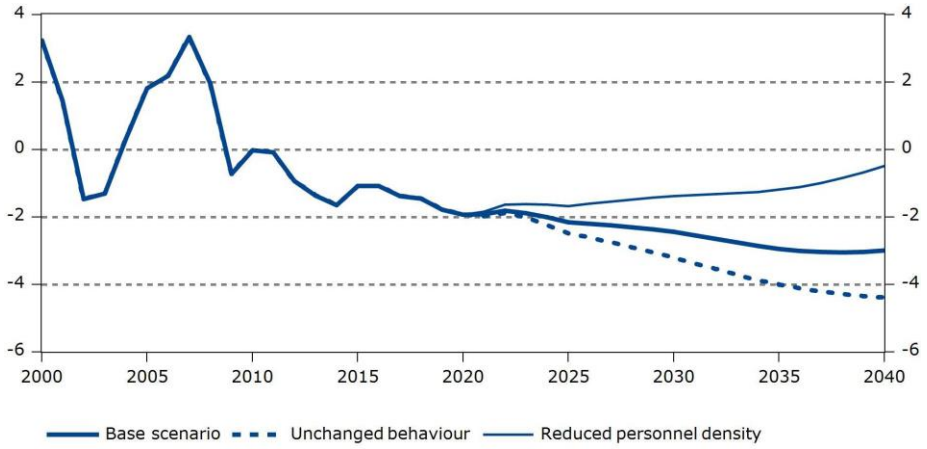
The government sector is currently running a deficit and has done so since 2009. Net lending is expected to be −1.1 per cent of GDP in both 2015 and 2016. Recent years' deficits have been due in part to the economic slump, but now that resource utilisation in the economy has largely returned to normal, the current deficit can be considered a *structural* deficit. Without tax increases, and with an unchanged welfare commitment, the current deficit will gradually increase. In the base scenario, the deficit widens to 3 per cent of GDP in 2040 (see Diagram 19). The increase in the deficit is mainly a result of higher interest costs due to an increase in gross debt, which doubles from 43 per cent of GDP in 2016 to 86 per cent in 2040 in the base scenario (see Diagram 20). The increase in gross debt is due, in turn, to borrowing to fund the annual deficits. The projections do not assume any sell-offs of central government financial assets.

[25] The increase in the tax-to-GDP ratio through to 2020 despite unchanged tax rules is due mainly to wages increasing relative to GDP during the period. Developments through to 2020 depart from the fiscal scenario in *The Swedish Economy*, December 2015, where taxes are raised by just over another 2 per cent of GDP by 2020.

[26] Unchanged taxes denotes constant implicit tax rates – in other words, tax revenue is constant in relation to each tax base.

Diagram 19 General government net lending

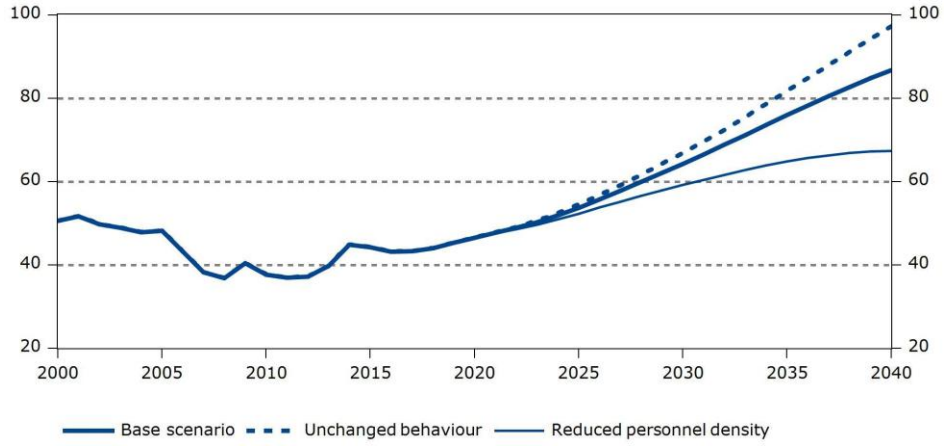
Percentage of GDP



Source: Statistics Sweden and NIER.

Diagram 20 General government gross debt

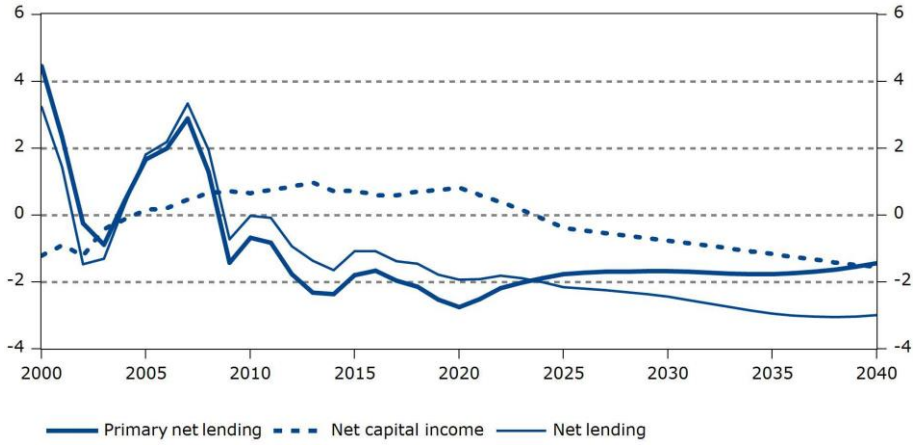
Percentage of GDP



Source: Statistics Sweden and NIER.

Diagram 21 General government net lending, primary net lending and net capital income in the base scenario

Percentage of GDP



Note: Net lending is the sum of primary net lending and net capital income.

Source: Statistics Sweden and NIER.

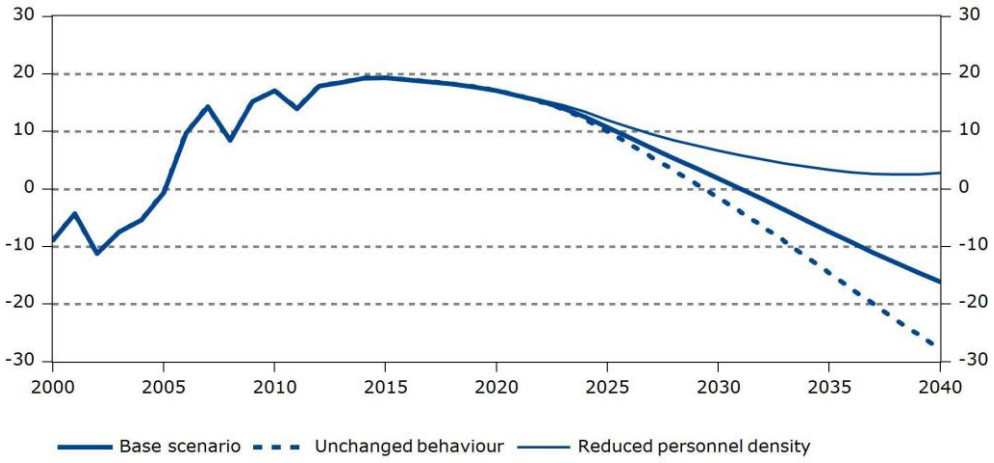
The main driver behind the increase in debt is the existing budget deficit. Primary expenditure does increase by 1.3 per cent of GDP from 2016 to 2040 in the projections, but this is fully offset by increased tax revenue during the period (despite the assumption of unchanged tax rules). In other words, the change in *primary* net lending from 2016 to 2040 is limited when we assume unchanged taxes and an unchanged public sector commitment (see Diagram 21).

In the alternative scenario with unchanged behaviour, the above effects are amplified: the budget deficit grows to more than 4 per cent of GDP in 2040, and gross debt to almost 100 per cent of GDP. In the alternative scenario with reduced personnel density, the deficit peaks around 2020 but then declines as expenditure falls relative to GDP. By 2040, primary net lending has dropped back to current levels, resulting in net lending only marginally below zero with an unchanged tax system.

The growing gross debt in all three scenarios means that the net financial position will deteriorate accordingly. In the base scenario, net wealth gradually declines from its current 20 per cent of GDP to zero around 2030 and −16 per cent in 2040 (see Diagram 22). In the alternative scenario with unchanged behaviour, net wealth deteriorates to almost −30 per cent of GDP in 2040. It also falls in the alternative scenario with reduced personnel density to just a few percent of GDP in 2040. Thus, none of the scenarios meets the criterion of unchanged net financial wealth during the period. In the alternative scenario with reduced personnel density, however, net lending is close to being balanced in 2040, and net wealth shows signs of levelling off relative to GDP. Public finances can therefore be considered sustainable in this scenario, even though it entails a slight redistribution of resources between generations.

Diagram 22 General government net financial wealth

Percentage of GDP



Source: Statistics Sweden and NIER.

5.3 Projections with adjusted taxes until 2040

With today's tax system, tax revenue will not be sufficient to finance future welfare needs with an unchanged personnel density. The natural next question is what tax increases would be needed – or how far the welfare commitment would have to be

scaled back. In the following, we present projections where taxes are adjusted so that net lending in each scenario is zero in each year of the projections from 2017 onwards. An exact balance between government revenue and expenditure each year is not a necessary criterion for the intertemporal budget constraint to be satisfied. Even very long periods of surpluses and deficits can be consistent with long-term sustainability based on this criterion. As discussed below, however, it is not sufficient either for net financial wealth in the government sector to be unchanged relative to GDP.

RETURN TO 2006 TAX BURDEN

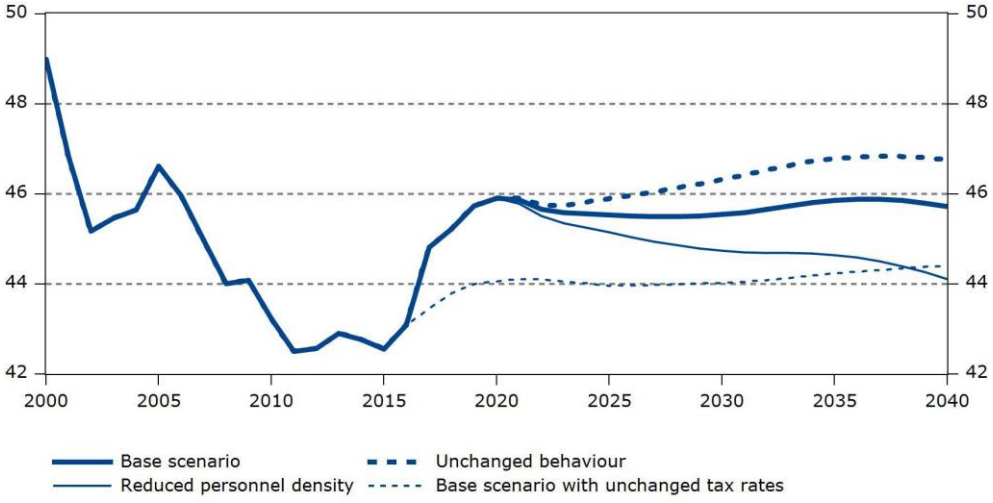
In the base scenario, the tax-to-GDP ratio needs to be raised gradually to 45.7 per cent in 2040 for public finances to balance each year (see Diagram 23). This is 2.6 percentage points higher than the level forecast for 2016 and roughly corresponds to the tax burden in 2006. The increase in the tax-to-GDP ratio is of roughly the same size as the deficit in 2040 in the base scenario with unchanged taxes.

Much of the increase in taxation occurs immediately in the projections, in 2017. The tax-to-GDP ratio has to be almost 45 per cent in 2017 for the current deficit to be eliminated. The remaining increase in the scenario occurs by 2020 as expenditure rises relative to GDP. The tax-to-GDP ratio is then more or less constant around 46 per cent, which is a result of the expenditure-to-GDP ratio being largely constant during that period in the base scenario.

If we assume unchanged behaviour in terms of the labour market and the need for welfare services, as is the case in one of the alternative scenarios, the tax-to-GDP ratio needs to be 1 point higher than in the base scenario at almost 47 per cent of GDP. In other words, the gain from the 1.5-year "rejuvenation" of behaviour in terms of welfare services and retirement age consists of a 1 percentage point lower tax-to-GDP ratio in 2040. The alternative scenario with reduced personnel density permits gradual reductions in the tax-to-GDP ratio after 2020 to 44 per cent.

Diagram 23 Tax-to-GDP ratio with adjusted taxes

Taxes and duties as a percentage of GDP



Note: The diagram is based on projections where taxes are adjusted so that net lending is zero each year from 2017 onwards.

Source: Statistics Sweden and NIER.

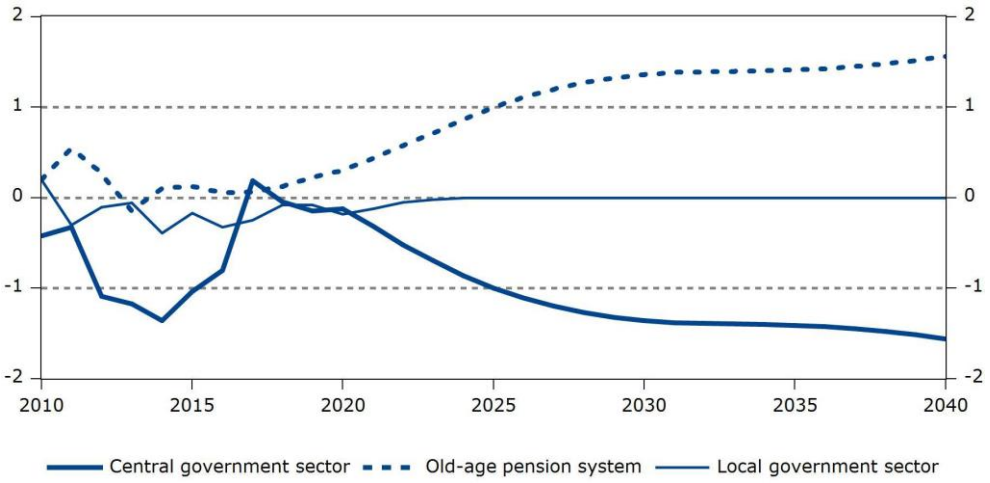
LARGELY UNCHANGED NET WEALTH

When taxes are adjusted so that net lending is zero each year, government net financial wealth is more or less unchanged relative to GDP. Net wealth is just over 3 per cent higher relative to GDP in 2040 than in 2015, and most of the increase occurs by 2020. Developments until then depend on the assumptions underlying the medium-term forecast. In the period 2016–2020, nominal increases in the value of shares and other non-interest-bearing financial assets are assumed to average just over 4 per cent per year, which is in line with the historical average. The long-term projections are based on an assumption of a 2 per cent increase in value per year for these assets. The fact that net financial wealth is almost constant relative to GDP in the projections is not, however, an automatic result of neutral net lending. It is due instead to the capital appreciation of financial assets offsetting the erosive effect of output growth on net wealth relative to GDP.

Although public finances are balanced each year in these projections, there is no downward trend in gross debt relative to GDP. In the absence of budget deficits, one might expect GDP growth to lead gradually to a reduced debt-to-GDP ratio. There is indeed a decrease until the mid-2020s, but the debt-to-GDP ratio then rises again somewhat. The reason why the debt-to-GDP ratio does not continue to decline has to do with the distribution of net lending between the government sector's various subsectors. To create the balanced scenarios, central government net lending is adjusted using tax increases. The old-age pension system, which is not affected by these tax increases, produces growing surpluses in the projections.[27]

Diagram 24 Net lending by subsector in the base scenario

Percentage of GDP



Source: Statistics Sweden and NIER.

This is due mainly to capital income, which grows to more than 1 per cent of GDP after 2025. The local government sector is subject to the balanced-budget requirement, which has been assumed at the margin to result in zero net lending in the sector

[27] Until 2040, the projections of payments from the old-age pension system are based on calculations in the Pensions Agency's pensions model. After that, payments are assumed to be adjusted so that net wealth in the pension system is constant relative to GDP (see Chapter 6).

in the projections. So that the government sector as a whole achieves a balanced budget, central government finances have therefore been permitted to run deficits corresponding to the surpluses in the old-age pension system (see Diagram 24). Central government must then fund these deficits with borrowing, which means that gross debt will gradually rise somewhat. The projections do not assume any sell-offs of central government financial assets.

HIGHER CENTRAL GOVERNMENT FUNDING FOR MUNICIPALITIES – OR HIGHER MUNICIPAL TAXES

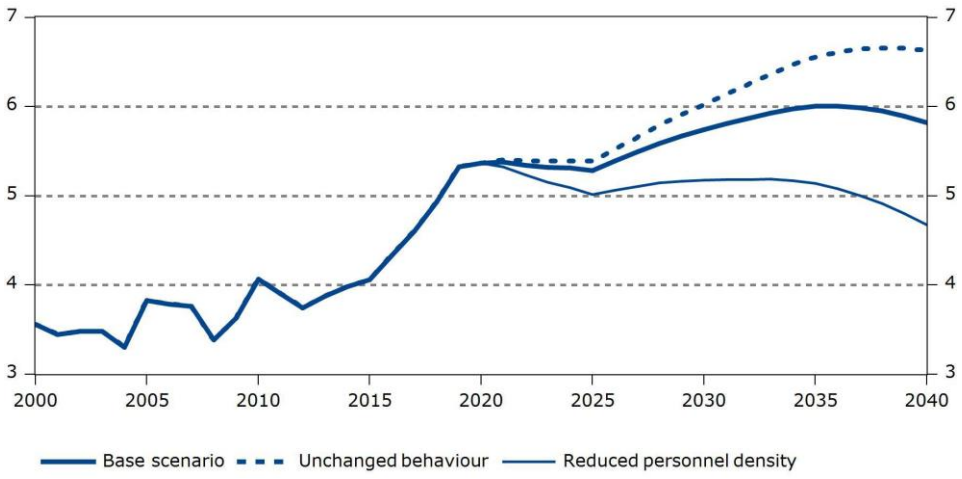
The projections assume that the average rate of municipal taxation is unchanged at 2016 levels (32.1 per cent). Since much of the increase in government expenditure will be in local government, this would mean large deficits in the local government sector with unchanged central government funding. The projections therefore assume that central government grants are adjusted so that the local government balanced-budget requirement is met. In the base scenario, central government grants rise from 4.3 per cent of GDP in 2016 to 5.8 per cent in 2040 (see Diagram 25).

With unchanged central government grants, the need for tax hikes to maintain long-term sustainable general government finances would largely be shifted from central government to local government. Whether tax increases are at central or local government level has no bearing on the analysis of the sustainability of overall public finances. It may, however, be unrealistic for central government to meet the whole of this growing need for funding.

Were central government grants to be constant relative to GDP at the levels forecast for 2016, local government tax revenue would need to rise by 1.5 per cent of GDP by 2040. The local government sector's tax base (wages and salaries, pensions and other taxable transfers) averages 49.7 per cent of GDP in the projections. This means that the average municipal tax rate would need to be raised by around 3 percentage points by 2040. This can be compared with developments over the past 20 years, in which the average municipal tax rate has increased by around 0.75 percentage point.

Diagram 25 Central government grants to local government

Percentage of GDP



Note: The scenarios assume that the average municipal tax rate is unchanged at 2016 levels.

Source: Statistics Sweden and NIER.

INTEGRATION OF IMMIGRANTS INTO THE LABOUR MARKET IMPORTANT FOR PUBLIC FINANCES

It is important for new immigrants to be integrated into the labour market and find work, not just for their own benefit but also for public finances. There are also significant economic gains to be made from integrating immigrants who have been in the country for some time into the labour market better.

Unemployment above 20 per cent among non-Europeans

Labour market participation is approximately the same among the foreign-born and native populations – approximately seven out of ten people aged 15–74 are in the labour force (see table below). The employment rate, on the other hand, is much lower in the foreign-born population. The employment gap (defined here as the difference in the employment rate in percentage points) between those born in Sweden and abroad is around 9 percentage points in the 15–74 age group (and more than 16 points in the 20–64 age group). The employment rate is lowest among those born outside Europe, at around 55 per cent, compared with just over 68 per cent for those born in Sweden. The employment gap between women born in Sweden and outside Europe is no less than 15 percentage points.

Table B1. Labour market statistics for 2015 by place of birth, 15-74 years

	Outside Europe	Europe ex Nordic	Nordic ex Sweden	Total outside Sweden	Sweden	Total
Share of population aged 15-74[1]	10.1	6.7	2.7	19.4	80.6	100.0
Participation rate[2]	71.4	73.4	61.8	70.8	72.3	72.0
Women	*66.5*	*69.8*	*58.6*	*66.5*	*70.2*	*69.5*
Men	*76.4*	*77.3*	*66.2*	*75.5*	*74.2*	*74.4*
Employment rate[2]	55.3	66.1	58.6	59.5	68.4	66.6
Women	*51.6*	*62.7*	*55.5*	*56.0*	*66.6*	*64.4*
Men	*59.0*	*69.8*	*62.7*	*63.2*	*70.1*	*68.8*
Unemployment rate[3]	22.6	9.9	5.2	16.0	5.4	7.4
Women	*22.4*	*10.2*	*5.2*	*15.7*	*5.2*	*7.2*
Men	*22.7*	*9.6*	*5.2*	*16.3*	*5.5*	*7.5*

Note: [1] Percentage of entire population aged 15-74. [2] Percentage of population aged 15-74 from each region. [3] Percentage of labour force from each region.

Source: Statistics Sweden.

The relatively high labour force participation rate among non-Europeans combined with the relatively low employment rate means that unemployment in this group is high at almost 23 per cent. Non-Europeans were hit particularly hard by the financial crisis in 2008, when the jobless rate in this group rose rapidly from 16 to 22 per cent, and it has since held at this high level. This suggests that *persistence effects* are more pronounced in this group than in other groups in the labour market – in other words, non-Europeans are affected more than other groups by

lasting or permanent job losses in an economic downturn.[28] One factor contributing to the continued high level of joblessness among non-Europeans is that there have been relatively large inflows in recent years. On average, a short period of residence in Sweden is associated with higher unemployment.

Over the next 15 years, the proportion of non-Europeans in the working-age population will double from 10 to 20 per cent, according to Statistics Sweden's autumn 2015 population forecast. This shift in the composition of the labour force will probably have appreciable effects on employment and unemployment. If all groups in the labour market were to retain their current labour market status, and only the demographic make-up of the population affected total employment and unemployment, the unemployment rate would climb to more than 9 per cent in 2030 from 7.2 per cent in 2015.

Scenario with improved integration

To illustrate the effects on public finances of improved integration of immigrants into the labour market, we present here an alternative scenario based on different assumptions for the labour market to those in the base scenario. In this scenario, the differences between those born inside and outside Sweden in the labour market are assumed to halve from 2021 to 2040. This means, for example, that the employment gap that exists in 2040 in the base scenario is only half as large in the alternative scenario with improved integration. We do not provide any analysis here of how integration might be improved. Nor does the scenario include any government spending to achieve this improved integration.

In this alternative scenario, overall labour force participation rises more quickly than in the base scenario and is 1.4 percentage points higher in 2040 than in the base scenario. As noted above, however, the big difference in the current labour market profile of the native and foreign-born populations is not in participation but in the employment rate. In the alternative scenario, the overall employment rate climbs to 69 per cent in 2040, compared with 66.5 per cent in the base scenario. At the same time, unemployment falls gradually to 5.6 per cent in 2040, compared with 6.8 per cent in the base scenario.

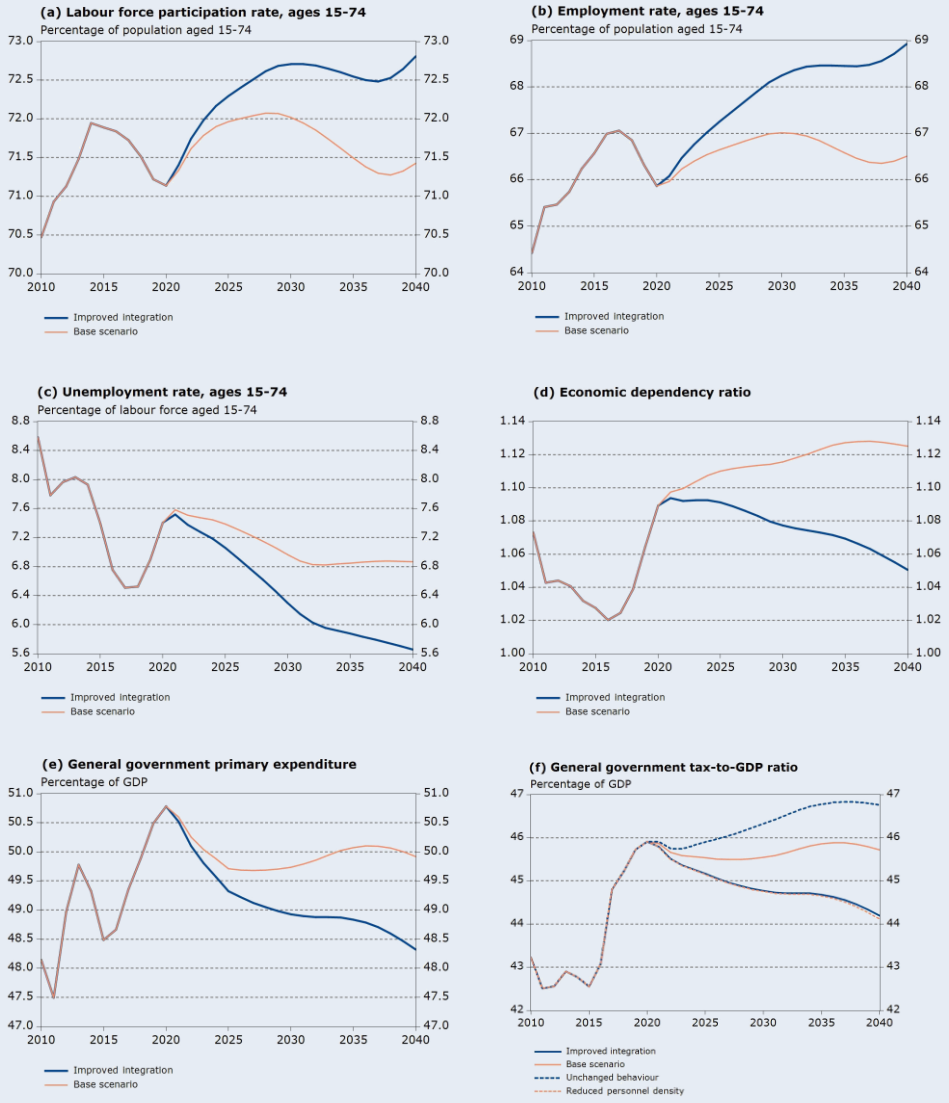
Major fiscal benefits from improved integration

The impact on public finances of the higher employment rate in the immigrant population compared to the base scenario consists mainly of higher tax revenue. Expenditure on social transfers decreases to some extent, but this effect is less prominent. On average, GDP growth is 0.2 percentage point higher in 2021−2040 in the alternative scenario than in the base scenario. GDP is therefore increasingly higher than in the base scenario during this period. Since government consumption is assumed not to be affected by improved integration, it is lower only *relative to GDP* in the alternative scenario. In 2040, government consumption is 0.9 per cent lower as a share of GDP than in the base scenario. In-

[28] Long-term unemployment in the immigrant population as a whole increased after the financial crisis and has since held at an elevated level. Long-term unemployment also increased among the Swedish-born population in connection with the financial crisis but has since fallen again. See the special analysis "Long-term unemployment in the Swedish labour market" in *The Swedish Economy*, August 2014.

come pensions and other social transfers are together around 0.7 per cent of GDP lower in 2040 than in the base scenario. All in all, government primary expenditure is 1.6 per cent lower relative to GDP in 2040. This improves primary net lending by 1.2 per cent of GDP in 2040 and net lending by no less than 1.8 per cent of GDP.

In the base scenario, the tax-to-GDP ratio needs to climb to 45.7 per cent in 2040 for the budget to balance each year until then. In the alternative scenario with improved integration, the tax-to-GDP ratio in 2040 is 44.2 per cent, assuming zero net lending. The need for tax increases is therefore virtually the same as in the alternative scenario with reduced personnel density. This alternative scenario illustrates the importance of integrating immigrants into the labour market better than is the case today. How this improved integration is to be achieved is not discussed in this report, but is a matter that should be prioritised on the political agenda going forward.



Source: Statistics Sweden and Nier.

6 Public finances until 2100

Theoretically one can analyse the sustainability of public finances over an infinite time horizon. In practice, however, a simplifying assumption is made that public finances are "frozen" after a given final year. After that year, primary net lending is assumed to be constant as a share of GDP at the level of the final year.

In the following analysis, 2100 has been set as the final year. This enables full use of the information in Statistics Sweden's population forecast. Demographic developments will not be in any state of equilibrium after 2040. According to the population forecast, the demographic dependency ratio instead rises further in the 2050s and some way into the 2060s. The share of elderly people in the population then stops climbing for a while. Towards the end of the 21st century, the share of elderly people rises again and the dependency ratio reaches 0.97 in the population forecast, which can be compared with 0.85 in 2040 (see Diagram 2 in Chapter 3). This means that the dependency ratio climbs as much 2040–2100 as 2015–2040.

6.1 Unchanged taxes

IMPORTANCE OF IMPROVED HEALTH INCREASINGLY APPARENT

When looking beyond 2040, the rise in government consumption relative to GDP largely comes to an end in the base scenario. From 2040 to 2060, there is only a marginal increase from 28.6 to 29.1 per cent. It then begins to fall slowly to 27.9 per cent in 2100 (see Diagram 26). In the alternative scenario with unchanged behaviour, government consumption instead continues to increase and hits 32.9 per cent of GDP in 2100, which is 5 percentage points more than in the base scenario.

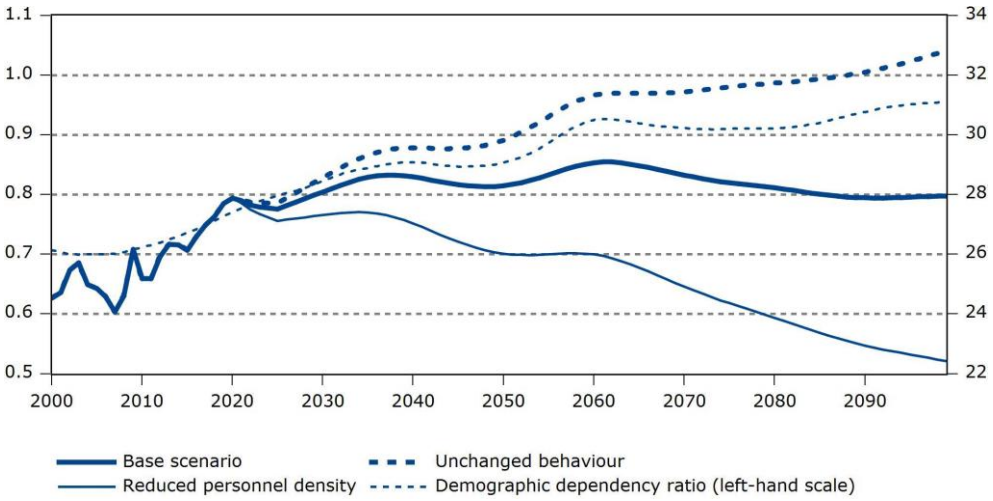
The growth in government consumption in the alternative scenario with unchanged behaviour is closely related to the demographic dependency ratio. In periods when this ratio rises, government consumption as a share of GDP will also rise, whereas it will fall when the dependency ratio falls. This relationship between the dependency ratio and government consumption can also be seen in the base scenario, but weakens over time. Despite the increase in the dependency ratio from 2080 onwards, there is no increase in government consumption as a share of GDP in the base scenario. This is due to the assumption of a rejuvenation of behaviour having a greater impact the closer we come to the projection horizon. By 2100, the rejuvenation of the need for welfare services means that an 80-year-old is expected to need the same welfare services as today's 75-year-old. This will reduce the rate of growth in government consumption. The rejuvenation of behaviour in the labour market in the base scenario also means that the retirement age is four years higher than today. This boosts GDP, further slowing the increase in the ratio of government consumption to GDP.[29]

[29] Because the change in behaviour in terms of both the need for welfare services and exit from the labour market is assumed to be linear over time through to 2100, only around 30 per cent of the change occurs by 2040 (25 years into a total adjustment period of 85 years). The difference between the base scenario and the alternative scenario with unchanged behaviour is therefore substantially smaller in 2040 than at the end of the period in 2100.

The rejuvenation of behaviour is not exactly the same for welfare services as it is for exit from the labour market: the need for welfare services is expected to decrease by five years during the period, whereas the average retirement age is assumed to increase by four years. Somewhat simplified, however, we can say that each year of rejuvenation roughly corresponds to a 1 per cent decrease in government consumption as a share of GDP.[30]

Diagram 26 Government consumption and demographic dependency ratio

Dependency ratio (left-hand scale) and percentage of GDP (right-hand scale)



Source: Statistics Sweden and NIER.

In the other alternative scenario, with reduced personnel density, government consumption continues to decline after 2040, falling to only just over 22 per cent of GDP in 2100. With a 0.3 per cent decrease in personnel density per year, personnel density is around 25 per cent lower in 2100 than today. The plausibility of such a scenario is difficult to gauge as it is so far into the future. Technological advances will probably make it possible for routine tasks in health care, education and general public services to be taken over to some extent by computers, robots and other aids in the future. The welfare sector is personnel-intensive, however, as much of the value added is embedded in the actual interaction between service provider and user. One can imagine that it is not in the interests of citizens for welfare services such as education and elderly care to be automated to an excessive degree.

OLD-AGE PENSION SYSTEM OVERFUNDED IN THE LONG TERM

With unchanged rules, the old-age pension system would generate a positive and growing surplus in the future, based on calculations using the Pensions Agency's pension model. Primary net lending in the old-age pension system, which is roughly equivalent to the surplus, would be 0.8 per cent of GDP in 2050 and more than 1 per cent in the 2080s. This positive primary balance would lead to an increase in financial wealth in the pension system. Unchanged rules combined with an assumption of a 4.5

[30] The 2015 fiscal sustainability report contains alternative scenarios where behavioural changes in terms of the labour market and the need for welfare services are studied separately. These scenarios show that around two-thirds of the difference in government consumption with and without behavioural changes can be attributed to a reduced need for welfare services, and one-third to the GDP effect of an increased labour supply.

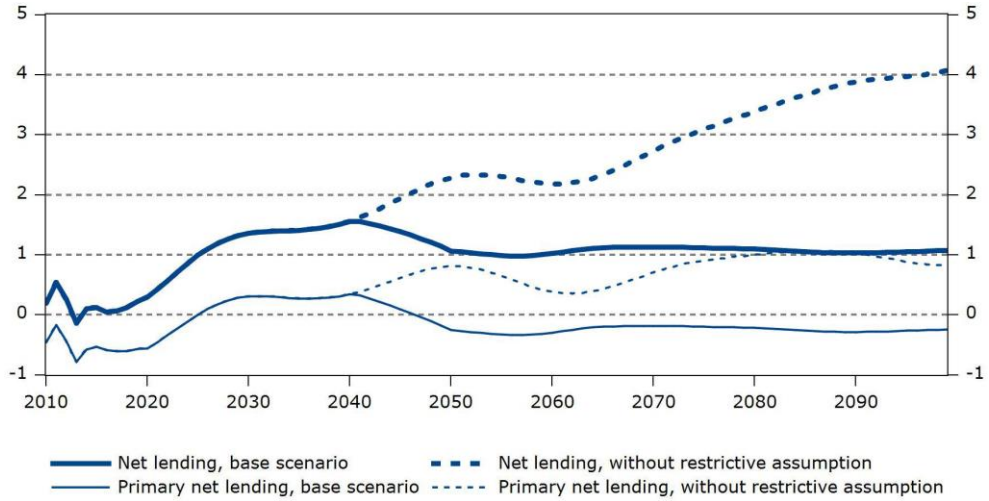
per cent total return would result in net wealth in the system growing to more than 100 per cent of GDP in 2100. At the same time, net lending in the system would rise to more than 4 per cent of GDP in 2100.

A scenario for the old-age pension system with the accumulation of such extensive financial wealth seems unrealistic, however. The projections beyond 2040 therefore assume that payments from the old-age pension system are adjusted so that net wealth in the system is kept constant relative to GDP. In other words, it is implicitly assumed that an "accelerator" is introduced in the old-age pension system after 2040 so that surpluses are used to boost pensions. This can be compared with the proposals from the 2004 enquiry into the distribution of surpluses in the old-age pension system.[31] It was proposed that when the balance ratio reaches 1.1 (in other words, when assets in the system exceed liabilities by 10 per cent), surpluses should be distributed as increased payments to existing pensioners and increased pension holdings for future pensioners.

The assumption of constant net wealth relative to GDP in the old-age pension system after 2040 means that primary net lending averages around 1 per cent of GDP less than in projections without this assumption. The equivalent difference in net lending in the old-age pension system is an average of 1.8 percentage points (see Diagram 27). Financial net wealth in the old-age pension system is then locked in at just under 40 per cent of GDP rather than climbing to more than 100 per cent without this restrictive assumption.

Diagram 27 Net lending in the old-age pension system

Percentage of GDP



Source: Statistics Sweden and NIER.

BASE SCENARIO UNSUSTAINABLE ALSO WITH THE LONGER HORIZON

Developments in government consumption in the base scenario mean that primary expenditure peaks around 2060 at around 51 per cent of GDP before falling back to

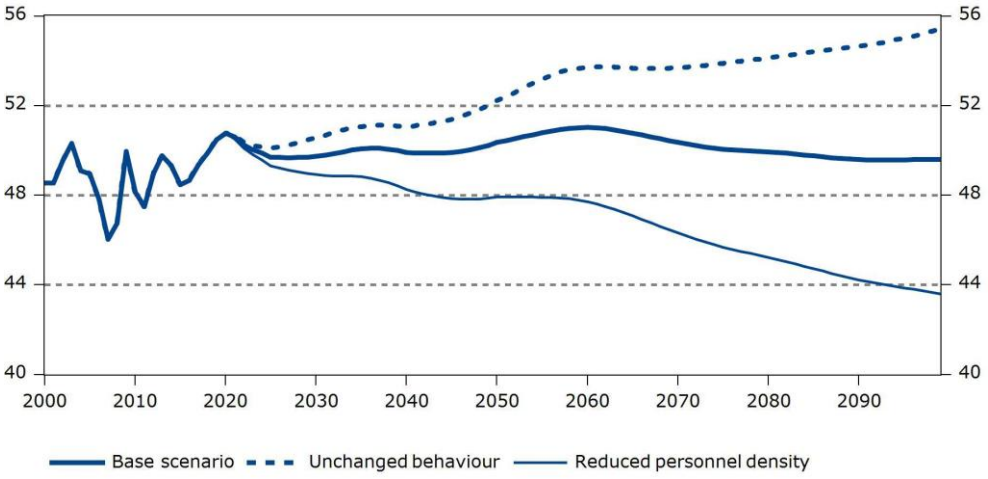
[31] See Swedish Government Official Reports (2004) "Utdelning av överskott i inkomstpensionssystemet" [Distribution of surpluses in the income pension system], SOU 2004:105.

just below 50 per cent in 2100. Primary expenditure other than consumption is largely constant as a percentage of GDP in the projections beyond 2040. The expenditure-to-GDP ratio is just over 55 per cent in 2100 in the alternative scenario with unchanged behaviour, and only 43.5 per cent in the alternative scenario with reduced personnel density (see Diagram 28).

With unchanged taxes, the expenditure path in the base scenario means that the deficit in 2040 will increase somewhat through to 2060 before improving again. As the expenditure-to-GDP ratio begins to fall, the primary deficit decreases and is just half a per cent of GDP in 2100 (see Diagram 29). The long-term deficits also mean that government debt continues to grow, resulting in rising interest costs and even larger deficits once interest costs are taken into account. In other words, the debt dynamics through to 2040 will continue. Net wealth, which turns negative by 2040 in the base scenario, deteriorates to −108 per cent of GDP in 2100.

Diagram 28 General government primary expenditure

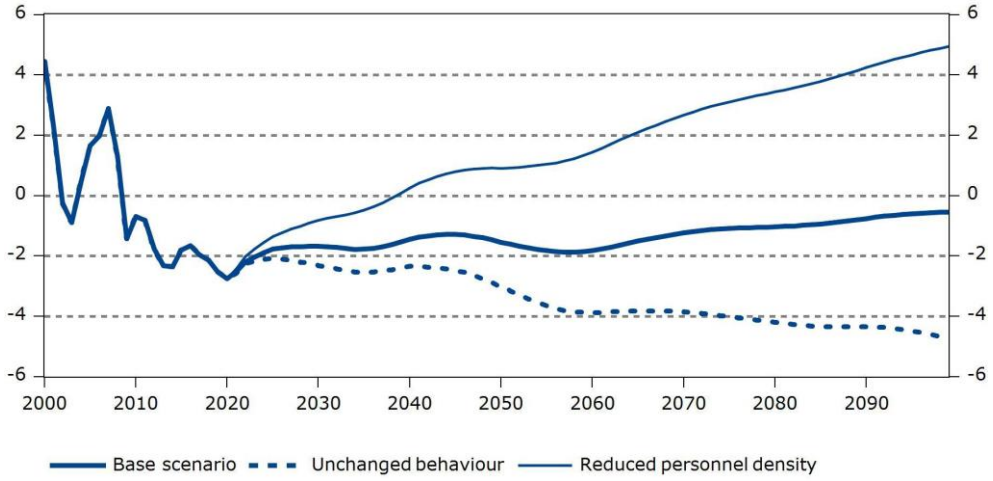
Percentage of GDP



Source: Statistics Sweden and NIER.

Diagram 29 General government primary net lending with unchanged taxes

Percentage of GDP



Source: Statistics Sweden and NIER.

6.2 Projections with adjusted taxes

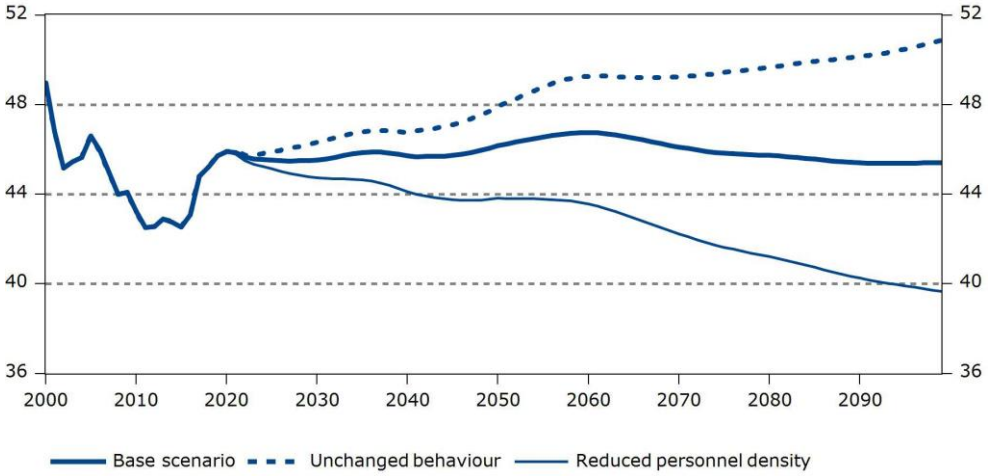
TAX-TO-GDP RATIO STABLE AFTER 2040

In the previous chapter, it was found that taxes would need to be raised by almost 3 per cent of GDP by 2040, to nearly 46 per cent, to finance an unchanged welfare commitment and still keep the budget balanced. This message does not change appreciably when the projection horizon is extended to 2100. For general government net lending to be zero each year, the tax-to-GDP ratio moves between 45.5 and 46.5 per cent in the base scenario in 2040–2100 (see Diagram 30). This effectively means that, if the budget is balanced in 2040, unchanged taxes will be sufficient to fund an unchanged welfare commitment after that.

In the alternative scenario with unchanged behaviour, taxes need to be raised further after 2040 to fund the continued increase in expenditure. In 2100, the tax-to-GDP ratio is above 51 per cent, 8 percentage points higher than in 2016. If, on the other hand, the decrease in personnel density in the other alternative scenario continues through to 2100, the tax-to-GDP ratio can gradually be lowered to 40 per cent.

Diagram 30 Tax-to-GDP ratio with adjusted taxes

Taxes and duties as a percentage of GDP



Note: In the balanced scenarios, taxes are adjusted so that general government net lending is zero in each year of the projections.

Source: Statistics Sweden and NIER.

NET FINANCIAL WEALTH STABILISES

In the projections with adjusted taxes, net financial wealth is largely constant over time. There are now only minor differences between the base scenario and the two alternative scenarios, because there are no surpluses or deficits to impact on the net position.

Net financial wealth converges on a level of around 20 per cent of GDP at the end of the projections and reflects a theoretical relationship between net lending, GDP growth and net financial wealth. This relationship means that net wealth in the long term stabilises relative to GDP at the level of net lending divided by the rate of growth in GDP (one condition for this relationship to hold being that net lending

stabilises at a given level in the long term).[32] Because financial assets increase in value in the projections, however, account must also be taken of this in the calculations. In the long term, net wealth is then the sum of net lending and capital appreciation divided by the rate of growth in GDP.[33] In the base scenario, GDP growth (in current prices) averages 4.2 per cent per year, whereas the annual appreciation of financial assets is just under 0.8 per cent of GDP. Given that net lending is held at zero, this means that net financial wealth will converge to about 20 per cent of GDP.

6.3 Sustainability indicators

This section discusses two indicators for evaluating pure fiscal sustainability in the long term: the S2 indicator and an indicator we call S2+. The S2 indicator is reported by the government each year in connection with the spring fiscal policy bill. An updated estimate is then reported in the autumn budget bill. The European Commission uses the S2 indicator in its sustainability assessments of member states' public finances in the sustainability report it publishes every third year.

THE S2 INDICATOR

The S2 indicator shows the amount of immediate and permanent tightening of public finances required to achieve long-term sustainability (see explanatory box below for a more detailed description of the indicator). Long-term sustainability means here that the intertemporal budget constraint is satisfied. The intertemporal budget constraint means that the sum of discounted future government revenue and any net financial wealth must be enough to fund discounted future government expenditure. The S2 indicator shows the degree of tightening required for the intertemporal budget constraint to be satisfied. The S2 indicator is expressed as a percentage of GDP, so a value of 2, for example, means that net lending needs to be tightened by 2 per cent of GDP (spending cuts or tax increases) immediately for public finances to be long-term sustainable. The S2 indicator can also be negative, meaning that public finances are already long-term sustainable despite various spending increases or tax cuts.

Table 4 provides an overview of the S2 indicator in the four scenarios studied in this report: the base scenario, the two alternative scenarios and the additional scenario in the explanatory box in Chapter 5 that assumes improved integration of immigrants into the labour market. The estimated values are based on projections with unchanged taxes. In the base scenario, the S2 indicator is 0.7, which means that public finances need to be tightened immediately and permanently by 0.7 per cent of GDP to be long-term sustainable.

The S2 indicator can be divided into three terms. The first term (1) specifies the increase in net lending needed to cover the cost of government net debt at the beginning of the projection period. As net debt is currently negative (there is positive net

[32] If, for example, net lending in the long term is 1 per cent of GDP and the rate of growth in nominal GDP is 4 per cent, net financial wealth in the long term will be 1/4 = 0.25 = 25 per cent of GDP.

[33] If, for example, the increase in the value of financial assets is 1 per cent of GDP per year, net lending is 1 per cent of GDP, and growth in nominal GDP is 4 per cent, net wealth in the long term will be (1 + 1) / 4 = 0.50 = 50 per cent of GDP.

financial wealth) and capital income in the government sector exceeds interest costs, net lending does not need to be strengthened on this account. The second term (2) shows the tightening of net lending required to counter primary deficits during the projection period through to 2100. This term differs in each scenario according to how government expenditure develops: the larger the increase in spending, the larger this term will be. In the base scenario, it is 0.3, which means that, ignoring the other two effects, net lending needs to be tightened by 0.3 per cent of GDP to cover the deficits projected through to 2100. The third term (3) refers to the deficits assumed to exist after the end of the projection period. From 2101 onwards, primary net lending is assumed to remain indefinitely at the same level as in 2100 in each scenario.

Table 4 The S2 indicator in the different scenarios

	Base scenario	Unchanged behaviour	Reduced personnel density	Improved integration
(1) Interest on initial net debt	−0.1	−0.1	−0.1	−0.1
(2) Effect of primary deficits to 2100	0.3	0.8	−0.3	0.2
(3) Effect of primary deficits after 2100	0.4	3.7	−4.0	−0.1
S2 = (1) + (2) + (3)	**0.7**	**4.4**	**−4.3**	**0.0**
S2+	1.3	6.4	−5.5	0.4

Note: S2+ is an adjusted S2 indicator which takes account of tax base effects and shows the percentage tightening of primary net lending required to generate an S2 indicator of zero with 2100 as the final year for the projections.

Source: NIER.

In the alternative scenario with unchanged behaviour, the S2 indicator is, not unexpectedly, higher than in the base scenario, which indicates that public finances are farther from being sustainable. Primary net lending needs to be tightened immediately and permanently by 4.4 per cent of GDP, or by 6.4 per cent of GDP based on the alternative indicator S2+ (see below). In this scenario, it is, above all, the effect of the deficits after 2100 that contribute to the high indicator value. As can be seen from Diagram 29 earlier in this chapter, the primary deficit trends upwards in this scenario to almost 5 per cent of GDP in 2100.

In the alternative scenario with reduced personnel density, the S2 indicator is −4.3, which can be interpreted such that primary net lending can be relaxed without jeopardising the sustainability of public finances. The indicator value is, however, explained mainly by high primary net lending after 2100 (which is kept constant at the 2100 level of 5 per cent of GDP). This is explained, in turn, by the sharp decline in government consumption after 2060 (see Diagram 26 earlier in this chapter). Given the long time horizon and the considerable uncertainty in the projections, it is, of course, inappropriate to draw firm conclusions about fiscal space and the need for tightening from the S2 indicator. It is nevertheless a useful tool for obtaining a comparable picture of the sustainability of public finances in different scenarios. The alternative scenario with improved integration, presented in the explanatory box in the previous chapter, gives an S2 indicator of 0. This is due primarily to higher absolute tax revenue than in the base scenario.

A DYNAMIC ESTIMATE OF THE S2 INDICATOR: S2+

The S2 indicator is a static and stylised estimate which assumes that tax increases can be made without impacting on the size of the tax bases. There is, however, reason to believe that the tax bases would change following a sharp rise in taxation, with the result that taxes need to be raised even further than the constant increase indicated by the S2 indicator. To complement the conventional S2 indicator, we therefore also study another indicator that takes some account of this effect.[34]

This alternative indicator, S2+, is 0.6 percentage point higher than the S2 indicator itself in the base scenario. This can be interpreted such that the S2 indicator underestimates the need for tax increases by 0.6 per cent of GDP if we take account of the effects of tax increases on the tax bases. The S2+ value of 1.3 means that there is a need for immediate tax hikes of 1.3 per cent of GDP in the base scenario for public finances to be long-term sustainable.

Long-term sustainability is defined in the calculation of both S2 and S2+ as satisfying the intertemporal budget constraint. This condition is less strict than the condition that net lending must be exactly zero in each period. In the previous section, we found that tax increases equivalent to around 3 per cent of GDP are needed in the base scenario to fund an unchanged welfare commitment and still keep net lending at zero. The smaller need for tightening suggested by the S2 and S2+ indicators is because the intertemporal budget constraint is compatible with decreasing net wealth so long as net wealth stabilises in the long term. Unlike in the projections with adjusted taxes in the previous section, net wealth gradually declines to zero in the estimates of S2+ (compared to around 20 per cent of GDP with adjusted taxes).

S2 INDICATOR TO BE INTERPRETED WITH CARE

The S2 indicator is a measure used to assess the long-term sustainability of public finances. It has been developed by the European Commission as a test of the gap to sustainable public finances. The indicator shows the permanent annual improvement in general government primary net lending, as a percentage of GDP, that is required to satisfy the intertemporal budget constraint. The S2 indicator can be derived from the following intertemporal budget constraint

$$d_0 = \sum_{t=1}^{\infty} \frac{pb_t + S2}{(1+r)^t}$$

where d_0 is current general government net debt, pb_t is the general government primary balance in year t, and $S2$ is the S2 indicator itself, all expressed as a percentage of GDP. The growth-adjusted interest rate is designated r and is approximated by the difference between the nominal interest rate and the nominal rate

[34] The calculation of S2+ takes account of household financial wealth being assumed to be lower in the event of tax increases. This leads to lower tax revenue from the taxation of capital income. The effects on the labour supply are not taken into account in the calculation of S2+.

of GDP growth (in the above expression, the growth-adjusted interest rate is assumed to be constant over time). Time is normalised so that $t = 0$ initially. [35]

This expression means that the discounted value of all future net lending is equal to the initial net debt. An S2 indicator of zero indicates that the condition has been met without the need for any permanent adjustment of primary net lending as a percentage of GDP. A positive S2 indicator indicates that future primary net lending as a percentage of GDP needs to be permanently tightened to the corresponding degree for the intertemporal budget constraint to be satisfied. With some simplifying assumptions, the S2 indicator can be derived from the above budget constraint and expressed as follows:

$$S2 = \underbrace{rd_0}_{(1)} + \underbrace{\left[-r\sum_{t=1}^{ts}\frac{pb_t}{(1+r)^t}\right]}_{(2)} + \underbrace{\left[-\frac{\overline{pb}}{(1+r)^{ts}}\right]}_{3}$$

The first term (1) is the amount of annual primary net lending needed to balance the flow of interest on net debt in the base year. The higher the net debt and the higher the growth-adjusted interest rate, the greater the contribution to the S2 indicator. The second term (2) measures the contribution from primary net lending from the base year through to the final year of the projections. The higher the primary net lending, the lower the S2 indicator. The final term (3) measures the contribution to S2 from primary net lending beyond the final year of the projections. Various assumptions can be made about primary net lending after the final year. In this report, net lending is assumed to be the same from 2100 onwards. The higher the primary net lending, the lower the S2 indicator.

The S2 indicator needs to be interpreted with care. It can, for example, be close to zero despite large deficits in the near term if these are offset by surpluses further ahead. Projections of public finances in the distant future are associated with very considerable uncertainty. The S2 indicator can also be high – and so indicate a need for fiscal tightening – even if public finances are essentially balanced in the near term. This might be the case, for example, if expenditure rises towards the end of the projections. Because effects arising a long way into the projections tend to have a major impact on the S2 indicator, but are also associated with particular uncertainty, the S2 indicator is generally unsuitable as a basis for fiscal policy decision-making. Shorter-term analyses looking at the interaction between the government sector's revenue, expenditure, net lending and financial position may be more useful and appropriate in this respect.

APPRECIABLE DIFFERENCES BETWEEN GOVERNMENT AND NIER ESTIMATES

The long-term sustainability of public finances is assessed by the government each year in connection with the publication of the spring fiscal policy bill. An updated

[35] For a complete derivation of the S2 indicator, see the NIER fiscal sustainability report of 2014, "Is an unchanged public sector commitment a sustainable commitment? An assessment of the long-term sustainability of Swedish public finances", *Occasional Studies 39*.

estimate is then included in the autumn budget bill.[36] The European Commission also assesses the sustainability of Sweden's public finances every three years as part of its review of EU member states' public finances. In the most recent report, published in January 2016, the Commission gives Sweden an S2 indicator of 2.3 in its base scenario. This ranks Sweden 12th out of the 26 EU member states included in the report.[37]

The Swedish government's assessment of the long-term sustainability of public finances includes a variety of scenarios. In the base scenario, which features unchanged behaviour, unchanged personnel density and unchanged replacement rates in the transfer systems, the S2 indicator is −1.1. In the equivalent scenario in this report (the alternative scenario referred to as unchanged behaviour), the S2 indicator is 4.4. Despite several shared assumptions, there is a considerable difference in the conclusions reached by the government and the NIER. Part of the explanation is that the situation has changed since the government performed its assessment in spring 2015. The NIER estimates that the S2 indicator has increased (deteriorated) by just over 1 percentage point since last year in the scenario with unchanged behaviour.

Table 5 The S2 indicator as estimated by the Ministry of Finance and NIER

	MoF 2015	NIER 2015	NIER 2016
Unchanged behaviour	−1.1	3.3	4.4
Higher exit age	−2.4	2.6	..
Improved health	−4.2	1.1	..
Higher exit age and improved health	..	0.4	0.7
Improved integration	−1.6	..	0.0

Note: MoF 2015 refers to the fiscal sustainability assessment presented by the Ministry of Finance in the 2015 spring fiscal policy bill. The NIER does not look at the effects of a higher exit age and improved health separately in its 2016 report. Although the NIER does study the effect of improved integration, this is based on the base scenario's assumptions of a higher exit age and improved health and is not therefore comparable with the government's equivalent scenario.

Source: 2015 Spring Fiscal Policy Bill (2014/15:100) and NIER.

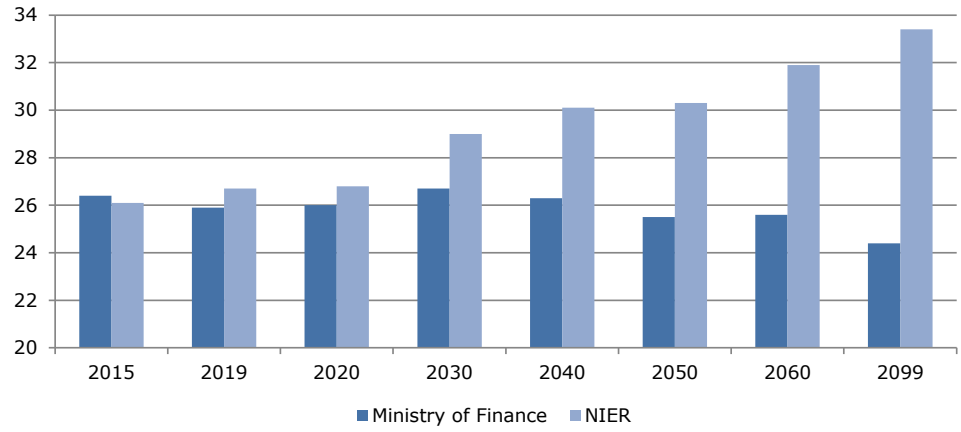
The most important explanatory factor for the difference in these estimates relates to the projections of government consumption. There is already a difference of 2 percentage points in 2020, which can be explained mainly by the NIER's more up-to-date and heavily revised forecast for government consumption in the coming years (see explanatory box in Section 4.4). The difference increases with time, however, and is more than 4 percentage points in 2050 and more than 8 percentage points in 2099 (see Diagram 31). This means that primary expenditure in 2099 is lower to the equivalent degree in the government's calculations. As a result, primary net lending is 6.5 percentage points higher in 2099 in the government's estimates than in the NIER's estimates (the difference in primary revenue is around 2.5 per cent of GDP).

[36] See Chapter 11 of the 2015 Spring Fiscal Policy Bill (2014/15:100) and the associated report "Utvecklad bedömning av finanspolitikens långsiktiga hållbarhet 2015" [Enhanced assessment of the long-term sustainability of fiscal policy 2015]. Section 5.5 of the 2016 Budget Bill (2015/16:1) also considers long-term fiscal sustainability and revises the S2 indicator to –1.0.

[37] In the Commission's base scenario, the need for welfare services among the elderly increases at a somewhat slower rate than in the base scenario in this report. No increase in labour market exit age is assumed.

Diagram 31 Government consumption as projected by the Ministry of Finance and the NIER

Percentage of GDP



Note: The diagram shows government consumption with unchanged behaviour. The Ministry of Finance values are those presented in the report "Utvecklad bedömning av finanspolitikens långsiktiga hållbarhet 2015" [Enhanced assessment of long-term fiscal sustainability 2015].

Source: Ministry of Finance and NIER.

The growing gap between the projections of government consumption by the government and the NIER occurs despite a common assumption of unchanged personnel density in the provision of welfare services and despite effectively the same method for calculating costs per user for welfare services. The assumptions for GDP growth and wage growth are also the same.

The divergence is due to a seemingly subtle difference in assumptions. The NIER assumes that *all production costs* for government consumption increase at the same rate as personnel costs. This is the result of the assumption of a constant cost distribution (in other words, constant wage costs as a share of total costs for government consumption), which ties in well with actual developments in the national accounts in 1980−2014. Since prices for input goods are assumed to rise more slowly than wages, the quantity of input goods per hour worked increases with time, resulting in a growing volume of government consumption per user in the national accounts. The government's calculations are not based on an assumption of a constant cost distribution but on a constant quantity of input goods per hour worked. This means that total costs for government consumption rise more slowly than wage costs in the government's projections. In this way, government consumption grows more slowly than GDP in current prices with unchanged demographics and so accounts for a decreasing share of GDP. With the NIER's assumptions, government consumption remains constant as a share of GDP with constant demographics, whereas it decreases using the government's method. As prices for input goods are assumed to grow more slowly than wages, the government's assumption also means that costs for input goods will be extremely low in the long term.

7 Conclusions

Long-term fiscal sustainability means that future revenue and expenditure balance and net financial wealth in the government sector stabilises in the long term.

UNCHANGED TAXES NOT ENOUGH TO FUND UNCHANGED COMMITMENT

Public finances are not long-term sustainable in the report's base scenario. In other words, an unchanged public sector commitment cannot be achieved in the long term at current tax rates. The reasons for this are partly the current structural deficit and partly the coming increase in the demographic dependency ratio, with a growing share of elderly people in the population leading to greater spending on welfare services. Government consumption expenditure will rise rapidly over the next few years as a result of the influx of refugees, but this expenditure is expected to be mainly temporary.

In the base scenario, the budget deficit widens to 3 per cent of GDP in 2040. This means that today's net financial wealth becomes *net debt* of 16 per cent of GDP in 2040. This scenario does not therefore meet the criterion of unchanged net wealth in the government sector, either in 2040 or in 2100. Nor does it satisfy the intertemporal budget constraint, as illustrated by the positive (albeit low) S2 indicator for the base scenario.

The report presents two alternative scenarios alongside this base scenario in order to evaluate the sensitivity of various assumptions in the projections underlying the base scenario. The first alternative scenario assumes *unchanged behaviour*. This means that the average retirement age and other labour market behaviours are assumed to be unchanged over time. It also means that the need for welfare services is assumed to be constant over time in each age group. In other words, there is no "rejuvenation" of older people's behaviour in either respect. Because GDP is lower and the need for welfare services is higher in this scenario than in the base scenario, government finances follow an even more unsustainable path than in the base scenario. With unchanged taxes, net lending declines to −4.4 per cent of GDP in 2040.

In the second alternative scenario, the assumption of constant personnel density in the provision of welfare services is replaced by an assumption of gradually *reduced personnel density*. Personnel density decreases by 0.3 per cent per year in this scenario. After a quarter of a century, this equates to a reduction of just over 7 per cent. Even these cuts are not sufficient to keep government consumption at current levels in 2040. To achieve that, the cuts would have to be twice the size. The deficit with unchanged taxes is, however, only half a per cent of GDP in 2040 in this scenario. Unlike in the base scenario and the alternative scenario with unchanged behaviour, net financial wealth is still positive in 2040, albeit lower than today. Developments through to 2040 in this scenario can therefore be considered sustainable.

TAXES AT 2006 LEVELS IN 2040?

To supplement the sustainability assessment, the report includes simulations of the tax increases needed to keep government net lending at zero in each period in the projections. These simulations are equivalent to a balanced-budget target for public finances

being met exactly each year. For the budget to be balanced so precisely is not entirely realistic, or even desirable, but the simulations show the level of tax increases needed to fund an unchanged public sector commitment, and at what points in time this need for funding arises. This information cannot be obtained from the S2 indicator. A positive S2 indicator may be a result of negative net lending initially or equally of a deficit arising at the very end of the projection period, maybe 80 years into the future.

The simulations with adjusted taxes show that the tax-to-GDP ratio needs to increase by 2.6 percentage points by 2040 in the base scenario if revenue and expenditure are to balance with an unchanged public sector commitment. This is higher than the S2 indicator, but this sustainability criterion is both stricter (in the sense that government net wealth is unchanged) and over a shorter time horizon (through to 2040 rather than indefinitely). The rise in taxation is gradual in the projections, with an increase of around 1.7 per cent of GDP straight away (in 2017) to eliminate the current deficit and then an additional almost 1 per cent of GDP as government consumption rises with the demographic dependency ratio. The increase in taxes means that the tax-to-GDP ratio in 2040 is approximately the same as it was in 2006, or around 46 per cent.

LARGER TAX INCREASES IF "OLD PATTERNS" PERSIST

The alternative scenario with unchanged behaviour illustrates the additional cost to public finances of having the same average retirement age in the future as today and an unchanged usage pattern for welfare services. The need for tax increases in this alternative scenario is approximately 1 per cent of GDP higher through to 2040 than in the base scenario. In the longer term, the cost is around 1 per cent of GDP for each year without any rejuvenation of behaviour. Put another way, each year of rejuvenation saves taxpayers 1 percentage point in future tax hikes. Just over 80 years from now, this equates to no less than 5 per cent of GDP in tax increases.

MANAGEABLE IMBALANCES

The main aim of analyses of the long-term sustainability of public finances is to identify potential imbalances at an early stage. Such imbalances, such as overly generous pension systems or other underfunded entitlement-based benefits, will tend to be more difficult to tackle politically the more established they become. Sustainability analyses can, in the best case, help ensure that imbalances are addressed before they arise.

The analysis in this report shows that there will be increased pressure on spending over the coming quarter of a century through to 2040, which can be explained by the share of elderly people in the population increasing and so pushing up the overall need for welfare services, especially care for the elderly. The dependency ratio levels off around 2040. It does rise again in the mid-2050s, but the uncertainty in the demographic forecast also increases that far into the future. Conclusions about events beyond 2040 must therefore be drawn with a growing degree of caution.

To keep public finances balanced in the long term, a balanced-budget target is an adequate but not essential condition. In periods of relatively high pressure on spending, it may be reasonable to permit temporary deficits, assuming that these are offset by surpluses in periods with relatively low pressure on spending. In this way, taxes can be

kept more even, so minimising the economic efficiency losses and negative redistribution effects between generations of volatile taxation. Because, however, it is a matter of a more or less *permanent* increase in expenditure, at least in the base scenario, it is doubtful whether borrowing to fund future spending is a viable way forward. This would entail passing on the permanently increased financing requirement to future generations. Gradual tax increases to fund expenditure increases as they occur are a way of keeping public finances balanced while avoiding an unintentional redistribution of resources between generations.

The analysis in this report assumes an unchanged public sector commitment and looks at whether the current tax system is capable of funding this commitment in the future – or what tax increases will be needed for this funding to be sufficient. Long-term sustainable public finances can, of course, also be achieved by adjusting spending to an unchanged tax system. The cuts in expenditure will then be of a similar size to the tax increases studied here. In periods with particularly rapid growth in the need for welfare services, it is not inconceivable that this would be addressed with a combination of higher taxes and a reduced welfare commitment.

STABLE NET WEALTH A REASONABLE SUSTAINABILITY CRITERION

Public finances can be considered long-term sustainable if net financial wealth (or net debt) in the government sector is unchanged at its current level relative to GDP. This criterion is met if net lending is zero in each period and the appreciation of financial assets is sufficient to offset the growth effect that erodes wealth as a percentage of GDP. This criterion is stricter than the criterion underlying the S2 indicator, namely that the intertemporal budget constraint is satisfied. An S2 indicator of zero is consistent with net wealth stabilising in the long term at an arbitrarily low (negative) level relative to GDP, just so long as it stabilises in the long term.

The sustainability criterion of unchanged net financial wealth can be applied in both the short and the long term (infinite horizon) and is relatively easy to grasp. It is not entirely unproblematic, however. For one thing, calculations of future net wealth are sensitive to the assumptions made about capital appreciation. For another, developments in net wealth are to some extent beyond political control, because there can be large and sudden changes in the market value of some assets. In principle, these characteristics mean that public finances can always be considered long-term sustainable if the assumptions for the appreciation of financial assets are sufficiently optimistic. Studying developments in net financial wealth in the shorter term can also lead to hasty conclusions about fiscal policy having been too loose or too tight, when net wealth may actually have changed as a result of movements in the stock market. Despite these limitations, net financial wealth is more suitable for sustainability assessments than government gross debt (the so-called *Maastricht debt*). Gross debt can increase without affecting net financial wealth (through sublending, for example). Gross debt can also be kept unchanged despite persistent budget deficits if the deficits are funded by selling off financial assets. Net financial wealth therefore provides a clearer and more complete picture of the government's financial position than gross debt.

Appendix 1. Further information on the macroeconomic scenario

The projections of public finances in the long-term scenarios employ a variety of the NIER's models: KAMEL for projecting labour market variables, DEMOG for projecting demographically driven government consumption, KAVEL for the macro scenario, and FIMO for developments in public finances and net lending in the other sectors of the economy. This appendix provides a brief description of the macro model KAVEL. For a description of the other models, see the 2014 sustainability report.[38]

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

DEVELOPMENTS IN DEMAND DRIVEN BY DEMOGRAPHICS

Household consumption grows with the overall population and a constant increase in standards reflecting productivity growth across the economy. Household consumption per capita therefore increases over time. Government consumption grows at different speeds in the different scenarios. The different growth rates for government consumption mean that household consumption as a percentage of GDP differs between the 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 2014, but scaled up proportionally to give the same forecast for total imports in 2020 as predicted in *The Swedish Economy*, December 2015 (see Table 6).

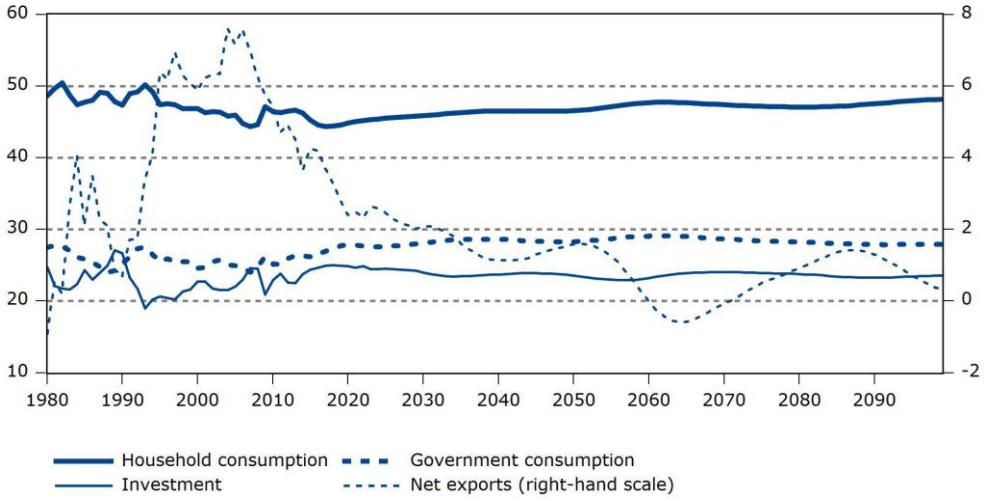
Demand for consumption and investment, together with the import coefficients, determines the amount of labour used to produce exports. Exports are thus the residual that balances supply and demand. In the very long term, it is reasonable for net ex-

[38] A description of these models is provided in the 2014 NIER fiscal sustainability report, "Is an unchanged commitment a sustainable commitment? An assessment of the long-term sustainability of Swedish public finances", *Occasional Studies 39*.

ports, 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 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 1 per cent of GDP in the long term (see Diagram 32).

Diagram 32 Components of demand

Percentage of GDP



Source: Statistics Sweden and NIER.

PRICES REFLECT PRODUCTIVITY

Productivity (labour productivity) and capital intensity are assumed to be the same in the four fictitious sectors that account for the production of household consumption, investment, government consumption and exports. 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 reflected in higher price rises.

The differences in productivity growth between the four fictitious sectors are based on their average productivity growth during the period 1981−2014. Productivity growth in the domestic production of goods and services included in the government consumption basket is, for example, assumed to be 0.4 per cent per year.

The level of value added per hour worked in current prices is the same and increases at the same rate in all sectors (3.8 per cent per year). This assumption greatly simplifies the model and fits fairly 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 constant prices) in the overall economy therefore varies somewhat over time in the different scenarios. The rate of increase in the GDP deflator varies somewhat with the composition of demand and averages just under 2.2 per cent.

Table 6 Assumptions in the macroeconomic base scenario, 2021−2100

Percentage change and per cent, respectively

	Productivity[1]	Deflator, expenditure	Deflator, value added	Import content
Household consumption	1.5	2.0	2.2	28.2
Government consumption	0.4	3.2	3.4	10.2
Investment	1.7	1.8	2.1	38.1
Exports	2.6	1.2	1.2	34.7
Imports	..	1.3	..	..
GDP[2]	1.5	2.2	2.2	28.0

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

[2] The values for the overall economy (GDP) have not been calibrated but denote the average for the period 2021−2100 from the other model parameters. The import content of GDP is imports' share of aggregate demand.

Relative price movements between the different demand components are determined by differences in productivity growth and import content. Import prices are assumed to rise by just under 1.3 per cent per year, which is in line with the average increase over the past 20 years. 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 2 per cent per year. Wage growth is assumed to be the same in all sectors (3.8 per cent), and labour costs' share of value added is constant over time.

The deflator for government consumption increases by 3.2 per cent, which is 0.6 percentage point below wage growth. The deflator is determined by the value-added deflator (3.4 per cent) weighted by the import deflator (1.2 per cent). The value-added deflator, in turn, is determined by wage growth (3.8 per cent) less productivity growth (0.4 per cent).

INTEREST RATE AND RETURN ASSUMPTIONS

In this report, the total return on financial assets is assumed to be 4.5 per cent per year after 2025. The rate of interest payable on debt is also assumed to be 4.5 per cent. The government sector's portfolio of financial assets consists of both interest-bearing and non-interest-bearing assets. The interest-bearing assets consist mainly of loans (mainly in the central government sector) and holdings of bonds (mainly in the old-age pension system). Non-interest-bearing assets consist mainly of shares in state-owned companies and the old-age pension system's buffer funds (the AP funds). With the non-interest-bearing assets, the total return breaks down into a dividend yield of 2.5 per cent and capital appreciation of 2 per cent per year.

The rate of interest on the national debt is also assumed to be 4.5 per cent, which roughly corresponds to the interest rate on 5- and 10-year Swedish government bonds maturing in 2025 in the NIER's medium-term macro scenario. With inflation of 2 per cent per year, this gives a real interest rate of 2.5 per cent, which can be compared with an average real interest rate on the national debt of around 3 per cent since 1980.

Appendix 2. Summary tables

Table 7 Base scenario

Percentage of GDP

	2016	2020	2030	2040	2070	2100
Primary expenditure	48.7	50.8	49.7	49.9	50.4	49.6
Government consumption	26.6	27.9	28.1	28.6	28.7	27.9
Investment	4.5	4.7	4.7	4.8	4.8	4.7
Income pensions	6.4	6.4	5.6	5.6	6.1	6.3
Social transfers (excluding pensions)	7.2	7.6	7.1	6.8	6.7	6.6
With unchanged taxes						
Primary revenue	47.0	48.0	48.1	48.5	49.1	49.1
Of which, taxes and duties	43.1	44.1	44.0	44.4	45.0	45.0
Primary net lending	−1.7	−2.8	−1.7	−1.4	−1.2	−0.5
Capital income, net	0.6	0.8	−0.8	−1.6	−3.8	−5.4
Net lending	−1.1	−1.9	−2.4	−3.0	−5.1	−6.0
Net financial wealth	19.0	17.1	1.8	−16.1	−69.7	−107.8
General government gross debt	43.2	46.6	64.3	86.8	140.0	175.4
With adjusted taxes						
Primary revenue	47.0	49.9	49.6	49.8	50.3	49.5
Of which, taxes and duties	43.1	45.9	45.5	45.7	46.1	45.4
Primary net lending	−1.7	−0.9	−0.2	−0.1	−0.1	−0.1
Capital income, net	0.6	0.9	0.2	0.1	0.1	0.1
Net lending	−1.1	0.0	0.0	0.0	0.0	0.0
Net financial wealth	19.0	23.3	23.7	22.7	20.4	18.2
General government gross debt	43.2	40.4	42.4	48.1	50.0	49.4

Source: NIER.

Table 8 Alternative scenario: unchanged behaviour

Percentage of GDP

	2016	2020	2030	2040	2070	2100
Primary expenditure	48.7	50.8	50.6	51.0	53.7	55.5
Government consumption	26.6	27.9	28.6	29.6	31.4	32.9
Investment	4.5	4.7	4.8	4.9	5.1	5.3
Income pensions	6.4	6.4	5.8	5.5	6.2	6.3
Social transfers (excluding pensions)	7.2	7.6	7.2	6.9	6.8	6.9
With unchanged taxes						
Primary revenue	47.0	48.0	48.3	48.7	49.8	50.7
Of which, taxes and duties	43.1	44.1	44.2	44.5	45.5	46.2
Primary net lending	−1.7	−2.8	−2.3	−2.3	−3.9	−4.8
Capital income, net	0.6	0.8	−0.9	−2.1	−7.0	−14.1
Net lending	−1.1	−1.9	−3.2	−4.4	−10.9	−18.9
Net financial wealth	19.0	17.1	−1.5	−27.9	−142.5	−306.0
General government gross debt	43.2	46.6	66.9	97.3	212.4	374.1
With adjusted taxes						
Primary revenue	47.0	49.9	50.4	50.9	53.6	55.5
Of which, taxes and duties	43.1	45.9	46.3	46.8	49.2	51.0

Source: NIER.

Table 9 Alternative scenario: reduced personnel density

Percentage of GDP

	2016	2020	2030	2040	2070	2100
Primary expenditure	48.7	50.8	48.9	48.3	46.3	43.5
Government consumption	26.6	27.9	27.3	27.0	24.9	22.4
Investment	4.5	4.7	4.7	4.7	4.5	4.3
Income pensions	6.4	6.4	5.6	5.6	6.1	6.3
Social transfers (excluding pensions)	7.2	7.6	7.1	6.8	6.7	6.6
With unchanged taxes						
Primary revenue	47.0	48.0	48.1	48.5	49.0	48.6
Of which, taxes and duties	43.1	44.1	44.1	44.5	45.0	44.7
Primary net lending	−1.7	−2.8	−0.8	0.3	2.7	5.0
Capital income, net	0.6	0.8	−0.6	−0.8	1.2	7.0
Net lending	−1.1	−1.9	−1.4	−0.5	3.8	12.0
Net financial wealth	19.0	17.1	6.7	2.8	44.8	175.8
General government gross debt	43.2	46.6	59.2	67.4	24.2	−110.2
With adjusted taxes						
Primary revenue	47.0	49.9	48.8	48.1	46.2	43.4
Of which, taxes and duties	43.1	45.9	44.7	44.1	42.2	39.6

Note: Primary net lending, capital income, net lending, net financial wealth and general government gross debt with adjusted taxes are not reported for the alternative scenarios as these are practically identical to the base scenario with adjusted taxes.

Source: NIER.

Table 10 Additional scenario: improved integration

Percentage of GDP

	2016	2020	2030	2040	2070	2100
Primary expenditure	48.7	50.8	48.9	48.3	49.6	49.0
Government consumption	26.6	27.9	27.6	27.7	28.1	27.6
Investment	4.5	4.7	4.7	4.7	4.8	4.7
Income pensions	6.4	6.4	5.5	5.4	6.1	6.3
Social transfers (excluding pensions)	7.2	7.6	7.0	6.5	6.5	6.4
With unchanged taxes						
Primary revenue	47.0	48.0	47.9	48.1	49.0	49.2
Of which, taxes and duties	43.1	44.1	43.9	44.1	44.9	45.1
Primary net lending	−1.7	−2.8	−1.0	−0.2	−0.5	0.1
Capital income, net	0.6	0.8	−0.6	−1.0	−1.9	−2.4
Net lending	−1.1	−1.9	−1.7	−1.2	−2.5	−2.3
Net financial wealth	19.0	17.1	5.3	−2.5	−26.3	−38.0
General government gross debt	43.2	46.6	60.5	73.2	97.3	106.4
With adjusted taxes						
Primary revenue	47.0	49.9	48.8	48.2	49.5	48.9
Of which, taxes and duties	43.1	45.9	44.8	44.2	45.4	44.9

Note: Primary net lending, capital income, net lending, net financial wealth and general government gross debt with adjusted taxes are not reported for the alternative scenarios as these are practically identical to the base scenario with adjusted taxes.

Source: NIER.

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