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Is an Unchanged Public Sector Commitment a Sustainable Commitment?

An assessment of the long-term sustainability of Swedish public finances

KONJUNKTUR INSTITUTET KI

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OCCASIONAL STUDY NO. 39, MARCH 2014
NATIONAL INSTITUTE OF ECONOMIC RESEARCH (NIER)

Foreword

The National Institute of Economic Research (NIER) has been commissioned by the Swedish government to produce long-term projections of public finances and assess their long-term sustainability. The assessment of sustainability is to include the S2 indicator, a measure of the sustainability of public finances. The NIER has published annual assessments of the sustainability of public finances, including the S2 indicator, since 2012.

Erik Jonasson was the project manager. Helena Knutsson, Göran Hjelm and Tomas Forsfält were also involved in the project.

Stockholm, 26 March 2014

Mats Dillén
Director-General

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1. Introduction

Average life expectancy in Sweden has increased by ten years since the 1950s and is set to grow by at least another four years over the next half a century, based on Statistics Sweden's population forecast. Not only are we living longer, but the proportion of elderly people is growing relative to the proportion of younger people. From the 1980s to the early 2000s, the ratio of elderly people to those of working age was largely constant, with around 30 people aged 65 and over for every 100 of working age. In recent years, however, the ratio has begun to rise, and it is forecast to grow by around 50 per cent by 2060.

This population ageing raises questions about the future level and financing of welfare services. Will we be able to maintain standards of health care, education and elderly care, and replacement rates in the social transfer systems? Will pensions be able to provide for an ever larger number of pensioners who are living ever longer? Will future tax revenue be enough to finance a public sector commitment at today's levels?[1]

This report analyses the long-term sustainability of Sweden's public finances. There is no universally accepted definition of long-term sustainability. One common and intuitive starting point for assessing the sustainability of public finances is that, over time, flows of expenditure should be matched by equal flows of income. If expenditure exceeds income, debt will inevitably increase. If this imbalance is large and persistent, debt levels will eventually become unmanageable, and public finances will not be long-term sustainable. In a sense, one can assume that public finances will always be long-term sustainable if political decisions continue to be made to correct any imbalances in public finances. In the event of deficits, taxes will be raised or spending curbed; and in the event of persistent surpluses, one can imagine taxes being lowered or unfunded reforms being introduced within the resulting fiscal space. The assessment of the long-term sustainability of public finances in the present report, as in other contexts, is based on the *current scope* of the welfare commitment and the tax system that is to finance it.[2] The question analysed is whether future developments in government expenditure with an unchanged commitment are compatible with the income provided by the current design of the tax system.

Three definitions of an unchanged public sector commitment

An unchanged public sector commitment can be understood in different ways. It could mean that *personnel density* in the production of welfare services is kept constant, so that, for example, the number of teacher hours per ten-year-old and the number of hours of home help per 80-year-old are the same in the future as they are today.

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[1] See, for example, Blix (2013) and Sundén et al. (2014) for detailed discussions of these topics. See also Swedish Government Official Reports (2008).

[2] The long-term sustainability of Swedish public finances is assessed regularly not only by the NIER but also by the Swedish government and the European Commission, cf. Government of Sweden (2013a) and European Commission (2012a). The Swedish Fiscal Policy Council, in turn, conducts regular reviews of the government's sustainability calculations, cf. Swedish Fiscal Policy Council (2013). Regular analyses of the sustainability of public finances are also performed in many other countries, cf. US Congressional Budget Office (2013), UK Office for Budget Responsibility (2013) and Canadian Office of the Parliamentary Budget Officer (2013), for example.

Productivity growth in the production of government consumption will then benefit the population in the form of a gradual increase in the standard of welfare services. An unchanged commitment could also mean that the *volume* of public services per user is kept constant at current levels, so that the standard of public services is the same in the future as it is today. Any productivity gains will then be taken as resource savings. The public sector commitment could also be viewed in relation to the size of the rest of the economy, with an unchanged commitment defined as allowing government expenditure to rise in line with GDP.

This report uses all three of these definitions of an unchanged public sector commitment in its analysis of the long-term sustainability of public finances. The overarching question is whether the current scope of welfare services and social transfer systems is compatible in the longer term with the income flows that result from the current design of the tax system. The report looks at three scenarios based on these three definitions of an unchanged public sector commitment, with projections of public finances from 2014 through to 2060.[3] The near-term projections (2014–2018) are based mainly on the forecast presented by the NIER in *The Swedish Economy*, December 2013. The long-term projections (2019–2060) are based on simplified assumptions about an economy at full capacity, with exogenous assumptions for productivity growth and labour supply.

Some tax increases needed to maintain personnel density in welfare services

The analysis reveals that an unchanged personnel density in the production of welfare services leads to an increase in government consumption expenditure from around 27 per cent of GDP today to just over 30 per cent in 2060. In the absence of tax increases, this results in a gradual deterioration in public finances, with negative net lending of around 2 per cent of GDP in the 2030s and 2040s, and 4 per cent in 2060. The S2 indicator, a measure of the sustainability of public finances, shows that tax revenue will need to be increased permanently by 1.5 to 2 per cent of GDP for an unchanged personnel density in the production of welfare services to be compatible with long-term sustainable public finances.

In the scenario based on an unchanged standard of welfare services, government consumption decreases instead as a percentage of GDP, eventually leading to substantial surpluses in public finances. In the third scenario, where government consumption expenditure follows GDP in current prices, public finances move into surplus once the economy is at full capacity. Net lending reaches around 1 per cent of GDP in 2040 and rises slightly further by 2060. As both income and expenditure in the government sector are closely linked to GDP in this scenario, public finances evolve in a balanced fashion.

The report also presents the S1 indicator, which shows the level of fiscal tightening (or loosening) required to achieve a certain level of general government gross debt in 2030. The EU's Stability and Growth Pact sets a ceiling for member states' general

[3] Chapter 6 and Appendix 1 also study a fourth scenario based on an assumption of unchanged rules in the period 2015–2018, after which government consumption expenditure per user follows GDP per capita. This assumption facilitates comparison with the Swedish government's assessments of the long-term sustainability of public finances.

government gross debt (Maastricht debt) of 60 per cent of GDP. Since Sweden currently has debt of just over 40 per cent of GDP, there is no need for fiscal tightening to meet this target. Instead, the calculations show that, even with an unchanged personnel density in the production of welfare services, net lending can fall by up to 1.5 per cent of GDP over the next 15 years without gross debt exceeding this limit.

Structure of the report

Chapter 2 begins with a brief account of the population forecast through to 2060 on which the projections of public finances are based. It also presents the assumptions made for developments in the labour market, the economy and government income and expenditure. The three scenarios based on different definitions of an unchanged public sector commitment are described. Chapter 3 examines developments in government expenditure, and Chapter 4 looks at income, before Chapter 5 brings income and expenditure together and analyses developments in net lending in the three scenarios. Chapter 6 presents calculations of the S2 and S1 indicators, and Chapter 7 rounds off the report with conclusions. The report has three appendices. Appendix 1 provides a more detailed account of the alternative scenario based on different assumptions for near-term developments in government expenditure (unchanged rules in 2015–2018). Appendix 2 presents the S2 and S1 indicators in more detail. Finally, Appendix 3 describes the models KAVEL, FIMO, DEMOG and KAMEL used in the projections of public finances.

2. Demographics, the macroeconomy and government income and expenditure

Government income is determined largely by the design of the tax system. Government expenditure is determined by rules and political decisions on the scope of welfare services, investment and social transfers. Demographic and macroeconomic developments are also key determinants of public finances. This chapter begins with an account of demographic developments through to 2060. It then outlines a scenario for long-term developments in the labour market and the economy as a whole, before presenting the assumptions made in the projections of government income and expenditure.

2.1 DEMOGRAPHICS

Demographic developments play a pivotal role in the long-term performance of public finances. Changes in the working-age population are an important determinant of the size of the labour force and thereby the nation's overall production, or GDP. Demographics also impact on the composition of GDP, which, in turn, affects tax revenue. Demographic developments also play a key role on the expenditure side. The higher the share of children and elderly people in the population, the greater the need for welfare services and social transfers.[4]

A substantial proportion of government consumption, such as health, education and care services, is age-related. As described in more detail in the following chapter, in 2005 a child aged 5–9 years was associated with government consumption expenditure of around SEK 100,000 per year on average, and a person in their 90s with almost SEK 200,000 per year. The equivalent figure for a person of working age was just over SEK 20,000.[5] The relative sizes of the population of working age and the population of non-working age are therefore very important for government consumption expenditure. Expenditure on social transfers is also determined partly by the age structure of the population. Pensions accounted for around 58 per cent of total transfers to households in 2012, and child/family-related benefits such as parental and child allowance for another 12 per cent.

Rising demographic dependency ratio

The demographic dependency ratio is often used to express the relationship between the part of the population that relies directly or indirectly on being supported by others, and those that provide the bulk of this support. It is defined as the ratio between the number of people who are not of working age and the number of people who are. The classification of working age varies depending on the context, but is defined here

[4] The analysis of developments in public finances in the present report is based on Statistics Sweden's latest population forecast from April 2013, which covers the period through to 2060, cf. Statistics Sweden (2012 and 2013).

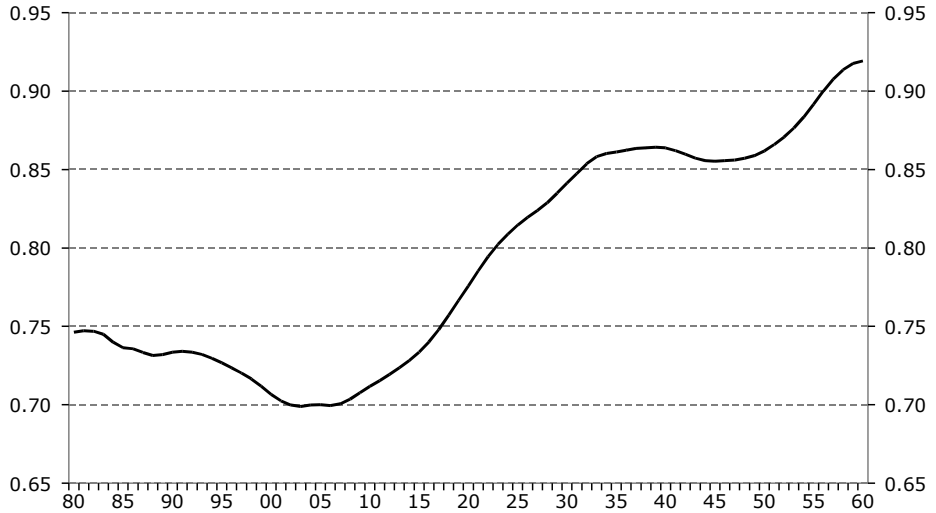
[5] These figures are for 2005, which is the most recent year with comparable statistics. See Chapter 3 for a more detailed account.

as 20–64 years.[6] The dependency ratio fell somewhat from the beginning of the 1980s through to the early 2000s, reaching a low of around 0.7 in 2003, or 70 young and elderly per 100 people of working age. According to Statistics Sweden's population forecast, we now face a long period of growth in the dependency ratio to 0.85 in 20 years and 0.92 in 45 years (see Diagram 1).

The overall dependency ratio can be divided into an old-age dependency ratio, which is the ratio of elderly people to the working-age population, and the child dependency ratio, which is the number of children and young people relative to the number of people of working age. Diagram 2 shows that the child dependency ratio has fallen slightly over the past three decades, from 0.46 in 1980 to 0.39 in 2013. According to Statistics Sweden's population forecast, it is now set to rise again slightly, especially over the next decade, and reach 0.43 in 2060. The main change in the overall dependency ratio will be driven by the old-age dependency ratio, however. The current level of 33 elderly per 100 people of working age is expected to rise to nearly 50 in 2060. This upward trend in the proportion of elderly people is being seen in most European countries. The average old-age dependency ratio in the EU is currently around the same as in Sweden but is forecast to rise to around 58 elderly per 100 people of working age in 2060. According to the European Commission's population forecast, Sweden is actually one of the countries with the most favourable (or least unfavourable) demographic outlooks in the period to 2060. Many countries are forecast to have between 60 and 70 elderly per 100 people of working age in 2060.[7]

Diagram 1 Dependency ratio

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



Note: Working age is defined here as 20–64 years.

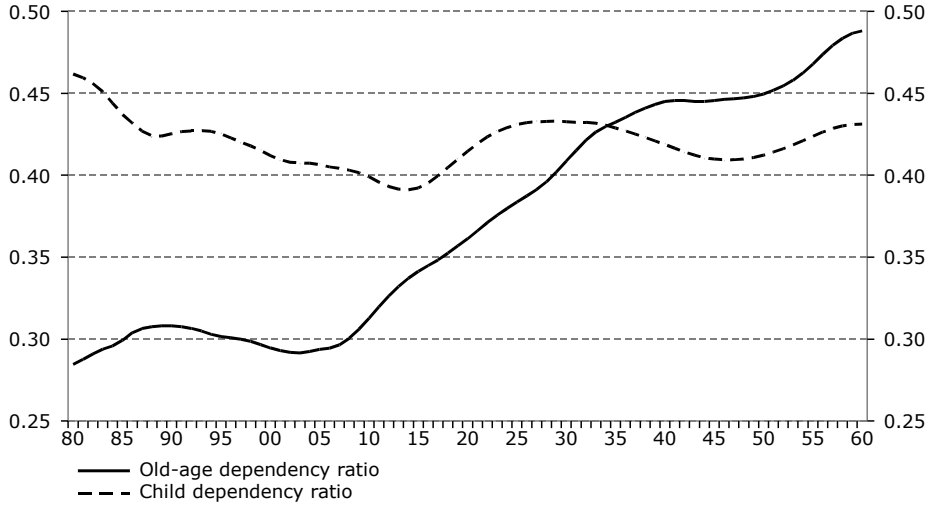
Source: Statistics Sweden.

[6] The demographic dependency ratio illustrates only the relationship between two age groups in the population and is therefore only a rough estimate of the relationship between the economically inactive (or non-working) population and the employed population. The relationship between the inactive population and the employed population is referred to here as the *economic dependency ratio* and is presented later in this chapter.

[7] See European Commission (2012b).

Diagram 2 Old-age dependency ratio and child dependency ratio

Relative to the working-age population



Note: Children are defined as ages 0–19; elderly as ages 65 and over. Working age is defined here as 20–64 years.

Source: Statistics Sweden.

Age structure determined by fertility, mortality and migration

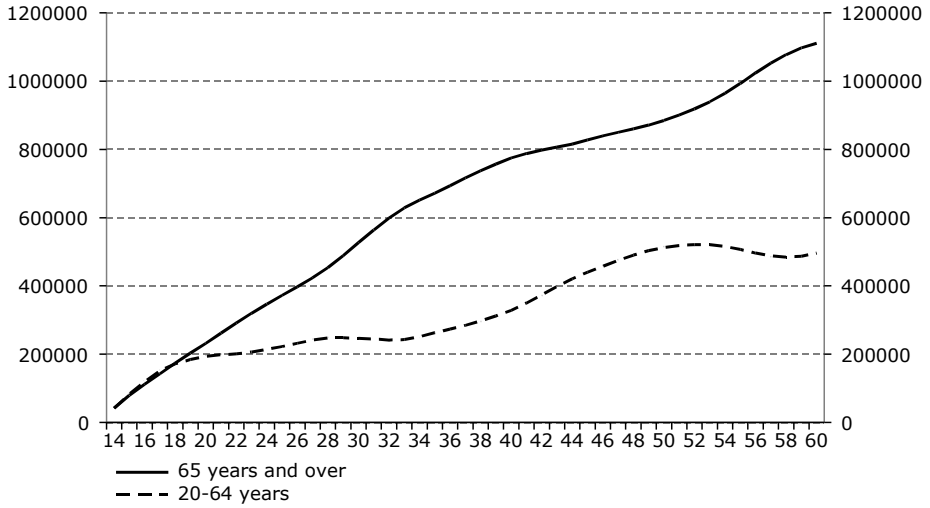
The age structure of the population – and thereby the dependency ratio – is determined by fertility, mortality and migration. The growth in the population during a period will consist of the excess of births over deaths and net migration (the excess of immigration over emigration). According to Statistics Sweden's population forecast, both the excess of births over deaths and net migration will be positive through to 2060, which means that the population as a whole will grow. Net migration will slow the increase in the dependency ratio, as the majority of immigrants are of working age. The excess of births over deaths will make the population younger and so rein in the old-age dependency ratio. The growth in the population will not be enough to stop the old-age dependency ratio from rising, however, as the number of elderly (65 and over) will increase more rapidly than the working-age population (see Diagram 3).

Fertility is generally measured as the total fertility rate, which is an estimate of the average number of children a woman will give birth to during her lifetime. This figure was 1.92 in Sweden in 2012 and, according to Statistics Sweden's population forecast, will stabilise in the longer term at 1.90. This is below the level of 2.1 children per woman that is required for the population to remain unchanged in the absence of net migration. Fertility rates have varied over time, however, which illustrates the uncertainty in the population forecast in the slightly longer term. The fertility rate was 1.85 children per woman in the mid-1980s, 2.4 in the early 1990s, and just under 2.0 at the beginning of the 2000s. Statistics Sweden's fertility forecast divides women into seven groups by country of origin. In 2011, 25 per cent of newborns had a mother born outside Sweden, and 16 per cent a mother born outside Europe. On average, fertility is higher among women born in developing countries than in the other groups. Statistics Sweden's population forecast assumes, however, that fertility levels in the different groups will converge at a level of around 2 children per woman (1.89 for those born in Sweden and 2.04 for those born abroad).

Average life expectancy, defined here as the expected lifetime of a person born this year based on current death risks, is at present around 84 years for women and 80 years for men. This is an increase of around ten years since 1950 and no fewer than 30 years since the start of the 20th century. Life expectancy continues to increase in Statistics Sweden's population forecast, albeit at a slower rate than before, to 89 years for women and 87 years for men in 2060. This means that the number of people reaching very high ages is expected to rise. For example, the number of people aged 90 and above is expected to climb from today's level of just under 100,000 to almost 300,000 in 2060 (see Diagram 4).

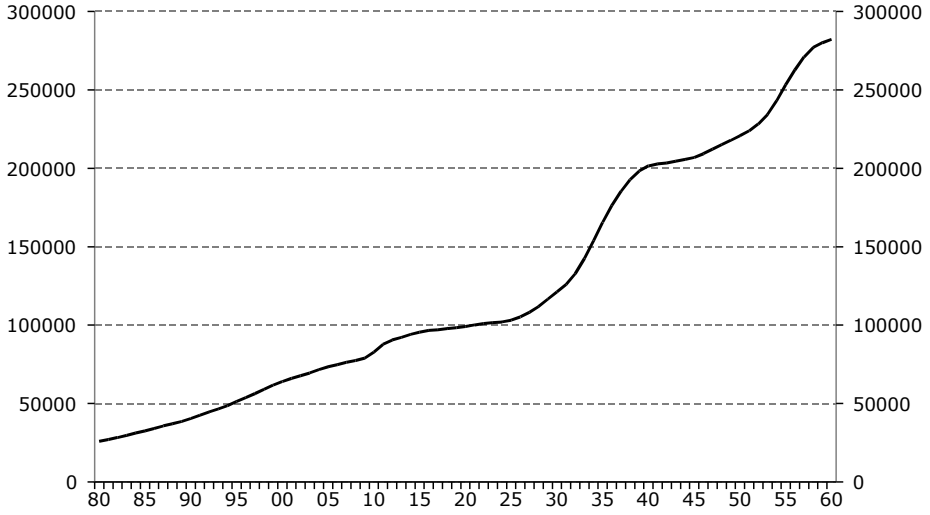
Diagram 3 Population growth, elderly and working age, 2014–2060

Change from 2013 level



Source: Statistics Sweden.

Diagram 4 Population aged 90 and over



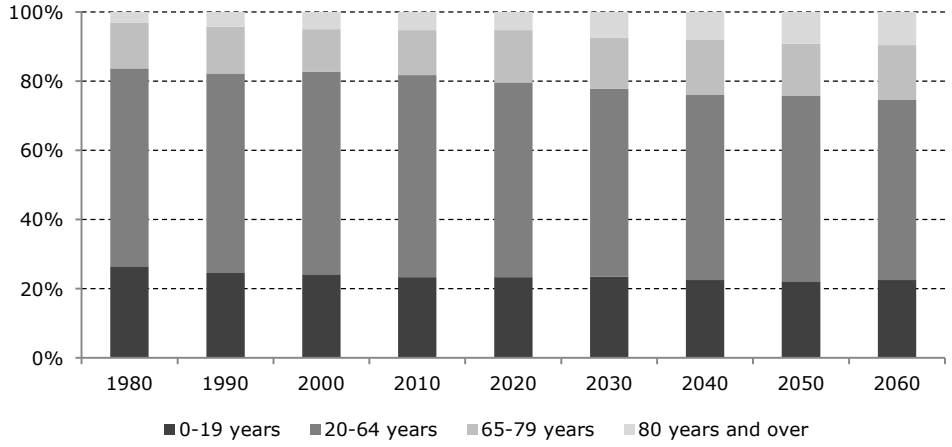
Source: Statistics Sweden.

In 2012, around 48,000 people emigrated from Sweden and around 106,000 immigrated, giving net immigration of almost 60,000 people. Immigration is expected to remain relatively high in the next few years, due partly to a continued strong influx of asylum seekers and family members. It is then expected to slow through to 2020 to a level of around 80,000 people per year. After 2020, both immigration and emigration trend slightly upwards in Statistics Sweden's population forecast, giving net immigration of just under 20,000 people per year in the long term. The increase in immigration after 2020 is driven primarily by Statistics Sweden's assumptions for labour immigration and the re-immigration of those who have previously lived in Sweden.

All told, Statistics Sweden's assumptions for fertility, mortality and migration mean that the share of the population below 20 years of age will be largely unchanged through to 2060, while the population aged 20–64 will fall from around 58 per cent today to 52 per cent in 2060, and the share of over-65s will rise from 19 to 25 per cent (see Diagram 5).

Diagram 5 Population by age group, 1980–2060

Percentage of overall population



Source: Statistics Sweden.

2.2 LABOUR MARKET

Changes in the labour force are a major determinant of how a country's aggregate production will develop over time. The size of the labour force, in turn, is decided primarily by developments in the working-age population and individuals' inclination to participate in the labour force.

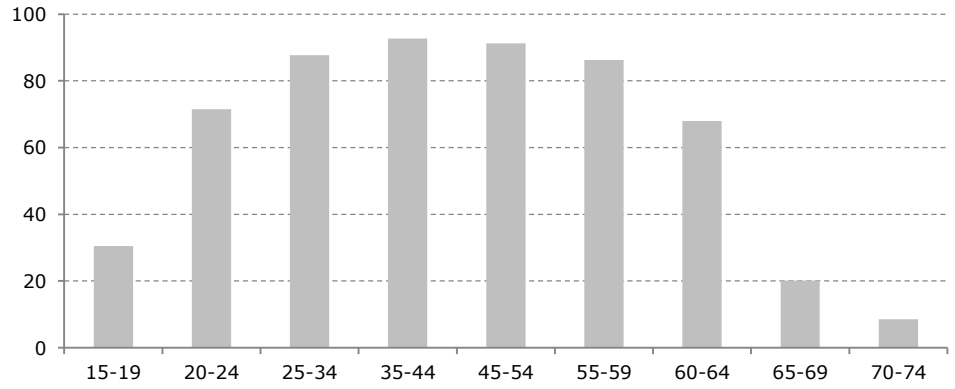
Looking at the population aged 15–74, there is significant variation in labour force participation.[8] Participation among those aged 15–19 is currently around 30 per cent, as the vast majority attend upper secondary school at this age. Participation is then 90 per cent in the 25–59 age group and around 70 per cent in the 60–64 age group, before decreasing significantly. The participation rate is 20 per cent among those aged

[8] The working-age population is defined in labour market contexts as those aged 15–74. Since labour force participation is limited in the 15–19 and 65–74 age groups, it may, however, be more useful to apply a narrower definition of 20–64 years as working age when analysing developments in the dependency ratio.

65–69 and just under 10 per cent among those aged 70–74 (see Diagram 6). Labour force participation is also affected by the state of the economy. By definition, the labour force includes both the employed and the unemployed. In an economic downturn, when unemployment is high, some will exit the labour force, for example to study or retire. When the economy is booming, labour force participation will increase, because it is easier to find work.

Diagram 6 Labour force participation by age group, 2012

Percentage of population in each age group



Source: Statistics Sweden.

Developments in the labour market over the next few years will be affected by the economic recovery and the economic policy reforms decided on in 2007–2014, which are expected to boost labour force participation.[9] This means that both employment and the labour force will grow more quickly than is demographically motivated. In 2017, unemployment will return to its equilibrium level, estimated by the NIER to be 6.5 per cent that year. Resource utilisation in the labour market will then have normalised. Temporarily high resource utilisation will, however, mean that unemployment falls back below the equilibrium level for a few years through to 2021.[10]

After that, it is assumed that labour market developments will be determined entirely by demographic developments. Long-term movements in labour market variables are estimated using the NIER's model for long-term labour market projections, KAMEL. In this model, labour market variables are influenced by changes in the composition of the population in terms of gender, age and country of origin. Different population groups have different characteristics, including labour force participation rates, employment rates and average hours worked by those who are in employment. The model projections assume that these differences will persist over time. If, for example, a group associated with a high employment rate grows in size relative to the other

[9] See National Institute of Economic Research (2011) for an analysis of the employment effects of the reforms introduced in 2007–2011.

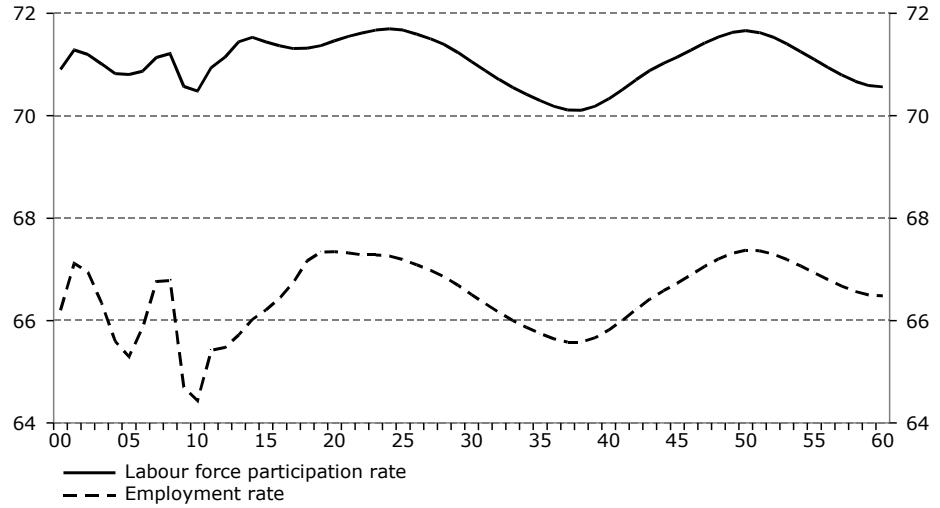
[10] The medium-term projections for the labour market differ somewhat from the NIER's forecast in *The Swedish Economy*, December 2013, cf. section 2.3.

groups, this will have a positive effect on the overall employment rate.[11] This method does not necessarily produce the most likely outcome. For example, because average life expectancy is rising, it is possible that people will exit the labour market later and the effective retirement age will increase. The design of the pension and tax systems and the likelihood of an increasingly healthy population in the 65–74 age group would support such a change.[12] It can therefore be argued that purely demographic projections may underestimate the employment rate in the long term. At the same time, it is possible that demand for leisure time will rise with economic prosperity, which might mean that demographic projections overestimate employment or average hours worked.[13]

The long-term model projections suggest that labour force participation in the 15–74 age group will fluctuate between 70 and 72 per cent through to 2060, and the employment rate between 66 and 67 per cent (see Diagram 7). The slightly negative trend from the start of the 2020s through to the end of the 2030s in both labour force participation and the employment rate can be explained by the age group with the highest participation rate (25–59 years) accounting for a declining share of the overall working-age population. Once this age group begins to grow again as a share of the working-age population, this trend reverses. Similarly, equilibrium unemployment varies somewhat over time.

Diagram 7 Labour force participation and employment rate

Percentage of working-age population (15–74 years)



Source: Statistics Sweden, NIER.

[11] The model projections are based on the Labour Force Survey for 2012, which is the most recent year for which full-year data are available. The choice of base year is rooted in the principle that the most recent year will provide the best information about future labour market behaviour. This principle may, however, mean that some cyclical effects will be captured and made permanent in the projections. The projections are based on the levels assumed for the various labour market variables when the economy has normalised (2021) and thereafter on the growth rates given by the model for each variable. See also Appendix 3 for a description of the KAMEL model.

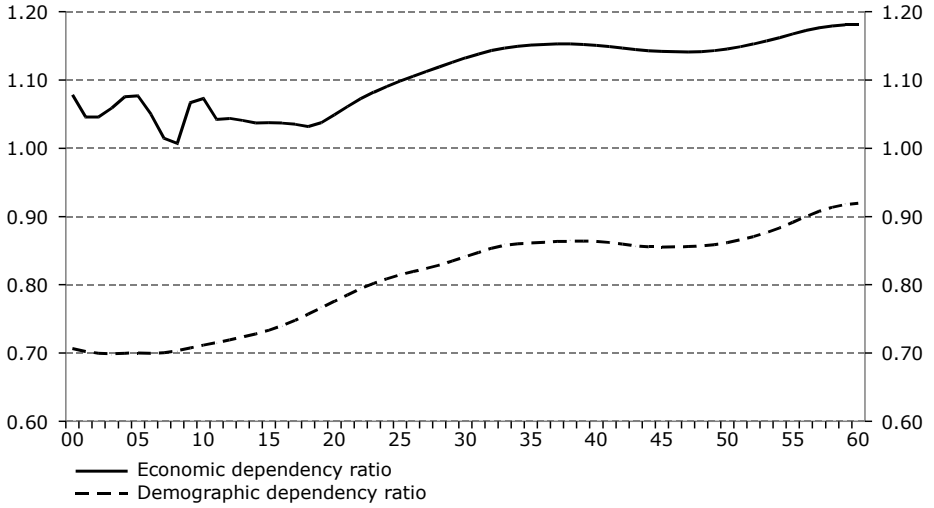
[12] See, for example, Swedish Government Official Reports (2013).

[13] See, for example, Sundén et al. (2014).

As discussed in the previous section, the demographic dependency ratio describes the relationship between the non-working-age population and the working-age population. The ratio is therefore an indicator of how many other people have to be supported by each person of working age. If the employment rate is low in certain groups of the working-age population, however, the burden that the economically active population must bear will be underestimated. The *economic* dependency ratio takes this into account and is defined here as the ratio between the number of economically inactive (non-working) people in the population and the number of employed. Projections of the economic dependency ratio are, of course, sensitive to the assumptions made for labour force participation and unemployment.

The economic dependency ratio is at present 1.04, which means that there are 104 economically inactive people for every 100 in employment. Unlike the demographic dependency ratio, the economic dependency ratio is affected by fluctuations in the economy. It climbed as high as 1.20 in the 1990s due to the low employment rate following the recession at the start of that decade. Today's ratio is also somewhat elevated due to the weak economic climate. The return of employment to normal levels as the economy recovers in the coming years will help to rein in the economic dependency ratio. At the same time, the old-age dependency ratio will rise relatively quickly. These contrasting effects mean that the economic dependency ratio will be almost constant over the next five years. In the long-term projections, the economic dependency ratio moves largely in parallel with the demographic dependency ratio, reaching 1.18 in 2060 (see Diagram 8).

Diagram 8 Economic and demographic dependency ratios



Note: The economic dependency ratio is defined as the ratio between the number of inactive people and the number of employed, i.e. $(N–N_E)/N_E$, where N is the entire population and N_E is the total number of employed. The demographic dependency ratio is defined here as the ratio between the number of people of non-working age and the number of people of working age (20–64 years). See also Diagrams 1 and 2.

Source: Statistics Sweden, NIER.

2.3 MACROECONOMIC DEVELOPMENTS

For an analysis of the long-term sustainability of public finances to be useful, the macroeconomic scenario must paint a realistic picture of future economic developments. One important reason for this is that most tax bases are affected by macroeconomic developments.

The macroeconomic projections in this report are based on the medium-term forecast presented in *The Swedish Economy*, December 2013. Unlike that forecast, however, the projections assume no tax increases in the next few years.[14] The forecast has therefore been adjusted somewhat to take account of this different assumption for the period 2015–2018. In the present projections, the economy recovers gradually from the current slump and reaches normal resource utilisation in 2016.[15] The output gap then temporarily turns slightly positive, due mainly to high household consumption growth. The economy is expected to return once again to normal resource utilisation in 2021. After that, the long-term macro scenario is based on the simplified assumption that the economy will remain at capacity. GDP growth is then determined by exogenously determined employment and technological advances, which, together with capital formation, produce aggregate productivity growth.

Productivity and GDP growth

The NIER's assessment of long-term – or potential – productivity growth is based on historical data for 1980–2012. The annual rate of growth in productivity in the economy as a whole averaged 1.8 per cent during that period. It is assumed that this historical growth rate will continue in the long-term projections through to 2060. It is, however, assumed that productivity will vary between sectors – for example, productivity in export-producing industries is expected to grow by more than 3 per cent per year, while weighted productivity growth in industries producing goods and services for government consumption is assumed to be just 0.4 per cent per year.[16] This, too, is in line with historical developments. The overall economy's productivity growth is therefore influenced by changes in the composition of demand. If demand in the economy is biased towards sectors with high productivity growth, GDP will grow more quickly than if demand is biased towards those with lower productivity growth.

Although productivity growth varies between sectors, nominal value added per hour worked will increase at the same rate in all sectors. This is because the labour force can switch between sectors, and so wage growth is assumed to be the same in all sectors. From 2019 onwards, value added per hour worked is assumed to grow by 3.8 per

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[14] In *The Swedish Economy*, December 2013, tax increases of SEK 93 billion are included in the period 2015–2018. The present report assumes that tax rates are constant at 2014 levels.

[15] In the forecast presented in *The Swedish Economy*, December 2013, the output gap does not close until 2017. The output gap closes earlier in the macro scenario in the present report as a consequence of the assumption that no tax increases will be made during the period 2015–2018. Besides the slightly earlier closing of the output gap, this assumption results in a positive gap through to 2021, whereas in the December 2013 forecast it is only marginally positive in 2018–2020. Macroeconomic developments over the next few years differ slightly in the alternative scenario based on unchanged rules in 2015–2018. This scenario is presented in Appendix 1.

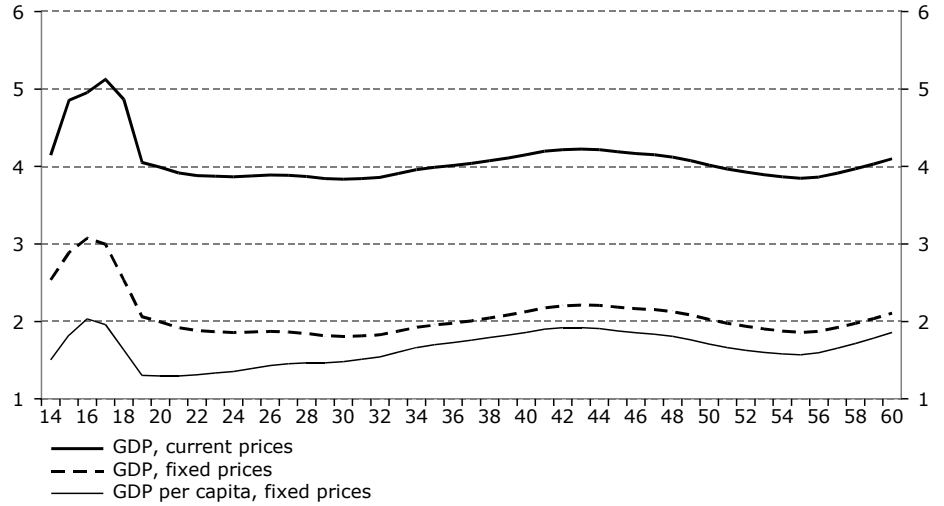
[16] Productivity growth in the general government sector has averaged 0.2 per cent per year since 1980 but has been higher in those parts of industry that also contribute to the production of goods and services in the government consumption basket. The weighted average of productivity growth in the government sector and the relevant parts of industry is estimated to have been 0.4 per cent per year since 1980.

cent per year, which will also determine the rate of wage growth in the economy as a whole. This rate of growth is consistent with the Riksbank's target of a 2 per cent annual increase in consumer prices (CPI).

Since both growth in nominal value added per hour and developments in the labour force are exogenously determined in the model projections, GDP in current prices is also exogenously determined. With long-term growth in hours worked averaging just under 0.2 per cent per year, productivity growth means that GDP in volume terms grows by 2.0 per cent per year in the long-term projections. With consumer prices rising at 2 per cent per year, the GDP deflator is also estimated to rise by 2 per cent per year. GDP growth in current prices therefore averages 4 per cent per year (see Diagram 9).[17] Since wage growth fully corresponds to nominal productivity growth, total wages are constant as a share of GDP in the long-term projections.

Diagram 9 Gross domestic product

Current and fixed prices, percentage change



Source: NIER.

Prices, deflators and interest rates

The difference between wage growth and sector-specific productivity growth is reflected fully in price movements (deflators) for the various components of total demand. Sectors with low productivity growth raise prices more quickly than those with relatively high productivity growth.[18] The deflator for household consumption rises by around 1.9 per cent per year in the long-term projections and largely reflects movements in the consumer price index (CPI). Investment goods are largely produced in sectors with high productivity growth, so the prices of these goods rise relatively slowly. This means that the investment deflator climbs more slowly than the consumption

[17] The present report analyses developments in public finances in three different scenarios with different trajectories for government consumption. Although its share of GDP moves differently in these scenarios, the impact on average GDP growth is negligible.

[18] The NIER's assessment of how the deflators develop when the economy is at capacity is based on calculations in the NIER's model for structural prices and labour costs described in Markowski et al. (2011).

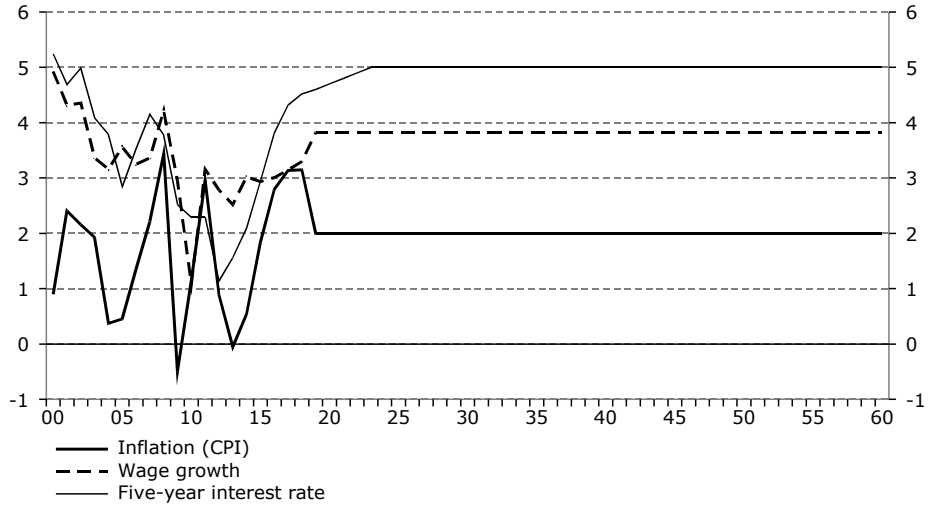
deflator in the projections. For similar reasons, the export and import deflator rises more slowly than the household consumption deflator.

The government consumption deflator largely follows wage growth, because the production of public services is relatively labour-intensive and features only modest productivity growth. Prices for consumable and capital goods climb more slowly than wages, however, which means that the government consumption deflator does not rise quite as quickly as wages. In the long-term projections, the government consumption deflator rises by 3.1 per cent per year, which is the same as the average rate seen in the period 1995–2012.

CPI inflation is assumed to be 2 per cent per year in the long term, which is also the Riksbank's inflation target. The current economic slump in Sweden means that inflation is currently below 2 per cent, however. As the economy recovers, inflation will pick up, with the result that the Riksbank will gradually raise interest rates. When the output gap turns positive in 2017–2020, inflation will temporarily overshoot the target somewhat (see Diagram 10). The average nominal interest rate on liabilities and interest-bearing assets is expected to reach a long-term level of 5 per cent in 2023. With inflation of 2 per cent, this gives a real interest rate of 3 per cent. This is in line with the assumptions for the real interest rate made by the European Commission and the Swedish government in their respective sustainability calculations.[19] It is assumed that non-interest-bearing financial assets, such as shares and fund units, will increase in value by 2 per cent per year and generate a dividend yield of 3 per cent. This means that the total nominal return on these assets is also 5 per cent.

Diagram 10 Inflation, wage growth and interest rates

Per cent



Source: Statistics Sweden, NIER.

[19] See European Commission (2012a) and Government of Sweden (2013a).

Developments in total demand

In the long-term projections, GDP in current prices is determined by the labour supply and the assumption for nominal productivity growth. Developments in the components of total demand (GDP plus imports) are based not only on demographic developments but also on assumptions for standards in private and government consumption and assumptions for long-term movements in the current account and the capital stock.

Household consumption moves differently in the three scenarios. Common to all three is that consumption rises with population growth plus a certain increase in standards to reflect productivity growth in the economy. This increase in standards is relatively large in the scenario where government consumption grows relatively slowly, and relatively small in the scenario where government consumption grows relatively quickly.

In the long-term projections, investment levels reflect the assumption of a constant capital-output ratio (capital stock to GDP in current prices) in the economy as a whole. Investment will grow relatively quickly in the next few years as the economy recovers, rising to just over 20 per cent of GDP in 2016 when the economy returns to capacity and then largely holding at this level. When it comes to foreign trade, Sweden has had net exports averaging 6.5 per cent of GDP over the past 20 years. In the long-term projections, the trade surplus is assumed to decline gradually to around 1 per cent of GDP. This trade surplus of around 1 per cent of GDP is explained by the sum of EU contributions and development aid being assumed to hold at around 1 per cent of GDP.

As mentioned before, three different scenarios are used for developments in government consumption. These scenarios are described in more detail in the following chapter, but essentially entail three different levels of change in the standard of public services. In the scenario with no increase in standards, government consumption expenditure grows relatively slowly, with the result that government consumption declines as a share of GDP while household consumption ups its share. The reverse applies in the scenarios with increases in the standard of publicly funded services.

2.4 ASSUMPTIONS FOR GOVERNMENT INCOME AND EXPENDITURE

The assumptions for government income and expenditure have been made specifically to evaluate the long-term sustainability of public finances based on the current tax system and the current level of the public sector commitment in terms of welfare services and social transfers. These assumptions should not therefore be taken as a basis for the best possible forecast of future developments in public finances. Government expenditure consists mainly of government consumption and social transfers. There is no universally accepted definition of what constitutes an unchanged public sector commitment to welfare services and other government consumption. This commitment can be quantified in different ways, such as resource allocation, volume growth or share of GDP. Three different scenarios with different rates of growth in government consumption are therefore used in the projections of public finances in the present report.

Regardless of the definition chosen, active political decisions will be needed to maintain an unchanged public sector commitment. If the rules governing government consumption and payments of social transfers are left unchanged, the public sector commitment will be eroded over time. The replacement rates of social transfers would lag behind relative wages. The supply of resources for welfare services would also be held back, due partly to nominally unchanged central government grants to the local government sector and the indexation methods for grants to central government bodies.

Government income

Government income has been estimated on the assumption that implicit tax rates are unchanged at 2014 levels. Tax revenue is therefore projected on the basis of developments in the respective tax bases. The average rate of local government taxation is also assumed to remain constant at the 2014 level of just under 32 per cent. The balanced-budget requirement for the local government sector is guaranteed via central government grants, which are gradually adjusted from current levels to finance the increased cost of consumption in the local government sector.

Government consumption

To reflect the different definitions that can be used for an unchanged public sector commitment, three different scenarios are used here with different methods for projecting government consumption.

In scenario A, government consumption per user is constant over time. This means that government consumption increases only as determined by demographical developments. Volume changes then occur only where age groups with a relatively large need for welfare services grow in size. There is no increase in standards per user. This means, for example, that an 85-year-old is expected to receive the same amount of elderly care in 2060 as today. Productivity growth in the production of welfare services is taken as a decrease in personnel density. In other words, it is assumed that an unchanged level of welfare services can be provided by fewer personnel. One can imagine that technological advances will bring labour savings in routine administrative tasks, for example. The scope for personnel reductions in the direct provision of welfare services is limited, however, as long as the actual service is defined as the contact between the service provider and the user (as with classroom education or home help services).

In scenario B, it is instead human resources per user (in other words, personnel density) that are constant over time. This means that the government sector's human resources move in line with demographic changes in the need for welfare services. This may seem the most reasonable definition of an unchanged public sector commitment. However, a constant personnel density leads to the standard of welfare services gradually rising if there is any productivity growth in the production of welfare services. This increase in standards is made possible partly by increased labour productivity in the production of welfare services, and partly by government consumption containing an element of consumable goods that are associated with relatively slow price increas-

es.[20] Such an increase in standards could be viewed as an enhanced commitment rather than an unchanged commitment. Given the assumptions made for overall productivity growth in the production of welfare services, a constant personnel density gives an increase in standards of 0.7 per cent per year. In other words, government consumption in this scenario grows 0.7 per cent more quickly than is demographically motivated. This increase in standards could take the form of more efficient routine tasks in the welfare sector being replaced with increased patient or student contact, or of service providers being given more or better technical aids and so being able to add more value in their work.

Scenarios A and B can be viewed as the upper and lower bounds of what could be defined as an unchanged public sector commitment. In scenario A, there is a constant *volume* of welfare services per user, and productivity growth is taken as personnel savings. In scenario B, there are constant *human resources* per user, which results over time in higher standards due to productivity growth. Scenario C is based instead on nominal expenditure per user rising in line with GDP per capita in current prices. This means that general consumption expenditure is constant relative to GDP if the demographic structure (the shape of the population pyramid) is unchanged. The idea behind this scenario is that, over time, the general public will expect an increase in standards in public services similar to that seen elsewhere, and that taxpayers will be prepared to finance this increase in standards. As long as GDP per capita grows more quickly than wages, human resources per user will be able to rise. Given that wage growth reflects nominal productivity growth in the economy, this means that human resources per user will increase for as long as employment grows more quickly than the population. This also means that human resources per user will rise when the economic dependency ratio falls, and fall when it rises. Since human resources, and so the volume of welfare services per user, will vary over time in this scenario, the public sector commitment is unchanged only in a relatively loose sense. It can be said to be unchanged in relation to standards in the rest of the economy. If standards in the rest of the economy (GDP per capita) fall, this will also impact negatively on the standard of welfare services. As can be seen from Diagram 8 earlier in this chapter, the economic dependency ratio rises for most of the projection period, falling only for a few years around 2040. This means that human resources per user will decrease for most of the projection period in this scenario. Since there is a certain amount of productivity growth, the standard of public services will nevertheless improve to some extent. Table 1 summarises the evolution of government consumption in the three scenarios.

[20] In all of the scenarios, the distribution of costs in the production of welfare services between factors of production and consumable goods is assumed to be constant. If prices for consumable goods rise more slowly, the volume of consumable goods will rise more quickly. If the volume of consumable goods is not permitted to rise more quickly than the number of hours worked, government consumption expenditure will be completely dominated by wages in the longer term, which would be an unreasonable assumption.

Table 1 Developments in government consumption

Per cent per year

	Increase in standards	Change in personnel density
Scenario A	0	–0.7
Scenario B	0.7	0
Scenario C	0.7 + (*l* – *n*)	*l* – *n*

Note: Increase in standards denotes the rate of growth in government consumption over and above that which is demographically motivated. Personnel density denotes the number of hours worked per user of welfare services. The variables *l* and *n* represent the percentage growth in employment and the population, respectively.

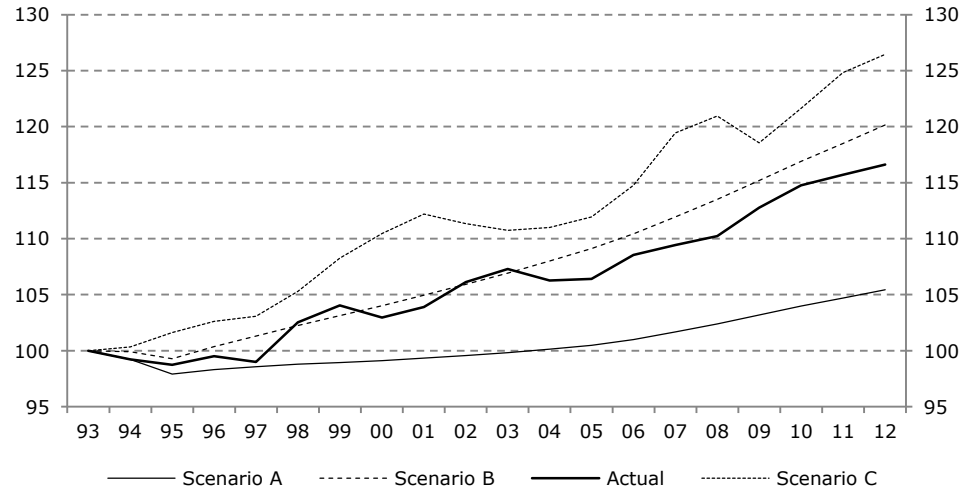
Source: NIER.

Historical data show that government consumption increased by a total of 17 per cent in fixed prices from 1994 to 2012, corresponding to an average annual growth rate of 0.8 per cent. Diagram 11 shows how consumption would have developed at the growth rates in the three scenarios described above. A purely demographic projection of consumption (in other words, with unchanged standards as in scenario A) gives an increase of just over 6 per cent during the period, or just over 0.3 per cent per year. This relatively small increase can be explained by the demographic dependency ratio declining throughout the 1990s and into the early 2000s. The 0.5 percentage point difference between the actual rate of growth and the rate given by the purely demographic projection provides an indication of the average annual increase in standards during the period.[21]

If government consumption had increased in line with scenario B (in other words, with an unchanged personnel density), the total increase would have been 20 per cent, which is somewhat higher than the actual outcome. Finally, if nominal consumption expenditure per user had moved with GDP per capita, as in scenario C, the increase would have been even greater. The fact that the assumption of a constant personnel density (corresponding to scenario B) best reflects actual developments since the mid-1990s does not necessarily mean that this assumption should be viewed as the best predictor of the future. Public finances are to a great extent politically determined and do not follow any "natural" pattern as might be assumed for some other macroeconomic variables in the longer term. As discussed above, the developments in government expenditure in the different scenarios are not intended as a forecast but as a basis for the analysis of the long-term sustainability of public finances.

[21] According to Sundén et al. (2014), government consumption expenditure in 1980–2012 grew by an average of 0.7 per cent per year over and above that which can be explained by demographic changes. See Witterblad and Fall (2014) for an analysis of developments in resources for welfare services since the year 2000.

Diagram 11 Government consumption, 1994–2012 (actual and hypothetical)
Volume, index 1993 = 100



Source: Statistics Sweden, NIER.

Other government expenditure

Social transfers paid by central government are projected on the basis of the projections for the number of people in different need groups (such as the unemployed, children and the ill) and nominal wage growth. In this way, replacement rates and payments per individual are constant relative to nominal wages, which means that the purchasing power of transfers relative to employment income is maintained. Payments from the old-age pension system are projected using the Swedish Pensions Agency's pension model, which assumes that the pension system's rules are unchanged over time and is based on the NIER's income forecast and Statistics Sweden's population forecast.

Investment in the local government sector grows in line with local government consumption, which means largely unchanged capital intensity in the production of public services. The central government sector's commitments are less dependent on demographic developments, and so central government investment follows growth in GDP.

When it comes to the general government sector's capital income and capital costs, an interest rate of 5 per cent is assumed for both liabilities and interest-bearing assets in all three subsectors (central government, local government and old-age pension system) with effect from 2024. As in the other sectors of the economy, the total return on non-interest-bearing financial assets is also assumed to be 5 per cent in the long-term projections.

3. The future public sector commitment: government expenditure

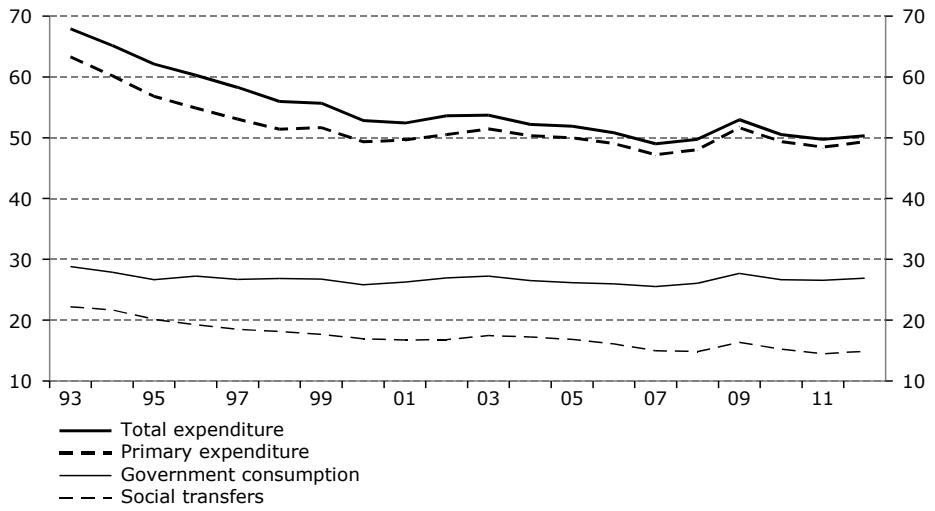
Government consumption accounts for just over half of government expenditure and has amounted to between 27 and 29 per cent of GDP over the past 20 years (see Diagram 12). Social transfers (including payments from the old-age pension system) account for about another third of expenditure. Unlike consumption, however, transfers have trended downwards since the 1990s, falling from 22 per cent of GDP in 1993 to just under 15 per cent in 2012. The remainder of government expenditure consists of investment, other types of transfers and interest costs.

The developments in government expenditure in the projections are intended to reflect movements in spending with three different definitions of an unchanged public sector commitment. These scenarios should not be viewed as forecasts of actual expenditure. In a forecast, it is reasonable to assume that any imbalances in public finances will be corrected as they arise. The best forecast can therefore be said to be that public finances will virtually always be sustainable in the longer term. Unlike a forecast, a sustainability analysis of public finances aims mainly to identify imbalances between income and expenditure that could arise in the future given the current design of the systems that determine government income and expenditure.

The starting point for this analysis is that the public sector commitment is maintained at current levels in the future. Because an unchanged commitment can be defined in several ways, three different methods have been used to project government consumption, as described in the previous chapter. Expenditure on social transfers and investment moves in the same way in all three scenarios. This chapter begins by studying how the need for government consumption will move in the future in purely demographic terms. This is then put in relation to developments in the three scenarios. Finally, the chapter examines transfers and investment.

Diagram 12 Government expenditure

Percentage of GDP



Note: Primary expenditure denotes total expenditure less interest costs.

Source: Statistics Sweden.

3.1 GOVERNMENT CONSUMPTION

The demographic need for resources

The starting point for the projections of government consumption is the demographic need for government consumption – in other words, the volume growth required to maintain the volume of public services per user, which can be equated to an unchanged standard of public services at current levels. This corresponds to the first of the three scenarios described in the previous chapter, scenario A. Scenarios B and C assume that the standard of public services will increase to some extent.

When calculating unchanged consumption per user, users can be divided into groups of various sizes. In the method used here, individuals are divided by age into five-year cohorts, so that, for example, each person aged 20–24 is assumed to consume the same volume of government consumption regardless of gender, national origin and socioeconomic background. The same principle applies to those aged 25–29, 30–34 and so on. The demographic need for public services is therefore affected by changes in the population in terms of both size and composition.

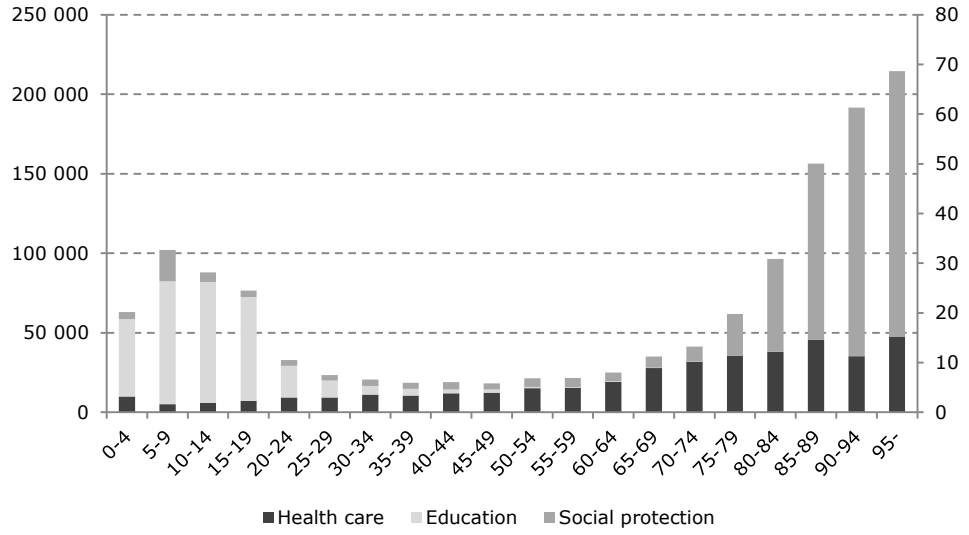
The projections differentiate between *individual* (user-specific) and *collective* government consumption. Individual consumption consists of public services that can be linked to a specific individual, such as health care and education. Collective consumption is that which cannot be linked to the individual, such as defence or law and order. Individual consumption accounts for around two-thirds of government consumption, and collective consumption for the remainder. In the projections of government consumption, collective consumption is assumed to rise in line with overall population growth and be unaffected by the age composition of the population.

The average cost per individual for individual government consumption varies considerably with age. While the average cost for those of working age was around SEK 20,000 in 2005, there was an average cost of around SEK 100,000 for children aged 5–9 and SEK 200,000 for those in their 90s. This last figure is equivalent to almost 70 per cent of GDP per capita in 2005. Individual consumption can be divided into three main areas: health, education and social protection.[22] Each of these areas accounts for around a third of individual consumption. Diagram 13 shows the size and distribution of costs between the five-year population cohorts in 2005. For children and young people, the bulk of these costs are for education – pre-school, compulsory and upper secondary. For those aged 20–24, two-thirds of the costs are for higher and other forms of education. In the other working-age cohorts, around two-thirds of the costs relate to health and the remainder to social protection. The average cost of health care rises with age and is twice as high for a person aged 70–74 as for one aged 55–59. The main age-related increase in costs, however, relates to elderly care, which makes up two-thirds of government consumption expenditure on those aged 65 and over, and around three-quarters for the over-80s.

[22] These areas correspond to categories 7, 9 and 10 in the standard Classification of the Functions of Government (COFOG). *Social protection* denotes public services in the form of children's homes, after-school child care, daytime child care, employability schemes, elderly care and mobility services. It does not include social transfers.

Diagram 13 Average cost of individual government consumption by age group

SEK per person per year and percentage of GDP per capita



Note: Figures for 2005. GDP per capita was SEK 307,000 in 2005.

Source: Statistics Sweden.

The height of the columns in Diagram 13 shows the need for resources per individual (expressed in 2005 prices). The total need for resources in the purely demographic projections is calculated by multiplying the number of individuals in each age group by their need for resources. Since the need for resources per individual in each age group is assumed to be constant over time in the purely demographic projections, the change in the total reflects only demographic changes.[23] Projecting the demographic need for welfare services in this way could lead to overestimation if health among the elderly gradually improves with the result that the need for elderly care comes later in life. Alternative assumptions for the future health of the older people could give a different picture of the future need for health and elderly care. No such analysis is performed in the present report, and so the cost structure in 2005 is used as the starting point for the analysis.[24]

The projection of government consumption on the basis of demographic needs results in average volume growth of 0.6 per cent per year in 2014–2060. This can be compared with the period 1993–2012, when consumption increased by an average of 0.8 per cent per year. The need for individual consumption rises more quickly on average (0.7 per cent) than collective consumption (0.4 per cent), because the population in the age groups with the greatest need for welfare services will grow more quickly than the population as a whole. Looking at the three categories of welfare services, the need for social protection (above all, elderly care) will grow relatively quickly, with a growth rate of 2–2.5 per cent per year in the 2020s. The need for resources in educa-

[23] The demographic projections of government consumption are produced using the NIER's DEMOG model. The model is based on cost data from 2005. Although the overall cost of welfare services has risen since then, it can be assumed that the relative shares of costs for different age groups will be stable in the short term. See Appendix 3 for a presentation of DEMOG.

[24] See Ministry of Health and Social Affairs (2010) for an analysis of costs for elderly care etc. through to 2050 based on alternative assumptions for developments in the health of older people.

tion will grow more slowly, reflecting the limited growth in the number of children and young people (see Diagram 14). From the mid-2030s, the dependency ratio stops rising for a period of 15 years, putting a general damper on the rate of increase in the demographic need for resources in the government sector. Despite the subdued growth rate, there is a continuous rise in the level of government consumption (see Diagram 15).

Diagram 14 Need for resources for individual government consumption

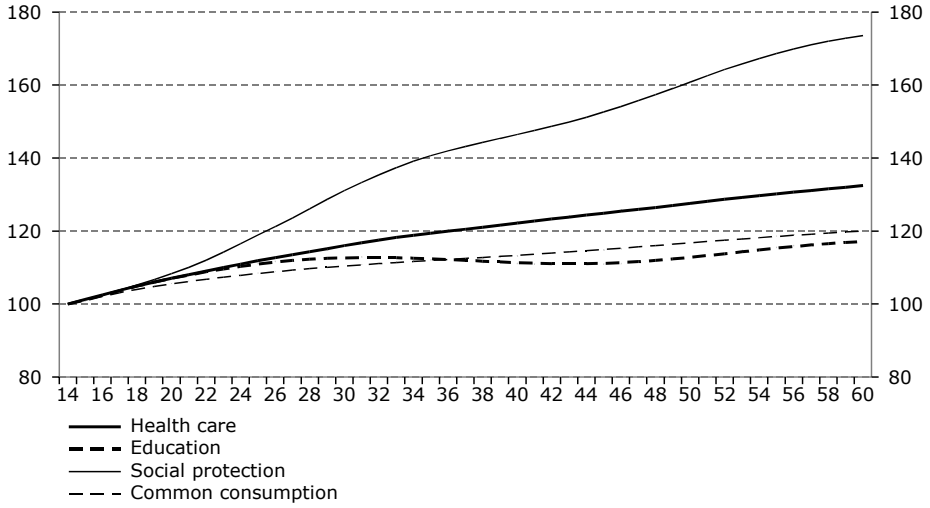
Percentage change, volume

Note: The diagram shows developments based purely on demographic needs.

Source: Statistics Sweden, NIER.

Diagram 15 Need for resources for total government consumption

Volume, index 2014 = 100

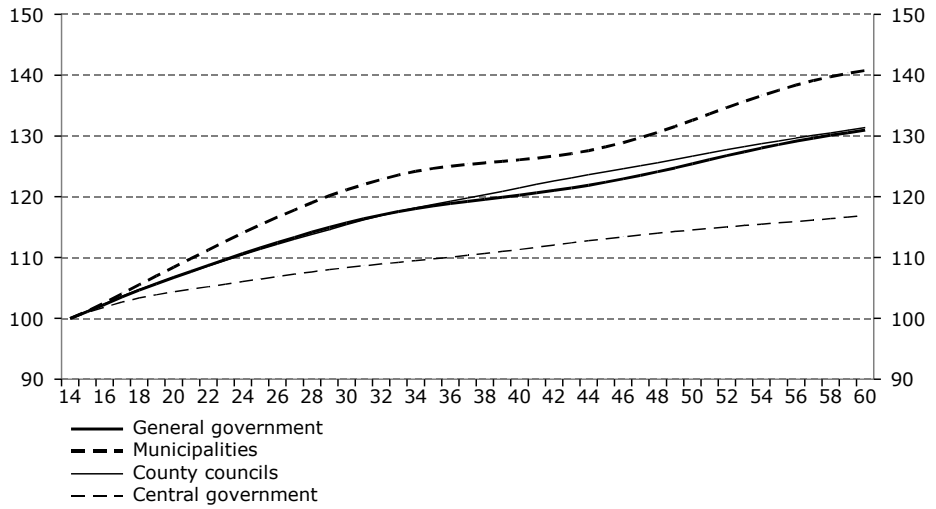


Note: The diagram shows developments based purely on demographic needs.

Source: Statistics Sweden, NIER.

Diagram 16 Need for resources by subsector

Volume, index 2014 = 100



Note: The diagram shows developments based purely on demographic needs.

Source: Statistics Sweden, NIER.

As local government accounts for the bulk of the commitment to social protection, it also sees the greatest increase in the need for resources. During the projection period, the demographic need for resources grows by a total of 40 per cent in the local government sector, compared with around 30 per cent for the general government sector (see Diagram 16).

Government consumption expenditure in the three scenarios

In scenario A, government consumption increases only in line with purely demographic needs in the long-term projections for 2019–2060.[25] In scenario B, human resources for government consumption are instead kept constant per user, and productivity growth in the production of public services falls entirely to users in the form of a gradual increase in standards. In the absence of productivity growth in the production of public services, the two scenarios would therefore be identical. Since productivity growth is expected to be 0.7 per cent per year, this is also the difference in the rate of growth between scenarios A and B, as can be seen from Diagram 17.

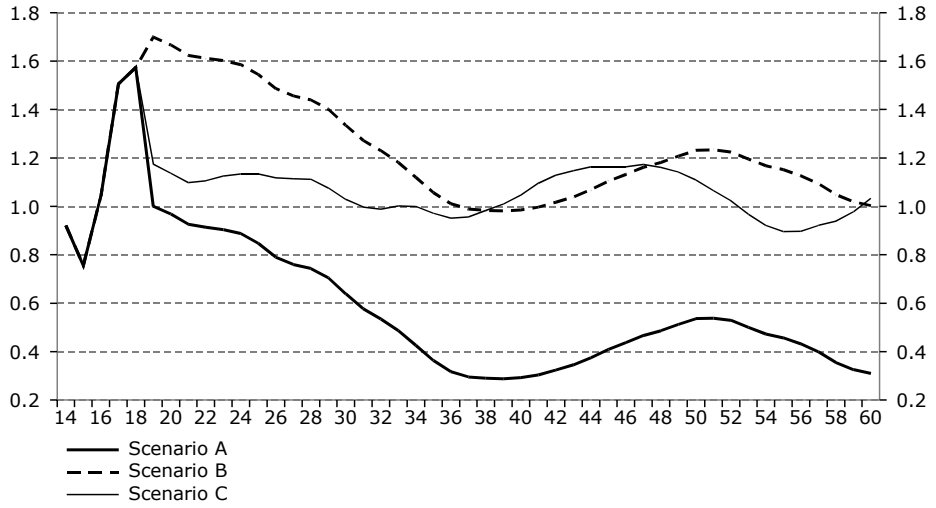
In scenario C, expenditure per user is kept constant relative to GDP per capita. As discussed in section 2.4, the difference between growth in employment and growth in the population determines how rapidly consumption will rise. Human resources per user decrease when the dependency ratio increases, and increase when it decreases. This can be seen from Diagram 17, where the rate of growth in consumption is higher in scenario C than in scenario B for parts of the 2040s when there is a temporary decline in the dependency ratio. Diagram 18 shows growth in government consumption in the three scenarios in current prices. This growth rate determines whether government consumption decreases or increases as a percentage of GDP in current prices.

[25] To take account of cyclical effects, developments in 2015–2018 follow the forecast for government consumption presented in *The Swedish Economy*, December 2013.

GDP in current prices grows by an average of 4 per cent per year in the long-term projections (see Diagram 9 in Chapter 2). Diagram 18 shows that consumption grows above 4 per cent for all or most of the period in both scenarios B and C.

Diagram 17 Government consumption (volume)

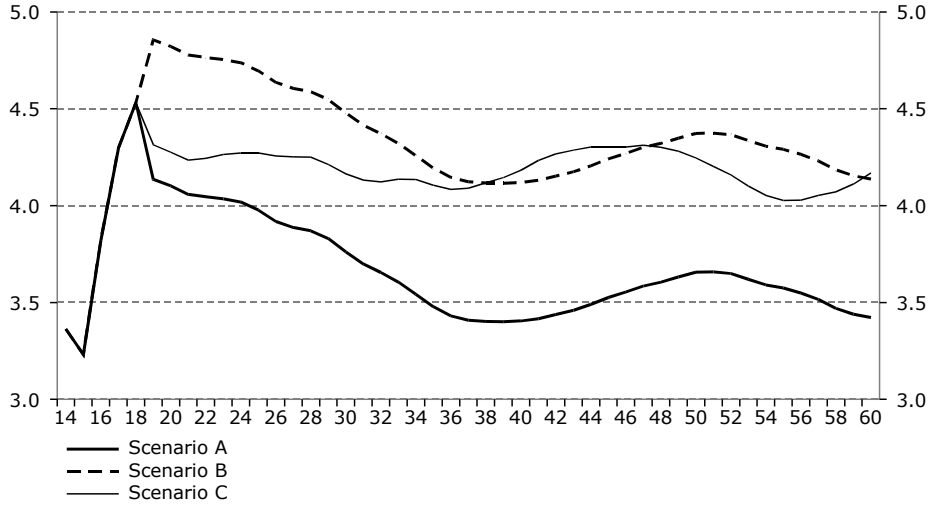
Percentage change



Source: NIER.

Diagram 18 Government consumption (current prices)

Percentage change



Source: NIER.

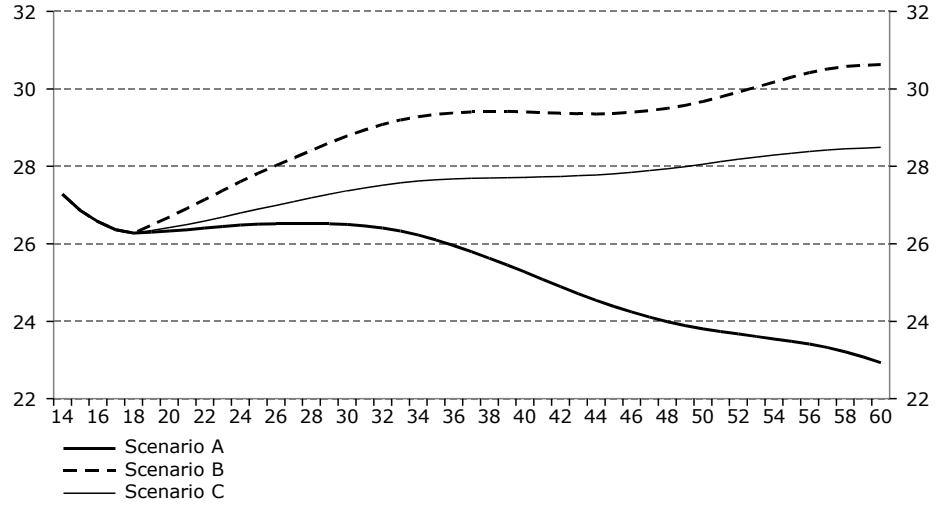
The difference between the growth rates in current prices and volume terms (fixed prices) is 3.1 per cent and gives the government consumption deflator. The deflator is that part of the growth rate in current prices that can be considered to correspond to a pure price increase. The reason why the "price" of government consumption grows more quickly than consumer prices in the economy is that a large part of costs in the production of welfare services are wage costs. For the government sector to be able to recruit skilled staff, it must offer wages that can compete with industry. Wage growth

in industry can be assumed to reflect productivity growth in the longer term. Productivity in industry, in turn, will generally grow more quickly than productivity in the government sector, due partly to the different nature of goods and services in the private and public sectors, but also to how productivity in the government sector is measured. However we choose to measure productivity in the government sector, it is reasonable to assume that wage growth in the government sector in the longer term will follow productivity growth in industry.[26] This means that the cost of an hour of teaching will tend to rise with wages in industry, whether this teaching is provided by a public or private player.

In scenario A, government consumption growth lags behind nominal GDP growth, resulting in a falling share of GDP (see Diagram 19). In scenario B, annual consumption growth is 0.7 per cent higher than in scenario A due to an unchanged personnel density, and government consumption rises continuously as a percentage of GDP in the long-term projections. The share of GDP rises from today's level of just over 27 per cent to 30.6 per cent in 2060. Only for a few years in the 2040s, when the dependency ratio temporarily declines, is government consumption constant relative to GDP in the relatively resource-intensive scenario B. Scenario C features the smallest change in government consumption in relation to GDP, which is due largely to the definition of the scenario. Since consumption expenditure per user is assumed to grow in line with GDP per capita in this scenario, government consumption's share of GDP will depend on demographic changes in the need for resources. Given the projected increase in the old-age dependency ratio, the need for resources will rise more quickly than the population throughout the projection period. This effect will contribute approximately 1 percentage point of the rise in the share of GDP over the period as a whole.

Diagram 19 Government consumption to GDP ratio

Per cent, current prices



Source: NIER.

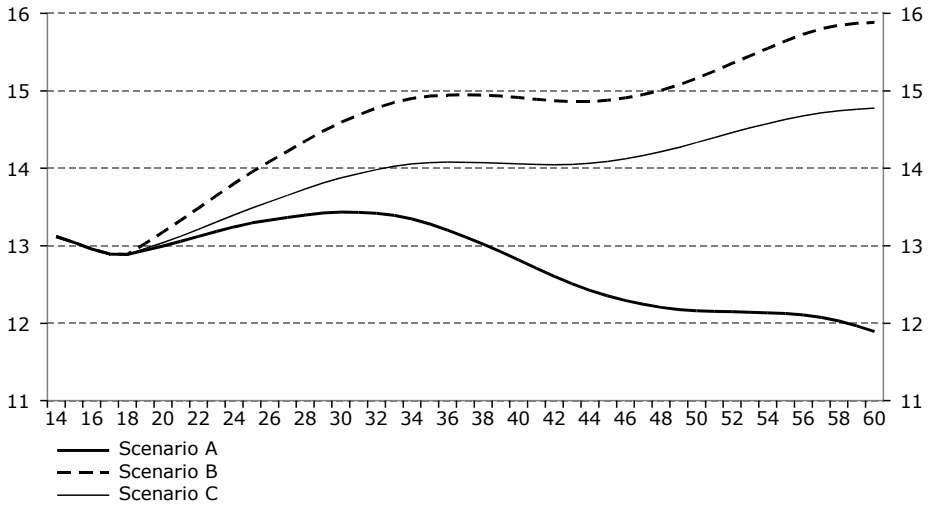
[26] The phenomenon whereby costs for public services rise in line with productivity growth in the rest of the economy is sometimes referred to as Baumol's cost disease. See Baumol (1993).

The changes in government consumption in the different scenarios are not evenly distributed between central government, municipalities and county councils. In scenario B, where consumption grows by around 3.5 percentage points relative to GDP, municipalities account for almost 3 percentage points of the increase (see Diagram 20), and county councils for most of the remainder. The reason why municipalities are behind such a large proportion of the increase in consumption is that they are responsible for elderly care, which is the welfare service that requires the greatest injection of resources to maintain an unchanged personnel density. Central government accounts for around 75 per cent of collective government consumption and is thereby affected only to a relatively limited extent by the ambition of an unchanged personnel density. This is because the need for personnel for collective consumption is assumed to increase only in line with population growth. In addition, around half of the central government sector's individual consumption relates to education, which is the category where the need for resources increases the least (and even decreases at times).

In the resource-saving scenario A, government consumption as a share of GDP falls by 4 percentage points during the period. However, municipal consumption decreases by just one percentage point, from around 13 to 12 per cent of GDP. Although productivity gains are taken as personnel savings, municipal consumption continues to grow at almost the same rate as GDP. Equivalent savings in central government and at county councils, however, would lead to a more marked decrease in the share of GDP (see Diagrams 21 and 22), because consumption grows so much more slowly than GDP in these subsectors in scenario A.

Diagram 20 Municipal consumption

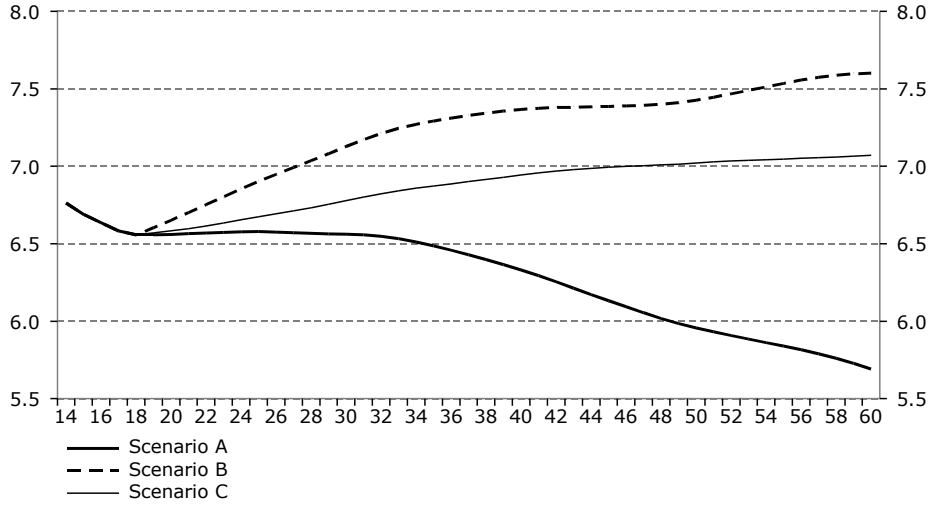
Percentage of GDP



Source: NIER.

Diagram 21 County council consumption

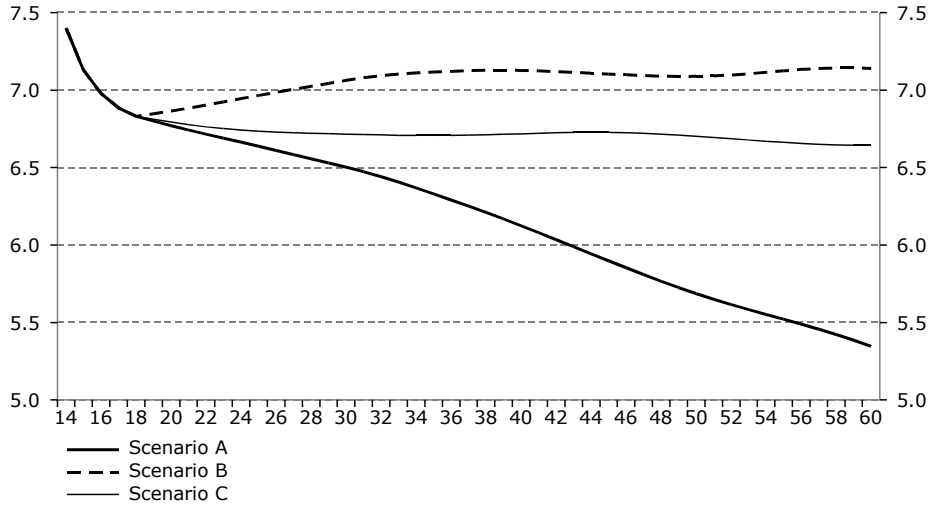
Percentage of GDP



Source: NIER.

Diagram 22 Central government consumption

Percentage of GDP



Source: NIER.

3.2 TRANSFERS

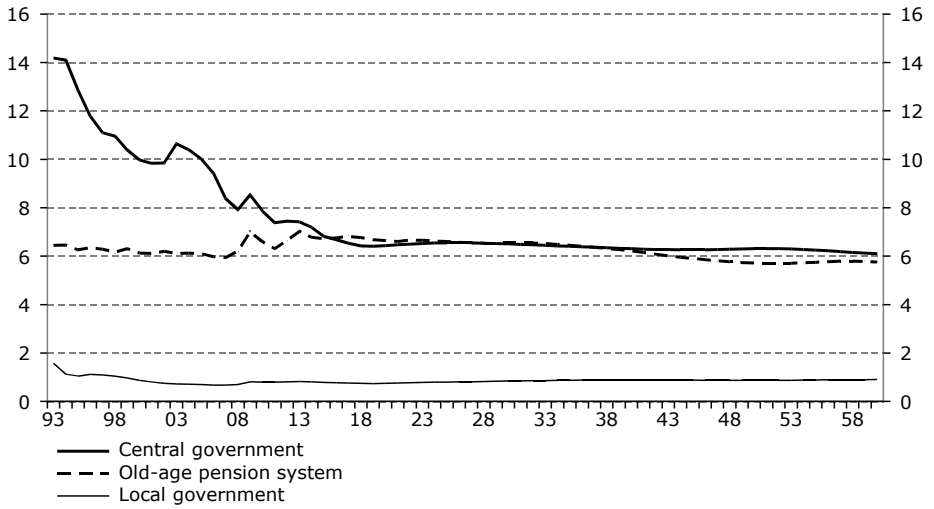
Government expenditure on transfers amounted to SEK 674 billion in 2012, or 38 per cent of total government expenditure. Almost 80 per cent of transfers went to households in the form of social transfers. The remainder went primarily to businesses, non-profit organisations and abroad. Transfers to businesses consist of various types of subsidy at both central and local government level, while transfers abroad consist mainly of EU contributions and aid to developing countries.

Social transfers to households have decreased over the past 20 years, falling from more than 22 per cent of GDP in 1993 to just under 15 per cent in 2012 (see Diagram 23). Pension payments from the old-age pension system were relatively constant at

around 6 per cent of GDP during the same period, while local government transfers to households, consisting mainly of occupational pensions and financial support, decreased from 1.5 to around 1 per cent of GDP. The largest decrease is in central government transfers, which almost halved from 14 to 7.5 per cent of GDP. This decrease is due partly to a reduction in pension payments for which central government is responsible and partly to a reduction in labour market payments.[27] Payments of sickness benefit have also halved over the past decade from 4 to 2 per cent of GDP.

Diagram 23 Social transfers to households

Percentage of GDP



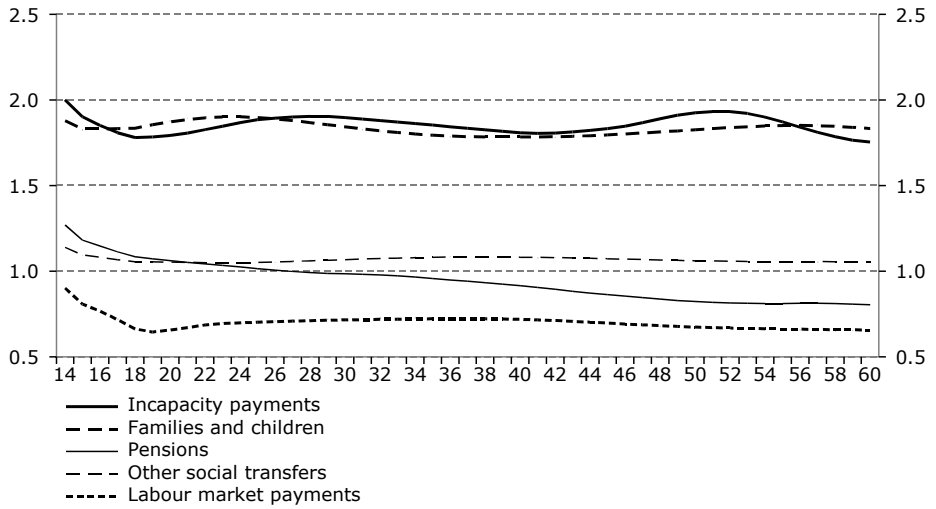
Source: Statistics Sweden, NIER.

Unlike government consumption, expenditure on transfers is assumed to move in the same way in all three scenarios. Apart from payments from the old-age pension system, expenditure on social transfers is estimated to rise in line with nominal wages and the number of recipients. This means that central government expenditure on social transfers will decrease from today's level of 7.4 per cent of GDP to just over 6 per cent in 2060, despite a rising dependency ratio and unchanged replacement rates. Around half of the decrease can be explained by a falling proportion of central government pension payments (see Diagram 24). As pensioners' average incomes increase, the number of people entitled to guaranteed pensions will decrease, slowing the rate of growth. Payments of widows' pensions will also decline over time, as this type of pension is being phased out. The remainder of the decrease is due to labour market payments and incapacity payments. Most of the fall in labour market payments is ongoing as the economy recovers from the economic slump and unemployment drops back to equilibrium levels. Incapacity payments consist mainly of temporary sick pay and the more permanent sickness and disability benefits. Sickness benefit will fall somewhat in the near future due to previous rule changes and is then assumed to mirror developments in hourly wages and the number of people of advanced working age (57–64 years).

[27] Central government pension payments comprise guaranteed pensions, survivors' pensions, widows' pensions, housing supplement for pensioners and occupational pensions for central government workers.

Diagram 24 Central government social transfers

Percentage of GDP



Source: NIER.

The old-age pension system is the single largest social transfer system and pays out around SEK 250 billion a year in pensions. The projections for these payments have been produced with the help of the Swedish Pensions Agency's model and therefore reflect the design of the pension system. Unlike in the projections of other social transfers, the assumption of unchanged purchasing power is not necessarily met for these payments. The projections are more a forecast of actual developments. In the projections, payments per person aged 65 and over grow by an average of 2.6 per cent per year. Total payments grow by an average of 3.6 per cent per year, as the population aged 65 and over will grow by an average of 1 per cent per year. The slightly lower average rate of growth relative to GDP means that payments as a share of GDP will drop from 7 per cent today to 5.7 per cent in 2060. One explanation for this decrease is that a larger share of the public pension will come from the premium pension system. Including payments from the premium pension system, payments will be largely constant relative to GDP (see Diagram 25).

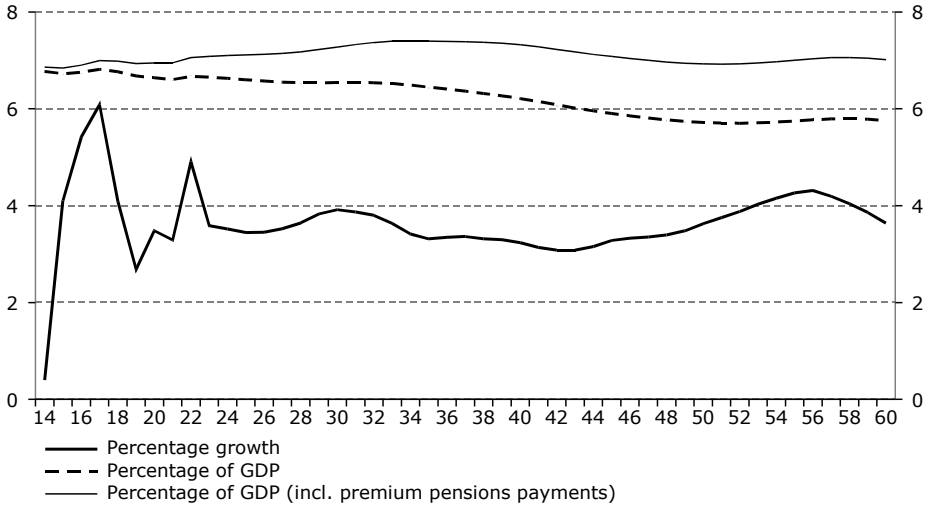
Because payments per recipient rise more slowly than nominal wages, the purchasing power of pension payments will decline relative to wages over time. Diagram 26 shows how payments per person move in relation to average wages, falling from today's level of almost 40 per cent to around 24 per cent in 2060, or 29 per cent if payments of premium pensions are included.[28] The present report does not contain any detailed calculations of payments of occupational pensions, partly because they have only a limited impact on public finances. A rough calculation, however, indicates that

[28] This ratio does not correspond to the pension system's replacement rate in the conventional sense. The replacement rate for the pension system is generally calculated as a percentage of the individual's final salary. Swedish Pensions Agency (2013) estimates the average replacement rate for a person born in 1995 and retiring in 2060 at 42 per cent in its base scenario. If retirement age is pushed back in line with the change in life expectancy, the replacement rate rises to around 55 per cent. The replacement rate for a person born in 1947 and retiring in 2012 averaged 50 per cent, according to the Pensions Agency's calculations.

if payments of occupational pensions are included in the calculation of the above ratio, there will be a decrease from 64 per cent today to around 50 per cent in 2060.[29]

Diagram 25 Payments from the old-age pension system

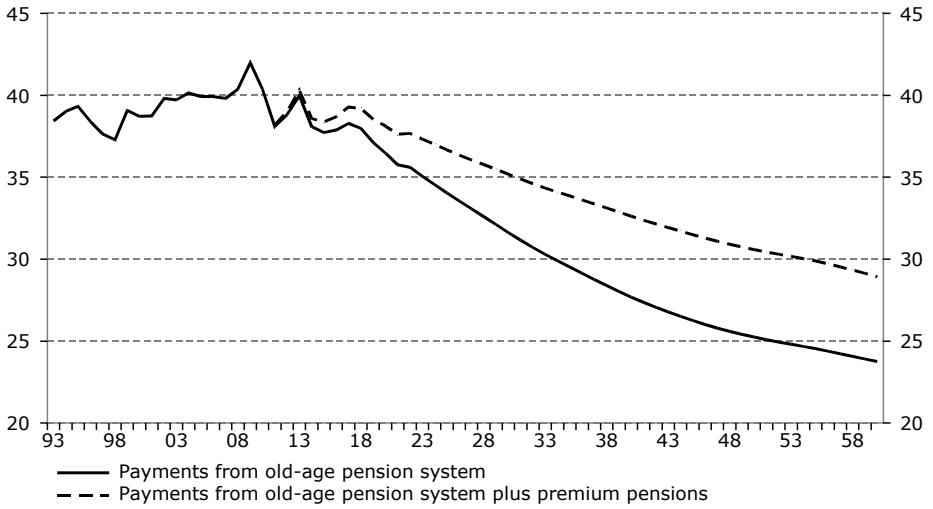
Percentage change and percentage of GDP



Source: NIER.

Diagram 26 Pension payments relative to average wages

Per cent



Note: The diagram shows expected payments per recipient in the old-age pension system in relation to the average annual wages of a person working the average number of hours per year.

Source: Statistics Sweden, NIER.

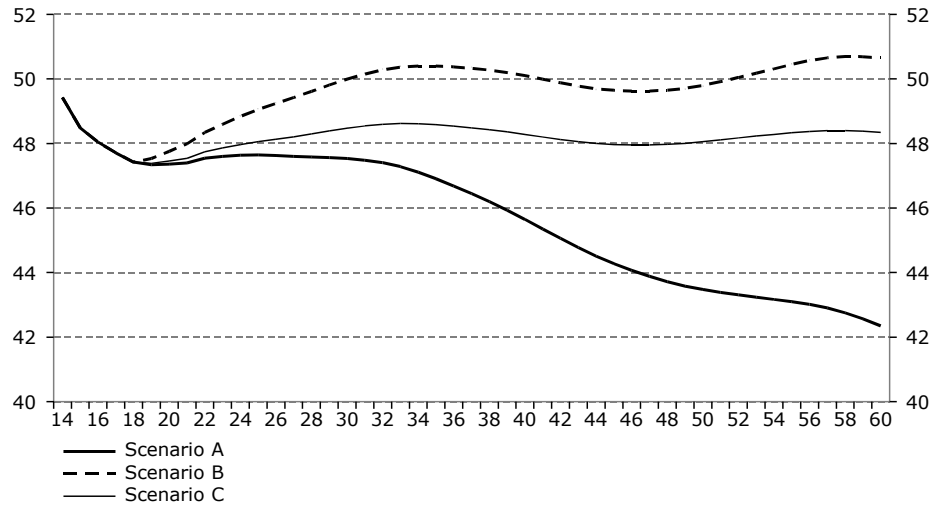
[29] Barr (2013) provides a more detailed analysis of the old-age pension system's long-term financial sustainability and adequacy.

3.3 GOVERNMENT INVESTMENT

Government investment has averaged 3.3 per cent of GDP over the past 20 years. The local government sector accounts for slightly more than half of this, and central government for the rest. The assumption underlying the long-term projections is that local government investment will rise in line with general government consumption, whereas central government investment will follow potential GDP. This assumption is motivated by the local government sector's core activity being the production of welfare services (demand for which is mainly demographically driven), whereas central government is responsible more for collective government consumption and the provision of collective utilities (demand for which can be expected to grow more in line with the economy as a whole). Central government investment expenditure is therefore constant as a share of GDP (1.4 per cent) in the projections. Local government investment moves somewhat differently in the three scenarios, with a slight increase relative to GDP in the resource-intensive scenario B and a slight decrease in scenario A.

All told, the projections of expenditure on consumption, transfers and investment indicate that primary government expenditure will remain more or less at its current share of GDP (just over 49 per cent) in scenarios B and C.[30] In the resource-saving scenario A, however, the ratio of primary expenditure to GDP falls gradually to just over 42 per cent in 2060 (see Diagram 27). In all three scenarios, expenditure on social transfers decreases by 2 percentage points of GDP, whereas expenditure on investment is practically unchanged relative to GDP. The reason why the expenditure to GDP ratios move in different directions can be explained entirely by the ratio of government consumption to GDP in the three scenarios.

Diagram 27 Primary government expenditure to GDP ratio
Percentage of GDP



Source: NIER.

[30] Primary expenditure denotes total expenditure less interest costs. Interest costs are discussed in Chapter 4.

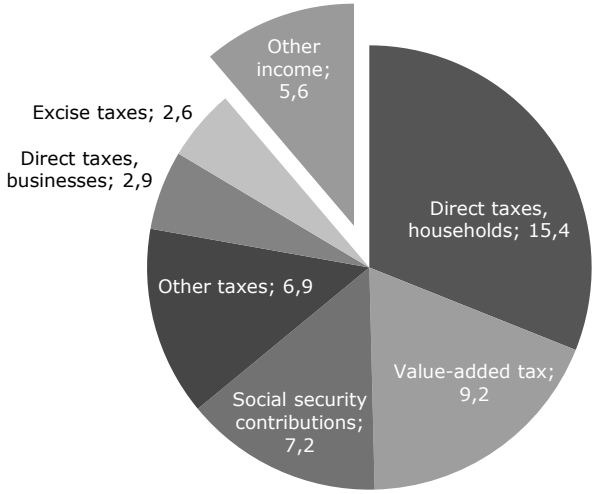
4. Financing: government income

Government income currently amounts to around 50 per cent of GDP, or SEK 1,767 billion in 2012. The bulk of this income consists of taxes and duties, which together amount to around 44 per cent of GDP. The remainder of the income reported in the national accounts consists mainly of capital income and various balancing items (see Diagram 28). The main source of tax revenue is taxes on employment, equivalent to around 15 per cent of GDP and a third of total taxes and duties. Value-added tax is the next most important at around 9 per cent of GDP, followed by social security contributions at 7 per cent.

Income as a share of GDP has fallen by around 7 percentage points from its peak in the year 2000 (see Diagram 29), due mainly to lower income taxes for households and lower social security contributions. The tax to GDP ratio fell by 4 percentage points in 2001 and 2002 alone, due mainly to the tax relief for pension contributions introduced by the Social Democrat government of the time. Since the Alliance government came into power in 2006, the tax to GDP ratio has fallen further, from just over 48 per cent to 44 per cent in 2012. The four earned-income tax credits in 2007–2010 are behind much of this decrease. The Alliance government has also lowered employers' social security contributions, cut the rate of value-added tax for restaurants, abolished wealth tax and introduced a tax relief for household services. Changes in the tax to GDP ratio in specific years can be caused not only by changes in tax rules but also by changes in the various tax bases. Despite the tax reductions of the past decade, the tax to GDP ratio in Sweden is still high by international standards. The average tax to GDP ratio in the EU was 38.8 per cent in 2011, when only Denmark had a higher ratio than Sweden. The average tax to GDP ratio in the OECD was 34.1 per cent, due to the US, Japan, South Korea and a handful of other member countries having ratios below 30 per cent.

Diagram 28 Government income

Percentage of GDP



Note: Data for 2012. Government income amounted to 49.8 per cent of GDP in 2012.

Source: Statistics Sweden.

Diagram 29 Government income

Percentage of GDP

Source: Statistics Sweden.

4.1 TAX REVENUE

The projections of government income assume that implicit tax rates are constant over time, which means that tax revenue is a constant proportion of each tax base whatever the exact design of taxation. In essence, this means that tax revenue rises in line with GDP. Since not all tax bases will grow at exactly the same rate as GDP, however, there will be some variation over time.

Although tax rates are the same in the different scenarios, the tax to GDP ratios move slightly differently in the long-term projections for 2019 onwards. In scenario B with an unchanged personnel density in the government sector, the tax to GDP ratio is 1.3 percentage points higher in 2060 than in scenario A with personnel savings (see Diagram 30). The differences in the ratios are due to differences in revenue from capital taxes. In short, this is because households increase their consumption more quickly in scenario A than in the other two scenarios. This can be seen as households buying welfare services privately that they do not consider to be adequately provided by the government sector.[31] Although household consumption moves differently in the scenarios, the differences in value-added tax revenue are limited. This behaviour does mean, however, that households have a lower savings rate, especially in scenario A relative to scenario B, and therefore accumulate less wealth. With less wealth, households will have less capital income, which means that central government, in turn, will receive less revenue from the taxation of capital income. There are no differences in wage-related tax revenue between the different scenarios, because the supply of labour and wage levels are the same in each one.

The decline in the tax to GDP ratio in the near term is due primarily to dwindling revenue from capital taxes. The rapid increase after that is due, in turn, to capital tax

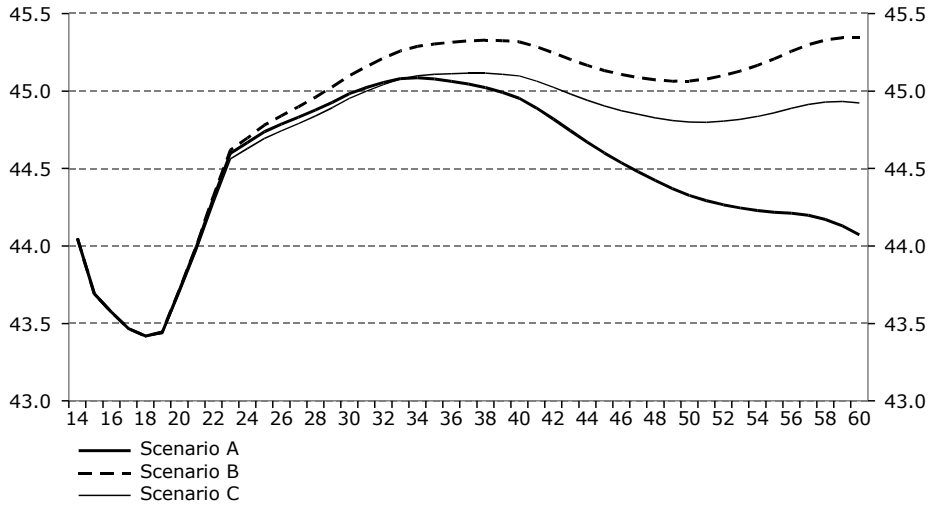
[31] The macro model KAVEL builds on the assumption that Sweden's overall (private and public) net international investment position will stabilise in the long run. Higher government net lending will therefore be offset by lower household saving. See also Appendix 3.

revenue growing instead by almost 1 percentage point of GDP. This is primarily a consequence of the assumption for returns on financial assets in the long-term projections from 2019 onwards. The increase in the tax to GDP ratio in the 2020s seen in all three scenarios is attributable mainly to higher value-added tax revenue as household consumption increases as a share of GDP.

Since movements in the tax to GDP ratio are due primarily to variation in revenue from capital taxes and to a certain extent value-added tax, it is almost exclusively the central government sector's tax to GDP ratio that is behind the variation, both over time and between the three scenarios. The tax to GDP ratio for the local government sector (municipal and county council taxation) is estimated at 16.7 per cent this year. In the absence of local government tax increases, movements in this ratio are very limited. Contributions to the old-age pension system fall somewhat in the near term as a result of total wages growing slightly more slowly than GDP, but are then expected to be constant at 5.6 per cent of GDP.

Diagram 30 Tax to GDP ratio

Percentage of GDP



Note: The tax to GDP ratio is defined as total tax revenue including social security contributions as a percentage of GDP.

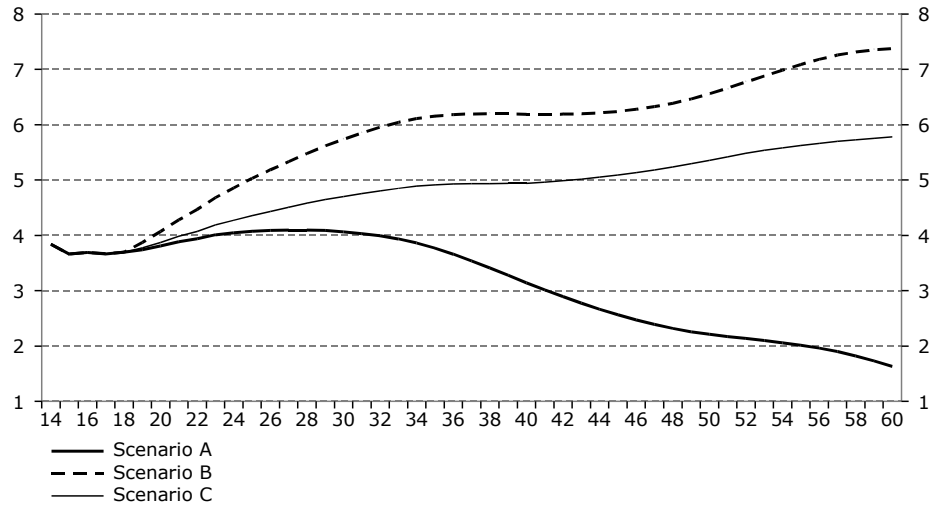
Source: NIER.

4.2 LOCAL GOVERNMENT FINANCING

Government consumption increases as a percentage of GDP in two of the three scenarios analysed. The increase is particularly marked in scenario B with an unchanged personnel density, where consumption expenditure rises by just over 3 percentage points of GDP by 2060. The local government sector – primarily the municipalities – accounts for the bulk of the increase in expenditure in these two scenarios. So that the increase in expenditure and the assumption of an unchanged local government tax rate do not lead to deficits in the local government sector, it is assumed that it will be awarded central government grants so that it can balance its budget. This means that general grants from central government will be raised gradually from today's level of 3.8 per cent of GDP (around SEK 140 billion) to 7.4 per cent in 2060 in scenario B and 5.8 per cent in scenario C (see Diagram 31). In other words, central government

grants will grow in importance as a source of funding for local government in these scenarios. In the resource-saving scenario A, however, the decrease in local government consumption relative to GDP means that central government grants will instead decrease over time to 1.6 per cent of GDP.

Diagram 31 Central government grants to local government
Percentage of GDP



Source: NIER.

FOCUS: LOCAL GOVERNMENT FINANCING

Local government taxes rise if central government grants grow more slowly

One fundamental assumption in the projections of government income in this report is that all tax rates are unchanged at current levels. It is therefore assumed that municipalities and county councils will be awarded central government grants so that they can balance their budgets. An alternative assumption for the funding of local government would be for central government grants to grow in line with the local government sector's tax base instead, and for municipalities and county councils to adjust their tax rates to the financing requirements that then emerge.[32] This assumption means that central government grants are kept largely constant relative to GDP, as the local government sector's tax base moves more or less in line with total wages in the economy. Total wages, in turn, move in line with GDP in current prices in the long-term projections.

In scenario B with an unchanged personnel density in the production of welfare services, this approach to central government grants would result in a particularly great need for tax increases. From today's average level of just under 32 per cent, local government taxation would need to be raised to 36 per cent in 2030 and 39 per cent in 2060 to keep the local government sector's budget balanced (see Diagram 32). Be-

[32] The assumption that central government grants will rise in line with the local government sector's tax base is also made by the Swedish Association of Local Authorities and Regions (2010) in a study of the local government sector's future financing requirement. See Swedish National Audit Office (2012) for a detailed analysis of the relationship between the future financing requirements of local and central government.

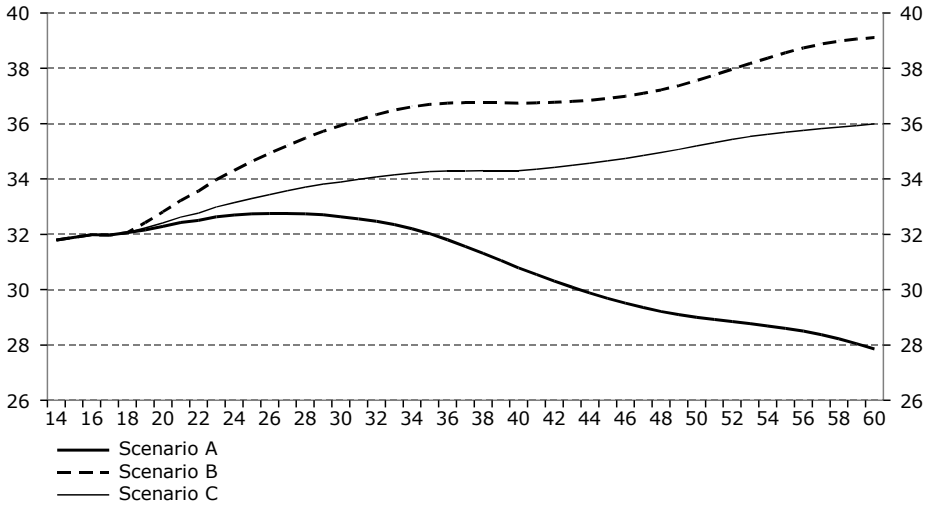
cause the local government sector's tax base is roughly half of GDP, an increase of 1 percentage point in local government taxation will increase the sector's tax revenue by around ½ per cent of GDP. The size of the tax increases required is therefore around 2 per cent of GDP by 2030 and 3.5 per cent of GDP by 2060 in the scenario with an unchanged personnel density. This corresponds to the increase in consumption expenditure at municipalities and county councils in scenario B, as can be seen from Diagrams 20 and 21.

In scenario C, the tax increase needed through to 2060 would be around 4 percentage points, which is motivated by local government consumption growing by 2 percentage points of GDP during the period. In the resource-saving scenario A, the average tax rate would need to be raised marginally over the next decade before being lowered by almost 5 percentage points through to 2060.

If the local government sector were to take on the responsibility for financing required in scenarios B and C, the central government sector's financing requirement would be reduced accordingly. Given that the general government sector has balanced finances, lower central government grants mean only an increase in the local government financing requirement and a decrease in the central government financing requirement (in other words, a reduced need for borrowing and/or taxation at central government level). The financing requirement for the general government sector is not affected by the size of central government grants to municipalities and county councils.

Diagram 32 Average local government tax rate

Per cent



Note: The diagram shows movements in the average rate of county council and municipal taxation based on the assumption that general grants from central government to local government move in line with the local government sector's tax base.

Source: NIER.

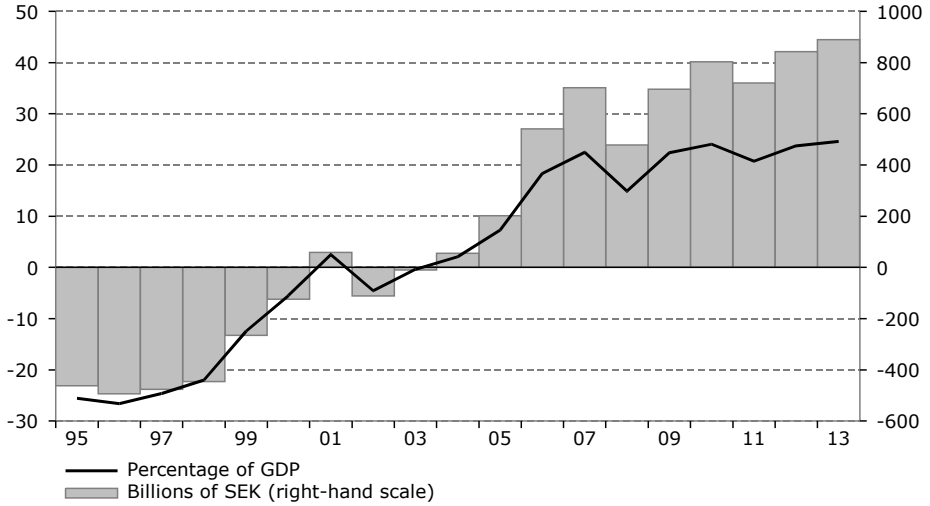
4.3 CAPITAL INCOME AND INTEREST COSTS

The government sector incurred interest costs of SEK 33 billion in 2012, of which SEK 26 billion was interest on the national debt and the remainder was interest on local government borrowings. Capital income in the form of interest, dividends and surpluses totalled SEK 73 billion. Income exceeded costs because the government sector has more financial assets than financial liabilities. Net wealth has been positive since 2004 and, according to the financial accounts, currently amounts to 24 per cent of GDP (see Diagram 33). The buffer fund in the old-age pension system is currently valued at SEK 1,050 billion in the financial accounts. The central government sector's holdings in companies and interest-bearing assets give it gross financial wealth of almost SEK 1,250 billion in the financial accounts. The local government sector also has considerable financial assets, mainly in the form of municipal corporations. As its liabilities are roughly the same size as its financial assets, however, net financial wealth in the local government sector as a whole is close to zero, although there are naturally variations between municipalities. This means that net capital income in the local government sector as a whole is very limited.

The assumption of a 5 per cent nominal interest rate in the long term and a 5 per cent total return on non-interest-bearing financial assets means that capital income in the old-age pension system holds at around 1 per cent of GDP in the long-term projections. The greatest variation in capital income, both over time and between the scenarios, is in the central government sector. In the projections, central government's financial assets are the same size as its liabilities at the beginning of the 2020s. After that, developments in the sector's net financial position depend on the assumptions made for expenditure. As shown in the following section, the savings in scenario A lead to considerable net lending in the central government sector, which means that financial wealth gradually grows and generates more and more capital income. The reverse occurs in the more resource-intensive scenario B, while in scenario C there is a moderate increase in wealth in 2060. For the general government sector, this means net capital income rising gradually to almost 7 per cent of GDP in scenario A, negative net capital income equivalent to 2 per cent of GDP in scenario B, and net capital income of just over 1 per cent in scenario C (see Diagram 34). The big differences in net capital income between the scenarios mean that net lending will vary between the scenarios not only as a result of different expenditure levels but also as a result of differences in net capital income.

Diagram 33 Government net financial wealth

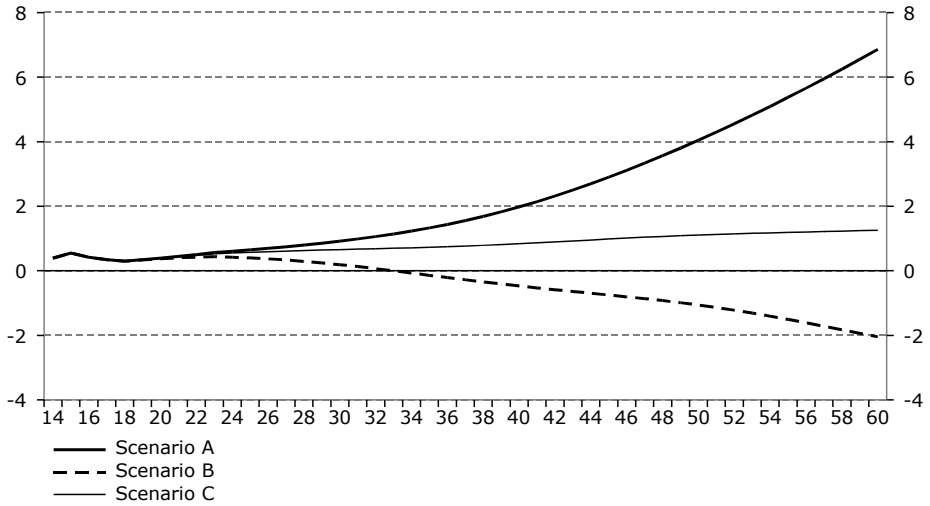
Percentage of GDP and billions of SEK



Source: Statistics Sweden.

Diagram 34 Government net capital income

Percentage of GDP



Source: NIER.

5. Net lending and net financial position

5.1 GENERAL GOVERNMENT NET LENDING

Given the developments in primary expenditure, primary income and capital income described above, we can now calculate net lending in the general government sector and its subsectors in the different scenarios.

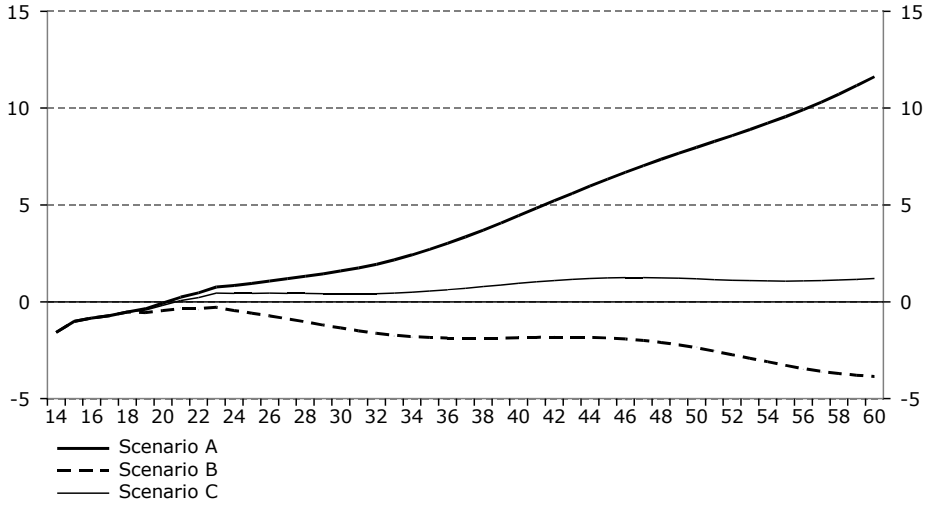
General government net lending will be negative or neutral through to at least 2020 in all three scenarios. This differs from the forecast published by the NIER in *The Swedish Economy*, December 2013, where net lending was forecast to be neutral as early as 2016. The difference between the projections in the present report and the forecast last December is that this report does not assume any tax increases (see section 2.3). In the NIER's December 2013 forecast, tax increases of around SEK 90 billion are made in 2016–2018 to meet the surplus target for net lending of 1 per cent of GDP over a business cycle. The surplus target is not taken into account in the projections of public finances in the present report.

From 2019 onwards, net lending moves very differently in the three scenarios, as can be seen from Diagram 35. Scenario A produces net lending of 5 per cent of GDP in 2040, rising gradually to almost 12 per cent in 2060. In scenario B, net lending falls instead to a negative 4 per cent in 2060, while scenario C has net lending of around 1 per cent during the latter part of the projection period. The levels of net lending in scenarios A and B are driven to a significant extent by the capital income and costs examined in the previous chapter. The size of these capital items is determined largely by the assumptions made for interest rates, returns and values of financial assets. These assumptions have a particular impact on projections as far forward as 2060. There are therefore grounds to look at primary net lending, defined as net lending excluding these capital items (see Diagram 36). In scenario A, primary net lending rises to 2 per cent of GDP at the end of the 2030s and almost 5 per cent in 2060, whereas in scenario B there is a primary deficit of between 1 and 2 per cent of GDP for most of the period.

Since the local government sector is assumed to be compensated with central government grants for the increases in its expenditure, net lending in this sector will be largely neutral throughout the period in all three scenarios. The old-age pension system is not affected by the different consumption trajectories in the three scenarios and therefore also sees the same movements in net lending in all the scenarios. In other words, the differences in primary and total net lending in the general government sector between the three scenarios arise entirely in the central government sector. The following therefore looks first at central government finances in the different scenarios before turning to the finances of the local government sector and the old-age pension system.

Diagram 35 General government net lending

Percentage of GDP

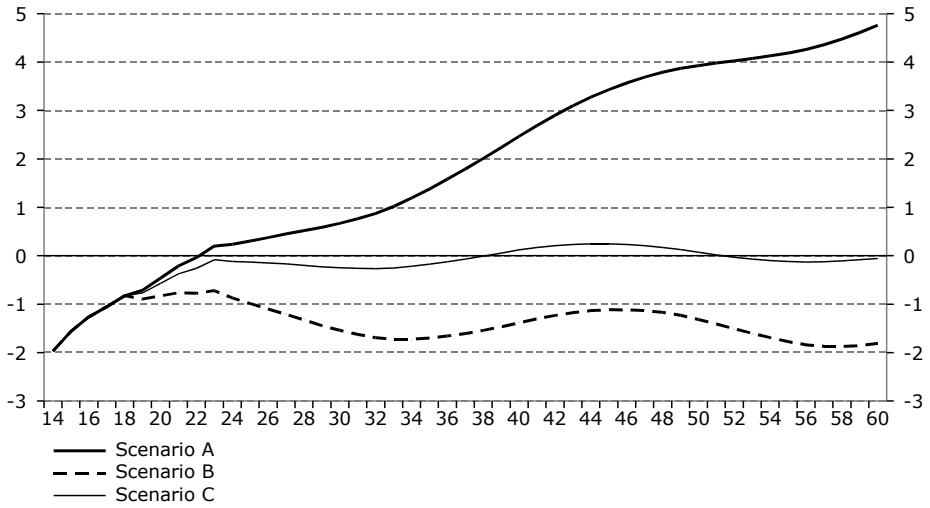


Note: Net lending is the sum of primary net lending (Diagram 36) and net capital income (Diagram 34).

Source: NIER.

Diagram 36 General government primary net lending

Percentage of GDP



Note: Primary net lending is net lending (Diagram 35) excluding net capital income (Diagram 34).

Source: NIER.

5.2 CENTRAL GOVERNMENT NET LENDING

The clear differences in central government net lending between the three scenarios are related to how surpluses and deficits in primary net lending accumulate over time. These surpluses and deficits lead, in turn, to growing interest income/expenditure. Central government primary net lending (Diagram 37) is very similar to general government primary net lending (Diagram 36), because primary net lending is largely neutral in both the local government sector and the old-age pension system throughout the projection period.

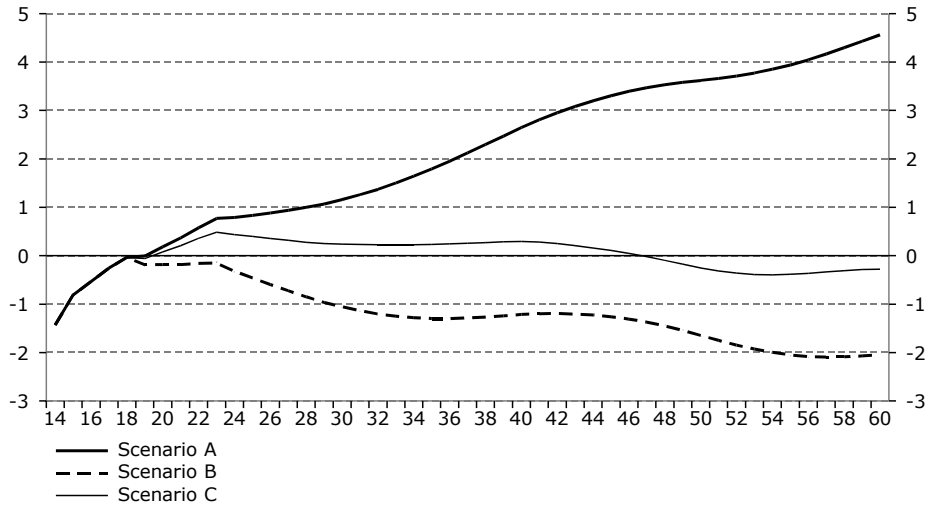
The reason why primary net lending grows in scenario A is that tax revenue is more or less constant as a share of GDP, whereas primary expenditure gradually decreases. This decrease is due to the resource savings made as a result of productivity growth in the production of welfare services. Consumption falls continuously in the central government sector, and central government grants gradually decline (see Diagrams 22 and 31). As a result of the persistent positive primary net lending in scenario A, there is an accumulation of financial assets which gradually generate more and more capital income (see Diagram 34). Total net lending grows relatively quickly as a result (see Diagram 38).

In scenario B, the central government sector instead builds up a growing deficit. Primary net lending is negative throughout the projection period and falls in line with the rising dependency ratio through to the mid-2030s. A further fall in primary net lending can be seen towards the end of the period, when the dependency ratio again begins to rise slightly. With constant deficits in primary net lending, central government net debt increases, pushing up interest costs and contributing to increasingly negative net capital income.

Scenario C is more balanced. Primary income and expenditure move very similarly, because both tax revenue and consumption expenditure grow closely in line with GDP. Because there are no significant surpluses or deficits in this scenario, there is no build-up of financial assets or liabilities.

Diagram 37 Central government primary net lending

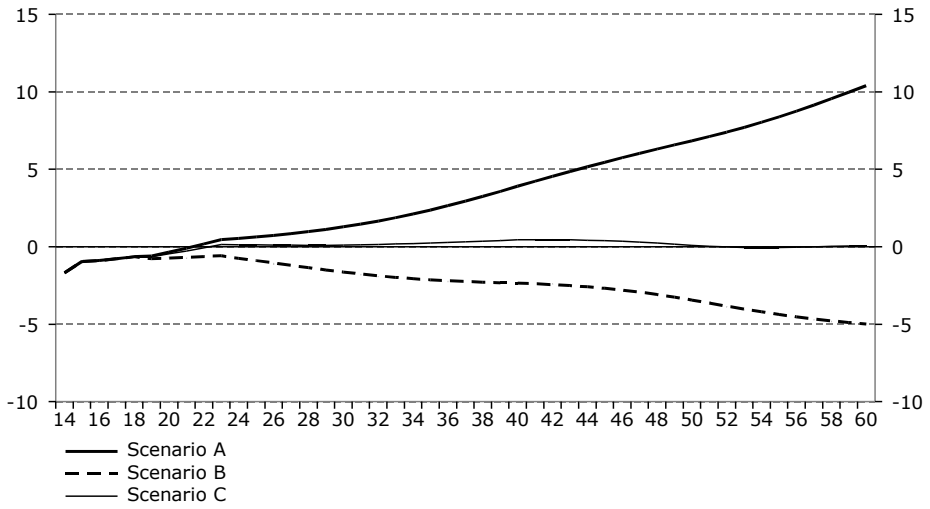
Percentage of GDP



Source: NIER.

Diagram 38 Central government net lending

Percentage of GDP



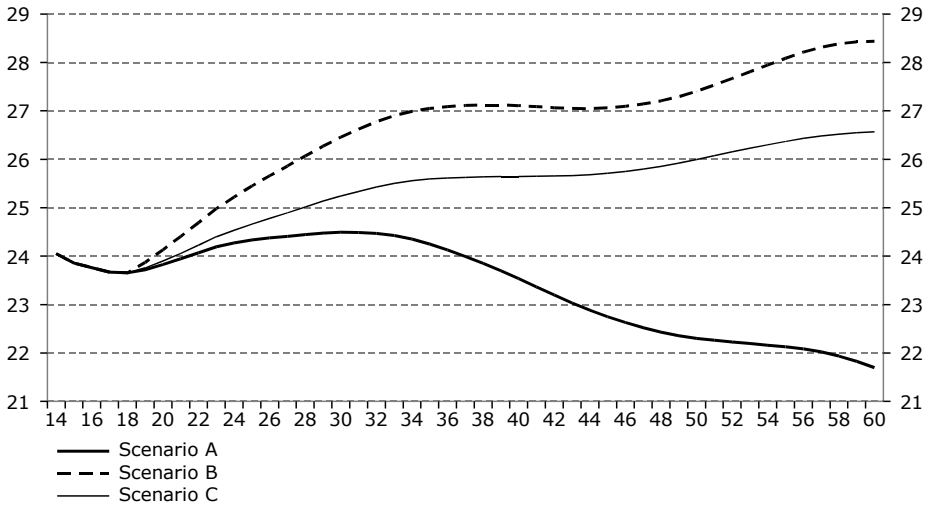
Source: NIER.

5.3 NET LENDING IN THE LOCAL GOVERNMENT SECTOR AND THE OLD-AGE PENSION SYSTEM

Total and primary net lending in the local government sector are close to neutral throughout the projection period. Financing requirements arising as a result of increased local government consumption combined with unchanged local government tax rates are fully covered by increases in central government grants. Local government income therefore follows expenditure in all three scenarios, albeit at different levels (see Diagram 39).

Diagram 39 Local government expenditure to GDP ratio

Percentage of GDP



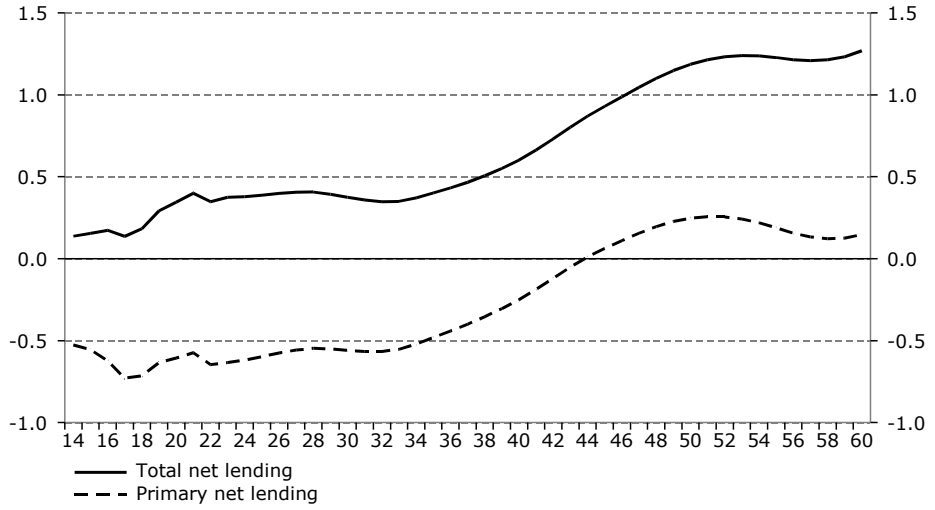
Note: The local government sector's income is expected to be kept in line with expenditure in all three scenarios through central government grants. Net lending in the sector is therefore close to neutral in all three scenarios.

Source: NIER.

Net lending in the old-age pension system is positive throughout the projection period and is around 0.4 per cent of GDP through to the mid-2030s before climbing gradually to around 1.2 per cent of GDP in the 2050s. The increase is due to primary expenditure rising more slowly than GDP after the mid-2030s. Net capital income in the old-age pension system holds at around 1 per cent of GDP throughout the period.

In summary, the three scenarios present a relatively disparate picture of how public finances will move under different assumptions for government consumption. Scenarios A and B, which can be seen as the outer bounds of what could be defined as an unchanged public sector commitment, create a ceiling and a floor for how expenditure – and so net lending – will develop. Scenario C has a degree of inbuilt sustainability, because increases in expenditure are related to GDP growth. Unfavourable demographic changes may nevertheless lead to deficits even in scenario C.

Diagram 40 Net lending in the old-age pension system
Percentage of GDP



Source: NIER.

5.4 FINANCIAL ASSETS AND LIABILITIES

Movements in the government sector's net financial wealth, or the difference between financial assets and liabilities, depend on net lending and changes in asset values. Positive net lending can be used to repay liabilities or invest in assets that produce a return. Changes in value occur mainly in non-interest-bearing assets in the form of shares and fund units, and can be both positive and negative. For example, the value of the buffer fund in the old-age pension system fell by SEK 160 billion in the early stages of the financial crisis in 2007–2008 due to the collapse in share prices. Since then, however, the value of the fund has grown by an average of 7 per cent per year as share prices have rallied.

Since net lending performs so differently in the different scenarios, net financial wealth also moves very differently (see Diagram 41). How quickly financial assets grow is, in turn, largely dependent on the assumptions for future interest rates and returns. Since central government is the only subsector where net lending moves differently in the different scenarios, it is also the only subsector where net financial

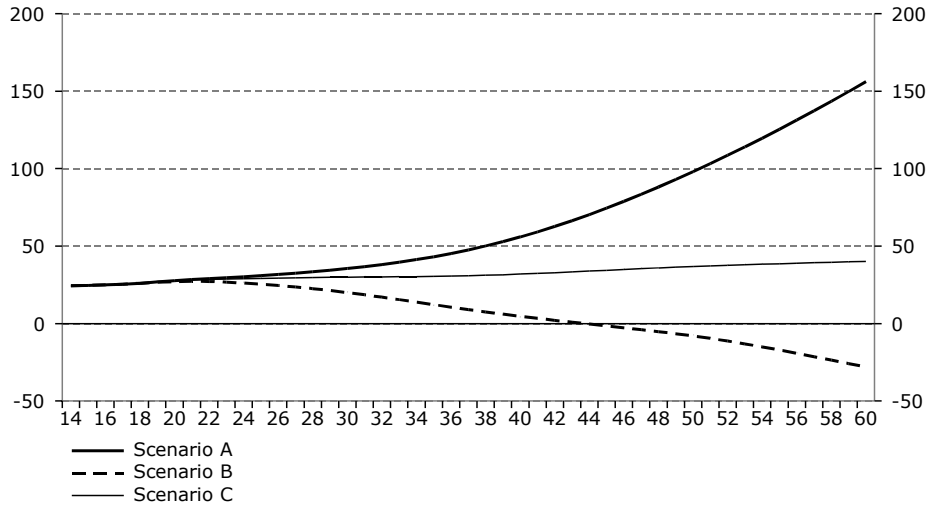
wealth varies between the scenarios. While net financial assets in the central government sector grow to as much as 120 per cent of GDP by 2060 in scenario A, net wealth turns negative in scenario B to produce net liabilities of around 60 per cent of GDP. In scenario C, central government net wealth grows to around 10 per cent of GDP, which is due mainly to increases in the value of financial assets rather than surpluses in net lending. Net lending is too low in scenario C for assets to be accumulated. Maastricht debt, or general government gross debt, doubles from today's levels of around 40 per cent of GDP to around 80 per cent in the relatively resource-intensive scenario B. In the resource-saving scenario A, Maastricht debt falls relatively quickly and is repaid during the 2040s. In scenario C, it falls more gradually and is halved by 2060 (see Diagram 42). Maastricht debt falls to around 25 per cent of GDP as early as 2040 in this scenario, even though net lending during the period is constantly below the surplus target of 1 per cent.

The local government sector's net wealth is close to zero during the projection period, because it is close to zero now and the sector is not assumed to have any deficits or surpluses in its finances.

Finally, the old-age pension system's buffer fund falls in value relative to GDP (even though it continues to grow in absolute terms) through to the mid-2030s (see Diagram 43). Only after that does net lending in the old-age pension system begin to rise, with the result that the buffer fund also grows relative to GDP.

Diagram 41 Government net financial wealth

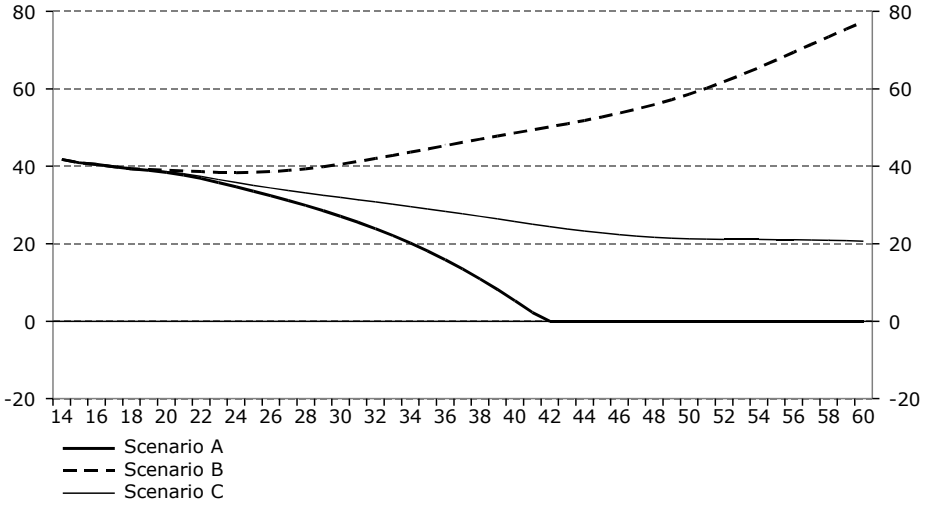
Percentage of GDP



Source: NIER.

Diagram 42 Maastricht debt

Percentage of GDP

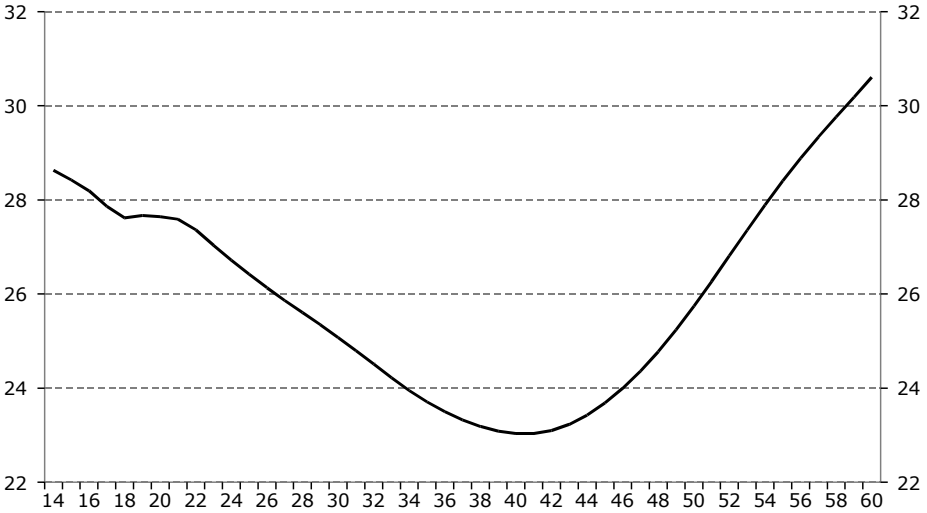


Note: Maastricht debt is defined as the general government sector's consolidated gross debt.

Source: NIER.

Diagram 43 The old-age pension system's net financial wealth

Percentage of GDP



Source: NIER.

6. Sustainability indicators for public finances

To sum up developments in public finances in an indicator for the degree of long-term sustainability, both the Swedish government and the European Commission use the so-called S2 indicator. As discussed in the introductory chapter, the long-term sustainability of public finances can be defined in different ways. The definition of sustainability underlying the S2 indicator is that the intertemporal budget constraint must be satisfied. This means that all future flows of expenditure must be covered by corresponding flows of income, such that government debt stabilises at a given level in the long term. The S2 indicator shows how much permanent fiscal tightening is required (or how much fiscal loosening is permitted) if the intertemporal budget constraint is to be satisfied. The indicator is expressed as a percentage of GDP, so that, for example, an S2 value of 1 means that permanent fiscal tightening of 1 per cent of GDP is needed to satisfy the budget constraint.

The S2 indicator is complemented by the so-called S1 indicator. The S1 indicator refers to a limited time horizon and describes how much fiscal tightening is needed per year to achieve a given debt to GDP ratio in a given year. The European Commission reports the S1 indicator in its sustainability report to illustrate the fiscal action that member states need to take to bring their debt to GDP ratio (Maastricht debt) into line with the Growth and Stability Pact's limit of 60 per cent. The final year used in these calculations is 2030. The Swedish government also reports an S1 indicator and uses the same debt target and final year as the European Commission. To aid comparison, the S1 indicator in the present report is calculated with the same debt target and final year as well. This report also presents an S1 indicator based on the constraint that the government sector's net financial position is the same in 2030 as today.

The following presents calculations of the S2 and S1 indicators based on the scenarios described in the previous chapters. Calculations are also presented for an additional scenario D, where costs are based on unchanged rules through to 2018 and then follow GDP per capita in the same way as in scenario C. Appendix 2 contains detailed presentations and derivations of the two indicators.

6.1 THE S2 INDICATOR

The S2 indicator is calculated with an infinite horizon. After the end of the projection period in 2060, simplified assumptions are made for developments in public finances. Primary net lending is assumed quite simply to remain constant at 2060 levels and is not overlaid with any demographic projections. The S2 indicator must, of course, be interpreted with care, given the high degree of uncertainty inevitably associated with the long horizon.

The S2 indicators for the various scenarios are presented in Table 2. As a result of the high primary net lending in scenario A, the S2 indicator is a negative 3.9. This means that, in principle, net lending can fall by 3.9 per cent in this scenario without threatening the sustainability of public finances. In scenario B, the indicator is 1.5, which means that public finances need to be permanently strengthened by 1.5 per cent of GDP per year for the intertemporal budget constraint to be satisfied. The positive indicator in this scenario is due to the deficits that result from the cost increases brought on by an unchanged personnel density in the government sector. Scenario C,

which features largely neutral net lending throughout the projection period, has an S2 indicator close to zero, which means that public finances are in long-term balance.

The S2 indicator can be subdivided into three component terms to shed light on what the estimated requirement for fiscal tightening relates to: (1) initial interest costs, (2) deficits generated during the forecast horizon and (3) deficits expected beyond the forecast horizon.[33] These component terms are also presented in Table 2 and illustrate the sensitivity of the calculations to the assumptions made for after the end of the projection period in 2060. The positive net capital income at the outset of the calculations helps make the first term negative (–0.2 per cent) in all scenarios. The contribution to the S2 indicator from primary net lending during the projection period is between –0.5 and 0.4 in the different scenarios. The assumption for net lending after 2060 has the greatest impact on the indicator, however. If primary net lending is assumed to be neutral (zero) after 2060, the S2 indicators will be significantly lower in absolute terms in both scenarios A and B.

Alternative scenario with unchanged rules in 2015–2018

A fourth scenario D is based on an assumption of unchanged rules through to 2018. This means that the increases in expenditure required in 2015–2018 to maintain an unchanged public sector commitment are eliminated. Since unchanged rules through to 2018 imply lower government expenditure on consumption in particular, the expenditure to GDP ratio will initially fall somewhat further in this alternative scenario than in the main scenarios. After 2018, expenditure rises in line with GDP per capita, adjusted for demographic needs, in the same way as in scenario C. Assuming unchanged rules in the short-term projections aids comparison with the sustainability calculations presented by the government in its spring fiscal policy bill.

In this scenario, government expenditure will be permanently somewhat lower than in the otherwise identical scenario C. This also means that primary net lending is somewhat higher than in scenario C. The S2 indicator is therefore –0.7 in scenario D, compared with –0.1 in scenario C. Since the higher primary net lending is assumed to be permanent and so prevail beyond 2060, this assumption impacts on both terms 2 and 3 in Table 2.

S2 indicator with tax base effects (S2+)

The conventional S2 calculation is a static calculation. The tightening indicated by a positive S2 value is assumed not to affect households' consumption behaviour, the supply of labour or the size of the tax bases. If fiscal tightening has a negative effect on the tax bases, it is likely that the S2 indicator will underestimate the degree of tightening required to achieve sustainability in public finances. Similarly, one can argue, at least theoretically, that a negative S2 value will underestimate the tax cuts that can be made, given that these impact positively on the tax bases.

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[33] When the component terms are negative (as in these calculations), the meanings of these terms are as follows: (1) deterioration in net lending made possible by net capital income, (2) deterioration in net lending made possible by primary surpluses during the forecast horizon, and (3) deterioration in net lending made possible by surpluses beyond the forecast horizon (after 2060). See Appendix 2 for a description of the decomposition of the S2 indicator.

Model simulations have been performed for each scenario to identify the permanent action (increase or decrease in taxation) needed to satisfy the intertemporal budget constraint and so give an S2 value of zero. In this simulation, account is taken of changes in household wealth according to the following principle. When taxes are lowered, household wealth is impacted positively. This increases households' capital income, which means that the tax base for capital income taxes grows. A tax cut equivalent to 1 per cent of GDP will not therefore reduce net lending by 1 per cent but by a somewhat smaller amount.[34]

This simulation, which leaves all of the other assumptions unchanged, shows that household taxes in scenario A can be permanently lowered by 5.5 per cent of GDP and primary net lending will still be neutral in 2060. This can be compared with an S2 value of –3.9 using the conventional method. Similarly, the simulation for scenario B shows a need for tax increases of 2 per cent rather than 1.5 per cent once the effects on the tax bases are taken into account. In the balanced scenario C, the simulation does not deviate from the static S2 estimate. The principle for these simulations is illustrated in Diagram 44. The diagram shows developments in primary net lending in scenario B both using the standard calculation method and applying the increase in taxation given by the simulation (S2+). As a result of the tax increase of 2 per cent of GDP, primary net lending is just over 1 per cent in the near term before falling towards zero as the dependency ratio rises. This modest primary surplus is enough for net lending to grow over time and for gross debt to be repaid by the early 2040s.

Table 2 The S2 indicator

Percentage of GDP

	Scenario A	Scenario B	Scenario C	Alternative scenario D
Interest costs on net liabilities (1)	–0.2	–0.2	–0.2	–0.2
Effect of primary deficits through to 2060 (2)	–0.5	0.4	0.1	–0.1
Effect of primary deficits after 2060 (3)	–3.2	1.2	0.0	–0.4
S2 = (1) + (2) + (3)	**–3.9**	**1.5**	**–0.1**	**–0.7**
S2+	–5.5	2.0	–0.1	–1.0

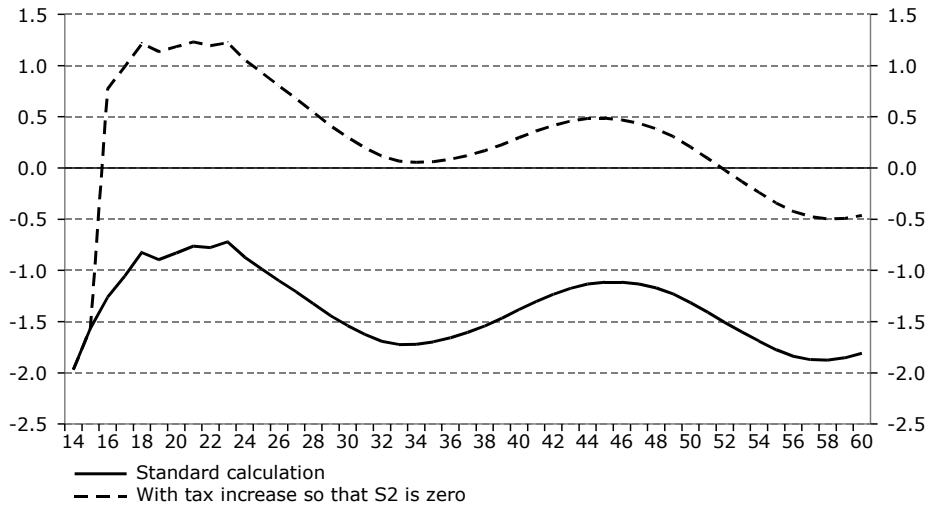
Note: See Appendix 2 for a more detailed presentation of the S2 indicator. S2+ is an indicator that has been calculated using a model simulation and shows the percentage improvement in primary net lending needed to produce an S2 value of zero with 2060 as the projection horizon.

Source: NIER.

[34] Effects on the labour supply are not taken into account in the simulations. Tax cuts tend to stimulate the labour supply and, thereby, total wages. If these behavioural effects were taken into account in the simulations, S2+ would deviate even further from the conventional S2 indicator in each scenario.

Diagram 44 Primary net lending, scenario B

Percentage of GDP



Source: NIER.

6.2 THE S1 INDICATOR

Like the S2 indicator, the S1 indicator expresses the fiscal tightening (as a percentage of GDP) required to achieve a given target. For the S1 indicator, this target is a given ratio of debt to GDP in a given final year. The European Commission uses a ratio of 60 per cent and 2030 as the final year to illustrate the tightening that many of its highly indebted member states must make to meet the requirements of the Stability and Growth Pact. Sweden's Maastricht debt is currently equivalent to around 40 per cent of GDP and so well below the ceiling established in the pact. An alternative condition used here is that the government sector's net financial wealth should be at the same level in 2030 as it is today, or 24 per cent of GDP.

Table 3 presents the S1 indicators for the four different scenarios. The S1 indicator for Maastricht debt has two components: the fiscal loosening made possible by the current margin to the debt ceiling, and the loosening made possible by any surpluses in primary net lending during the period through to the final year (2030). Since Maastricht debt is currently just over 40 per cent of GDP, there is a margin of almost 20 per cent to the debt ceiling.

Diagram 45 shows how net lending develops in the four scenarios through to 2030. In scenario A, government net lending is 1.5 per cent in 2030. Theoretically, this surplus and the margin to the debt ceiling together permit fiscal loosening of 2.5 per cent of GDP through to 2030. In the relatively resource-intensive scenario B, on the other hand, net lending is negative throughout the period to 2030. This leads to a borrowing requirement and growing debt, gradually eroding the margin to the debt ceiling. The remaining space permits fiscal loosening of 1.5 per cent of GDP through to 2030 in these calculations. While scenario C permits fiscal loosening of 2.1 per cent, scenario D allows loosening of no less than 2.9 per cent. This is because net lending in scenario D is positive as early as 2018 and then gradually rises to more than 1.5 per cent in 2030 (see also Appendix 1).

Table 3 The S1 indicator

Percentage of GDP

	60 per cent Maastricht debt	Unchanged net wealth
Scenario A, personnel savings	–2.5	–0.7
Scenario B, unchanged personnel density	–1.5	0.2
Scenario C, expenditure moves with GDP per capita	–2.1	–0.3
Scenario D, as C but with unchanged rules in 2015–2018	–2.9	–1.2

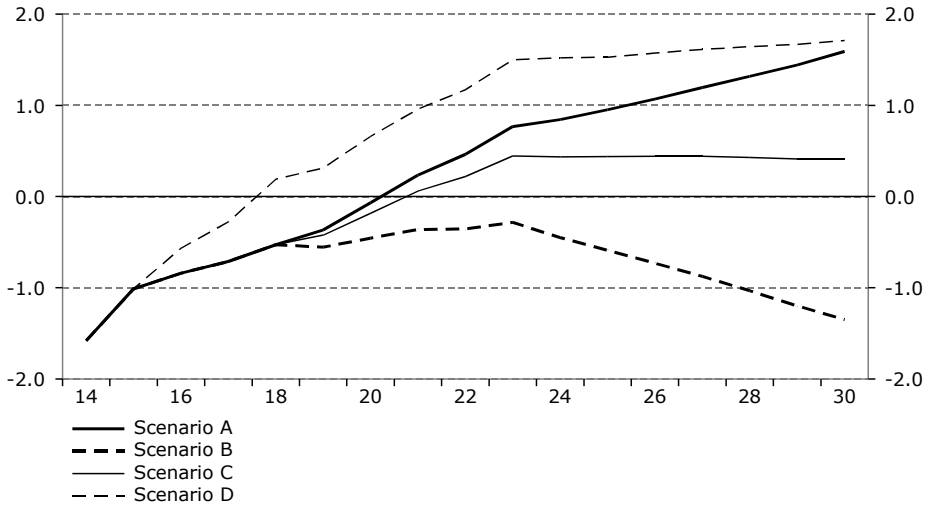
Note: "60 per cent Maastricht debt" denotes S1 calculations based on Maastricht debt of 60 per cent in 2030; "Unchanged net wealth" denotes S1 calculations based on government net financial wealth in 2030 at the same level as today (24 per cent of GDP). See Appendix 2 for a more detailed presentation of the S1 indicator.

Source: NIER.

Keeping the net wealth at current levels gives less space for fiscal loosening than the calculations using the Maastricht debt ceiling as the target. Unchanged net wealth means that liabilities are not permitted to grow more rapidly than assets. The S1 indicator can again be divided into two component terms. One, as was the case above, consists of any surpluses in net lending during the period in each scenario. The other is the expected increase in the value of government assets in the form of shares and other non-interest-bearing financial assets.

Diagram 45 Government net lending

Percentage of GDP



Source: NIER.

The S1 indicator is around 1.7 lower in the calculations based on unchanged net wealth than in the calculations based on the Maastricht debt ceiling. In scenario A, the S1 indicator is –0.7 based on an unchanged net position. In other words, instead of the fiscal loosening of 2.5 per cent given by the calculations based on the debt ceiling, there is now space for loosening of 0.7 per cent. This space is due to a combination of net lending surpluses and increases in asset values. In the more resource-intensive scenario B, the increase in the value of financial assets does not cancel out the deficits in net lending, which means that there is a slight need for fiscal tightening (0.2 per

cent) to keep the net position at current levels. In scenario C, net wealth rises by a couple of percentage points through to 2030, while net lending is positive for parts of the period. These factors combine to give an S1 value of –0.3. Due to high net lending, scenario D gives the greatest scope for fiscal loosening with unchanged net wealth, with an S1 value of –1.2.

6.3 COMPARISON WITH OTHER AND PREVIOUS S2 CALCULATIONS

The previous report with calculations of the S2 indicator by the NIER was published in March 2013.[35] These gave a value of –0.7 using the conventional method and –1.1 based on the simulation method (S2+). Because the calculation method has been revised slightly since the previous report, none of the scenarios in the present report are directly comparable with the scenario in the previous report.

The government presents its assessment of the long-term sustainability of fiscal policy in the spring fiscal policy bill. As part of this assessment, the government reports its calculations of the S2 and S1 indicators. In the 2013 spring fiscal policy bill, the government's S2 indicator was –2.4 in the main scenario based on an unchanged standard of welfare services.[36] In addition, there are indicator values for 12 alternative scenarios with different assumptions, including a higher retirement age, better health and higher productivity in the government sector. The government reports an S1 value of –1.1 based on a target of 60 per cent Maastricht debt in 2030. The budget bill for 2014 revised these results to –1.5 for the S2 indicator and –0.4 for the S1 indicator. These revisions are motivated by the fiscal policy proposed in the budget bill.[37]

The European Commission last published calculations of the S2 and S1 indicators for member states in 2012.[38] Sweden was given a positive S2 value of 1.7, which indicates a need for permanent fiscal tightening. This was the eighth-lowest S2 indicator out of 26 member states. The European Commission's scenario for Sweden includes an increase in age-related government consumption expenditure of 2.7 per cent of GDP in the long term. This scenario is therefore closest to scenario B in the present report, where government consumption increases in the long term by 3.3 percentage points of GDP from the level forecast for 2014. The Commission reported an S1 indicator for Sweden of –3.7.

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[35] See National Institute of Economic Research (2013b).

[36] The base scenario is thereby based on the same assumption for government consumption as scenario A in the present report. Different assumptions for productivity growth in the production of welfare services mean that personnel density moves differently, however. The difference between the government's S2 indicator in the 2013 spring fiscal policy bill and the S2 indicator in scenario A in the present report is due partly to different assumptions about macroeconomic developments, the employment rate, etc.

[37] See Government of Sweden (2013b).

[38] See European Commission (2012a).

7. Conclusions

This report analyses the long-term sustainability of Sweden's public finances. The aim has been to assess the degree to which the *current* level of welfare services and security systems can be financed in the future with the *current* design of the tax system. It is not clear which definition best describes on unchanged public sector commitment – in other words, welfare services and social security systems of the same standard as today. We therefore use three definitions in the report, resulting in three different scenarios where government consumption develops at different rates. The resource-saving scenario A and the relatively resource-intensive scenario B can be seen as the lower and upper bounds of what could be defined as an unchanged commitment. Scenario C, which links expenditure growth to GDP growth, ends up somewhere between these two extremes.

A constant personnel density in the production of public services as assumed in scenario B is the definition of an unchanged public sector commitment that the NIER normally uses in its forecasts for public finances on a five-year horizon. A constant personnel density is relatively easy to relate to and means that a given demographic group will benefit from the same number of hours of welfare services in future as it does today. Any productivity growth over time in the sectors producing welfare services will benefit users in the form of higher standards. In this report, productivity growth (in a broad sense) in the production of welfare services is assumed to be 0.7 per cent per year.

In the calculations, a constant personnel density translates into a growing deficit in public finances, rising to 2 per cent of GDP in the 2030s and no less than 4 per cent in 2060. The long-term sustainability of government expenditure can be assessed on the basis of the deficits or surpluses arising in the long term in these scenarios. An alternative approach is to estimate the level of fiscal tightening required, or loosening permitted, if long-term sustainability is to be achieved in each scenario. The S2 indicator provides such a measure. In the scenario with an unchanged personnel density, the S2 indicator shows that taxes need to be permanently increased by 1.5 per cent of GDP for public finances to be long-term sustainable. This is close to the European Commission's S2 value of 1.7 from 2012 but differs from the Swedish government's S2 indicator of –1.5 in the budget bill for 2014 and –2.4 in the more detailed report in the 2013 spring fiscal policy bill. The difference is due partly to the assumption for government consumption, which is 26.1 per cent of GDP in 2060 in the government's main scenario and 30.6 per cent in scenario B in the present report.

In this report, the conventional S2 calculations are supplemented with simulations intended to identify the permanent fiscal tightening (or loosening) that results in long-term sustainable public finances. These simulations show that a permanent increase in taxation of 2 per cent of GDP is sufficient to achieve sustainability in public finances with an unchanged personnel density. This 2 per cent of GDP currently equates to around SEK 75 billion and can be seen in the light of taxes having been lowered by 7 percentage points of GDP since the year 2000. With a permanent tax increase of this kind, primary net lending will be more or less neutral through to 2060, while total net lending will be positive. Based on these calculations, general government gross debt would be paid off by the early 2040s.

In scenario A, where productivity gains in the production of welfare services are taken as resource savings, government consumption falls gradually to 23 per cent of GDP. The volume of public services per user (and so standards) would still be constant at current levels. This scenario brings surpluses in public finances, with primary net lending of more than 4 per cent in 2060, and even higher total net lending, making space for substantial tax cuts. However, it seems unlikely that there would be broad support for the standard of welfare services to be unchanged for any length of time when the economy as a whole is growing and living standards are otherwise improving.

In scenario C, where government consumption expenditure per user grows in line with GDP per capita, public finances are more or less balanced. Both government expenditure and government income are then linked to growth in the economy. Demographic changes mean that standards will fall in periods with a rising dependency ratio, and rise during periods with favourable demographic developments. The S2 indicator in this scenario is close to zero and so indicates that public finances can be considered long-term sustainable. This scenario can be considered to provide only limited insight into the sustainability of public finances, because both income and expenditure are linked to GDP. As such, this scenario is to be viewed more as an illustration of developments in government expenditure given a "sustainable" public sector commitment.

The projections of public finances are very sensitive to the assumptions underlying the scenarios. The longer the projections, the greater the impact of differences in assumptions for demographics, the labour market, and productivity growth in the economy. Alternative assumptions for these variables could easily transform the results. A gradual increase in the health of the elderly, for example, might mean that today's need for resources for elderly care and health care overestimate future needs. At the same time, increased life expectancy could lead to retirement ages being pushed back gradually, resulting in a more favourable economic dependency ratio than indicated by the projections based on current behaviour. Increased demand for leisure time (in other words, an increased tendency to "buy" more time off by working fewer days or weeks each year) could move the economic dependency ratio in the opposite direction.

The sensitivity to different assumptions associated with these long-term calculations means that caution is required when interpreting the results and that conclusions must be drawn with care. One tentative conclusion from the overall results is that there are no unmanageable imbalances in Sweden's public finances. This conclusion stands even when an unchanged public sector commitment is defined in relatively generous terms.

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Appendix 1. Alternative scenario with unchanged rules

In the short-term projections (2015–2018), government expenditure in all three main scenarios (designated A, B and C earlier in the report) moves in line with the NIER's definition of an unchanged public sector commitment, adjusted for certain cyclical effects. This means average consumption growth in the general government sector of 1.2 per cent per year in 2015–2018 in fixed prices. As discussed in Chapter 2, active political decisions are required for an unchanged commitment to welfare services and transfer systems.

Developments in public finances have also been analysed in an alternative scenario where expenditure in the short-term projections (through to 2018) is based on unchanged rules (scenario D in Chapter 6). This results instead in average growth in consumption of 0.4 per cent per year during this period. The projections for the period after that (2019–2060) are performed using the same method as in scenario C, which means that government consumption expenditure increases in line with GDP per capita, adjusted for demographic developments. The assumption of unchanged rules in the short-term projections aids comparison with the government's sustainability calculations in the spring fiscal policy bill.

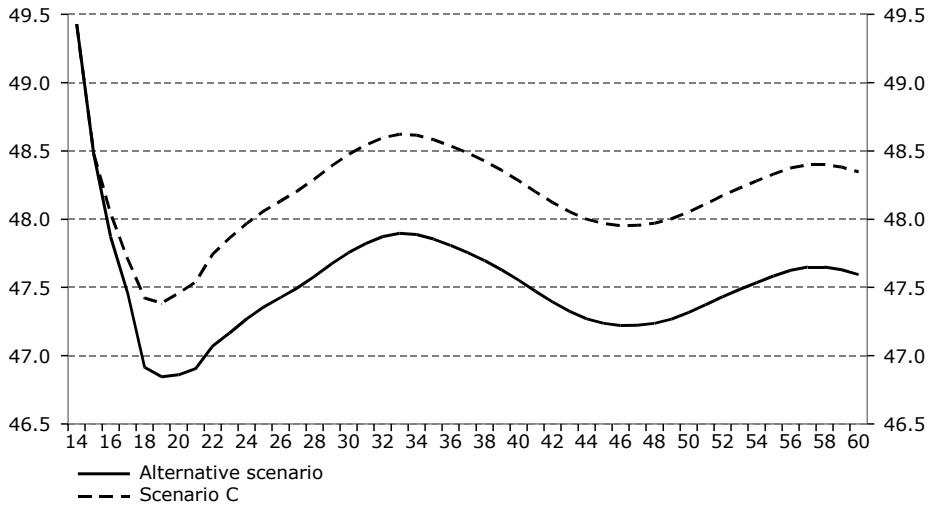
Since unchanged rules through to 2018 imply lower government expenditure on consumption in particular, the primary expenditure to GDP ratio will initially fall somewhat further in the alternative scenario than in scenario C. Social transfers to households are not fully indexed either and therefore grow at a somewhat slower pace in this scenario in 2015–2018 than in the other scenarios. Primary expenditure in 2018 is around 0.5 percentage points lower relative to GDP than in scenario C (see Diagram 46). The difference increases somewhat in subsequent years to around 0.7 per cent at the start of the 2020s. The lower expenditure level becomes permanent, because the growth rates for expenditure in both scenarios are the same in the long-term projections.

Primary revenue develops very similarly in the two scenarios, which means that the difference in primary net lending between the two scenarios is explained mainly by the different expenditure to GDP ratios (see Diagram 47). Higher net lending means that central government can repay its debt and increase its net capital income more quickly than in scenario C (see Diagram 48). This has a relatively strong effect on net lending, which rises to almost 4 per cent at the end of the projection period, compared to just over 1 per cent in scenario C (see Diagram 49). Maastricht debt can therefore be paid off at a significantly more rapid rate (see Diagram 50).

The S2 indicator is determined chiefly by future primary net lending (and not total net lending). Despite the significantly higher total net lending in 2060 in the alternative scenario than in scenario C, the S2 indicators do not differ as much between the two scenarios. The S2 indicator is –0.7 in the alternative scenario and –0.1 in scenario C (see Table 2 in Chapter 6).

Diagram 46 Government primary expenditure

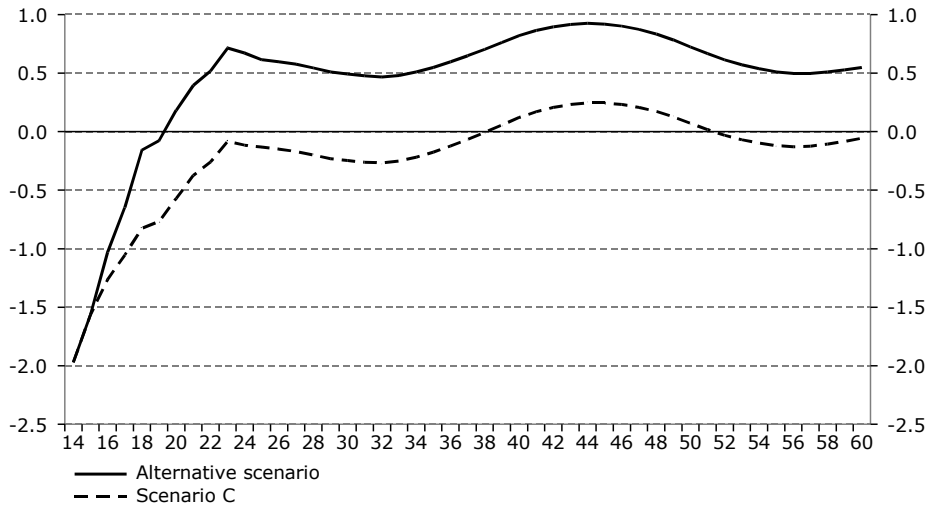
Percentage of GDP



Source: NIER.

Diagram 47 Government primary net lending

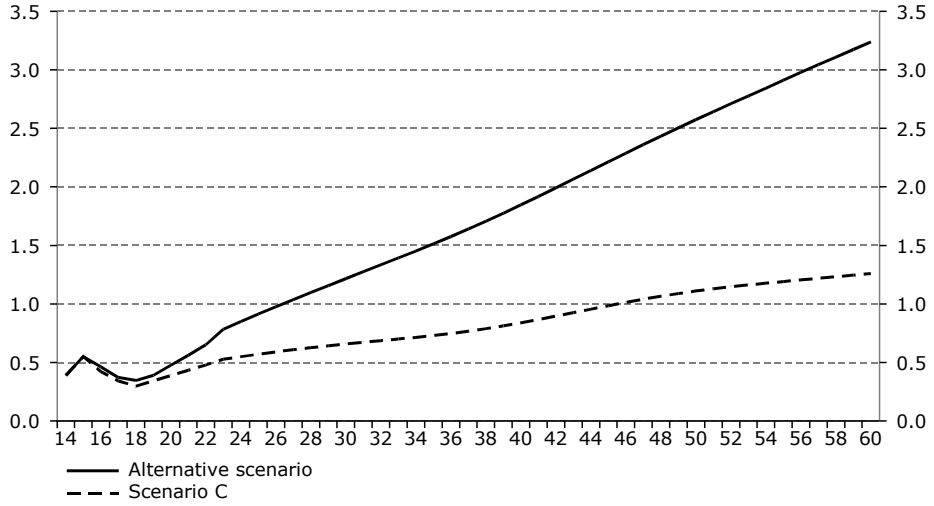
Percentage of GDP



Source: NIER.

Diagram 48 Government net capital income

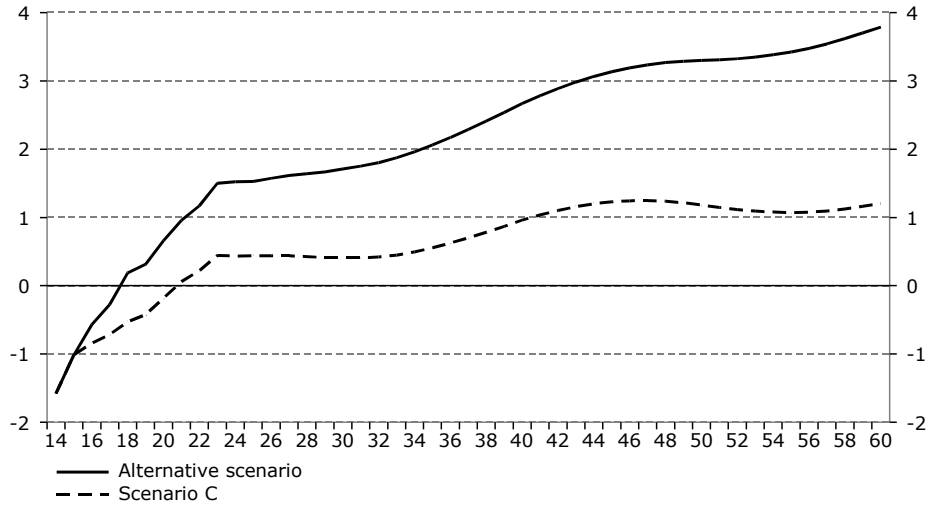
Percentage of GDP



Source: NIER.

Diagram 49 Government net lending

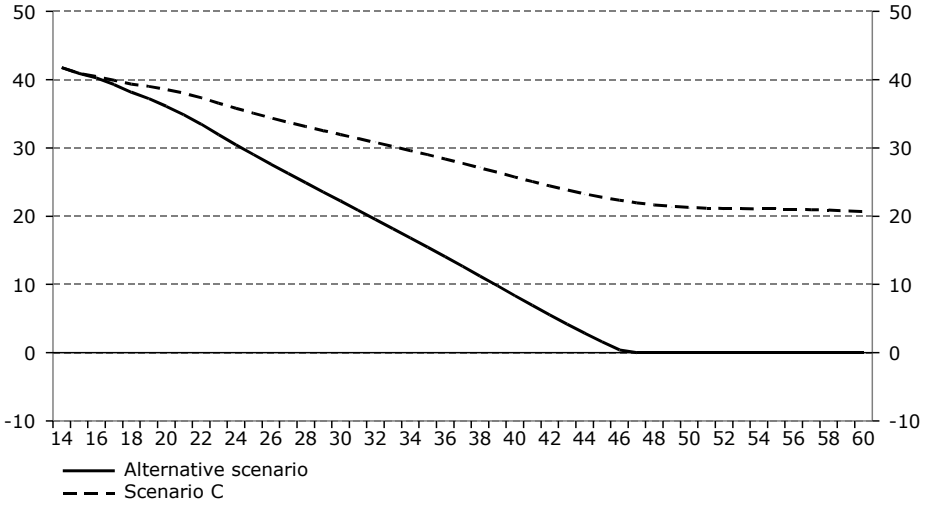
Percentage of GDP



Source: NIER.

Diagram 50 Maastricht debt

Percentage of GDP



Source: NIER.

Appendix 2. The S2 and S1 indicators

THE S2 INDICATOR

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 S2 indicator is calculated as 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 indicator is calculated on the basis of the government sector's intertemporal budget constraint with an infinite horizon. In practice, however, the calculation of revenue and expenditure is performed over a limited horizon, such as through to 2060, after which primary net lending is assumed to be constant at the level of the final year.

For public finances to be long-term sustainable, general government net debt must be limited. The S2 indicator can thus be derived from the intertemporal budget constraint

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

where d is net debt, pb is the primary balance (primary net lending), and S*2* 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 of GDP growth (in the above expression the growth-adjusted interest rate is assumed to be constant over time). The time scale t is normalised so that $t = 0$ for the current year.

This expression means that the discounted value of all future net lending is equal to the initial net debt. An S2 value of zero indicates that the condition has been satisfied without the need for any permanent adjustment of primary net lending as a percentage of GDP. A positive S2 value 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. In practice, this means that tax increases and/or spending cuts are required. A negative S2 value indicates that primary net lending is such that permanent future tax cuts and/or spending increases can be made without threatening the long-term sustainability of public finances.

Derivation of the S2 indicator

To facilitate interpretation of the S2 indicator, it can be divided into three terms as in Chapter 6. These terms relate to (1) interest payments on the government debt (or returns on net wealth), (2) primary deficits during the projection period and (3) primary deficits beyond the final year of the period. To make it easier to understand the origin of these terms, we first present a mathematical derivation of the S2 indicator. [39]

[39] See National Institute of Economic Research (2012) for a more detailed presentation and derivation of the S2 indicator.

Starting with the budget constraint

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

we can first separate the constant S*2* from the summation

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

Since the factor $\sum_{t=1}^{\infty} 1/(1+r)^t$ approaches $1/r$ as *t* goes to infinity, we can simplify this to

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

Solving the term S*2*/*r* gives us

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

which states that, if the intertemporal budget constraint is to be satisfied, the discounted value of all future adjustments to primary net lending (S*2*/*r*) must correspond to the difference between current net debt and the discounted value of all future primary net lending.

By specifying the final year *ts* of the projection period and assuming that *pb* is then constant at the same level ($\overline{pb}$) as at *ts*, we can separate the discounted value of all primary net lending after *ts*:

$$\frac{S2}{r} = d_0 - \left[\sum_{t=1}^{ts} \frac{pb_t}{(1+r)^t} + \frac{\overline{pb}/r}{(1+r)^{ts}} \right]$$

By multiplying both sides of the equation by *r*, we obtain:

$$S2 = rd_0 - r \sum_{t=1}^{ts} \frac{pb_t}{(1+r)^t} - \frac{\overline{pb}}{(1+r)^{ts}}$$

The S2 indicator's component terms

The above equation can be written as the sum of three terms:

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

Term 1 measures 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 value.

Term 2 measures the contribution from primary net lending from the base year through to the final year in the scenario underlying the calculations. The higher the primary net lending, the lower the S2 value. The growth-adjusted interest rate is included in the discount factor in the denominator, but also in the numerator. It is thus unclear how it affects the value of term 2. However, if the growth-adjusted interest rate is zero, term 2 will also be zero.

Term 3 measures the contribution to S2 from primary net lending beyond the final year used in the calculations. The higher the primary net lending, the lower the S2 value. Note that the growth-adjusted interest rate serves only as a discount factor here. The higher it is, the lower the contribution to the S2 value.

THE S1 INDICATOR

The S1 indicator shows the permanent percentage fiscal tightening needed to achieve a given debt target in a given year as a percentage of GDP. Like the S2 indicator, it can be divided into three terms to facilitate interpretation.

To derive the S1 indicator, we can start from the national debt equation

$$d_t - d_{t-1} = rd_{t-1} - pb_t$$

where dt is the national debt this year as a percentage of GDP, d_{t-1} is debt last year, r is the growth-adjusted interest rate, and pb is the primary balance (primary net lending) as a percentage of GDP. In principle, this equation states that the increase in national debt corresponds to the interest costs on this debt less repayments in the form of primary net lending. The same debt equation can be written prospectively as follows:

$$d_t = \frac{d_{t+1}}{1+r} + \frac{pb_{t+1}}{1+r}$$

This states that, for this year's debt to be repaid, a combination of new loans, d_{t+1}, and positive net lending, pb_{t+1}, will be needed. With a time horizon from year 0 to year T, the equation can be expressed as

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

Assume now that a debt target is set for the final year T in the form of a certain level of national debt as a percentage of GDP, $\hat{d}_T$. The S1 indicator shows the permanent fiscal tightening needed to achieve this target:

$$d_0 = \frac{\hat{d}_T}{(1+r)^T} + \sum_{t=1}^{T} \frac{pb_t + S1}{(1+r)^t}$$

If this summation is divided up and the equation rearranged somewhat, we obtain:

$$S1 \cdot \sum_{t=1}^{T} \frac{1}{(1+r)^t} = \left[d_0 - \frac{\hat{d}_T}{(1+r)^T} \right] - \sum_{t=1}^{T} \frac{pb_t}{(1+r)^t}$$

This equation tells us that the sum of the discounted fiscal tightening needs to cover both the reduction in debt and any primary deficits during the period through to the target year.

By solving *S1* and simplifying somewhat, we obtain

$$S1 = \underbrace{r d_0}_{(A)} + \underbrace{\frac{r(d_0 - \hat{d}_T)}{(1+r)^T - 1}}_{(B)} + \underbrace{\left[- \frac{\sum_{t=1}^{T} pb_t/(1+r)^t}{\sum_{t=1}^{T} 1/(1+r)^t} \right]}_{(C)}$$

This equation tells us that the fiscal tightening needs to cover interest costs on the debt in the base year (A), the annual reduction in debt required to hit the debt target (B), and any deficits arising during the period through to the target year (C).[40]

[40] The S1 indicator in the present report is solved through simulations in the FIMO model, which means that the component terms A, B and C cannot be solved as in the conventional, static calculation method.

Appendix 3. Use of models

This appendix describes the models used for the long-term projections. The long-term macroeconomic scenarios are produced using the NIER's analytical tool for the economy in the long term (KAVEL). Developments in the labour market are generated using the NIER's model for demographic projections of labour market variables (KAMEL). Government income and expenditure are calculated using the analytical model for net lending (FIMO). Demographically-driven developments in the resources required for government consumption are calculated using the demographic model for the projection of government consumption (DEMOG).

MACROECONOMIC LONG-TERM MODEL (KAVEL)

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

Developments in demand determined by demographics

Household consumption grows with the overall population and a constant rise in standards reflecting productivity growth across the economy. Household consumption per capita therefore increases over time. Government consumption grows at different rates in the different scenarios. The starting point is consumption based on demographic needs, calculated using DEMOG (see below). The different growth rates for government consumption mean that household consumption as a percentage of GDP moves differently in the different scenarios (see Diagram 51).

Investment (including stock changes) is calculated in such a way that the capital stock in current prices grows at the same rate as GDP in current prices, giving a constant capital-output ratio (capital stock as a percentage of GDP). Because hours worked are exogenously determined by demographics, and nominal value added per hour worked rises at a constant rate, the entire path of GDP in current prices is known in advance. With the help of a depreciation factor for the capital stock that takes account of the consumption of fixed capital and changes in relative prices, the necessary investment in current prices can be calculated so that the capital-output ratio is constant.

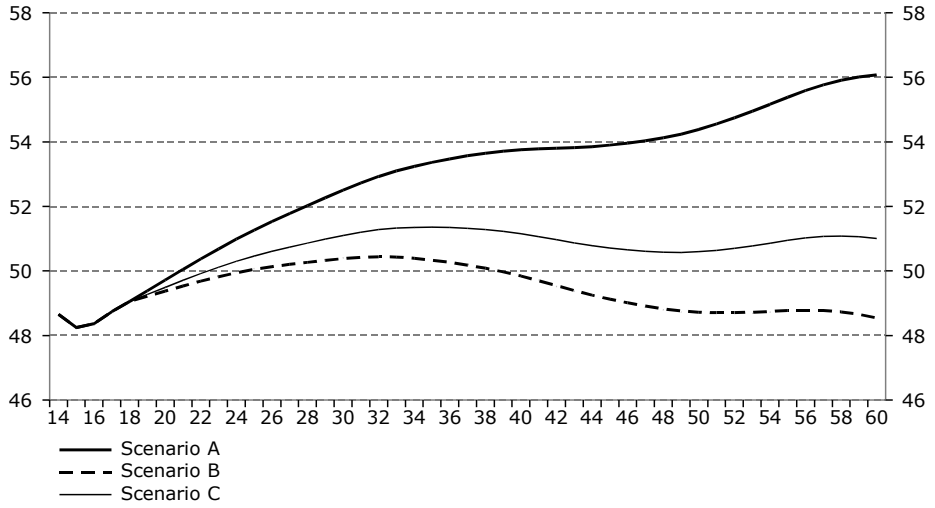
Each demand component generates imports and domestic value added in accordance with fixed input-output coefficients. The import content of the demand components is calibrated on the basis of the national accounts for 2011, but scaled up proportionally to give the same forecast for total imports in 2019 as predicted in *The Swedish Economy*, December 2013 (see Table 4).

Productivity and hours worked are exogenously determined, and so, therefore, is GDP. Demand for consumption and investment, together with the import coefficients, determines the amount of labour employed to produce exports. Exports are

thus the residual that balances supply and demand. In the very long term, it is reasonable for net exports, adjusted for transfers to and from abroad, to approach zero in a simple model. In this model, it is assumed that EU contributions and development aid will hold at around 1 per cent of GDP, which motivates positive net exports. The growth in household consumption per capita (improvement in standards) is therefore calibrated so that net exports approach 1 per cent of GDP in the long term.[41]

Diagram 51 Household consumption

Percentage of GDP



Source: NIER.

Movements in prices reflect productivity and the inflation target

The four demand components generate imports and value added in the various sectors of the economy. With the help of input-output tables, four sectors are constructed that produce the different demand components. Productivity (labour productivity) and capital intensity are assumed to be the same in the four sectors. However, growth in total factor productivity (TFP) is assumed to differ – for example, TFP growth in the production of government consumption is lower. This lower growth in TFP, and thereby labour productivity, is fully offset by higher price rises. The differences in productivity growth between the four sectors are based on their average productivity growth during the period 1994–2012. Ideally the calculations would be based on the entire period from 1981 to 2012, as the NIER's long-term productivity assumption for the overall economy is an increase in productivity at the same average rate as during this period. However, data for productivity in the individual sectors are not available at the necessary level of detail. Productivity in the four sectors is therefore scaled down proportionally to give an overall level of productivity growth in the aggregate economy (GDP per hour worked) of 1.8 per cent during the period 2019–2060, which is approximately the same rate of increase as the average for 1981–2012.

[41] The increase in standards varies between 1.70 and 2.05 per cent in the scenarios, depending on developments in standards in government consumption.

Table 4 presents the assumptions for productivity growth in domestic production that can be attributed to each sector. Productivity growth in the domestic production of goods and services included in the government consumption basket is 0.39 per cent per year. As this basket also includes imported goods, for which productivity growth is higher (2.92 per cent), the weighted productivity growth in the overall production of government consumption is 0.7 per cent per year.[42]

Table 4 Assumptions in the macroeconomic projections, 2019–2060

Percentage change or per cent

	Productivity[1]	Deflator, expenditure	Deflator, value added	Import content
Household consumption	1.57	1.88	2.22	25.6
Government consumption	0.39	3.10	3.42	12.4
Investment	2.07	1.40	1.71	38.7
Exports	3.28	0.68	0.52	40.7
Imports	..	0.90	..	..
GDP[2]	1.81	1.97	1.97	..

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

[2] The values for the overall economy (GDP) have not been calibrated but denote the average for the period 2019–2060 from the other model parameters.

The level of value added per hour worked in current prices (nominal productivity) is the same and moves at the same rate in all sectors. This assumption greatly simplifies the model and fits well with the data. Changes in the composition of demand do not therefore affect nominal productivity. The composition of demand does, however, affect the proportions of nominal value added attributable to price changes and volume changes. Productivity growth (in fixed prices) in the overall economy therefore varies somewhat over time, but only between 1.73 and 1.84 per cent in the period 2019–2060 in the different scenarios. The rate of increase in the GDP deflator, which also varies with the composition of demand, is between 1.95 and 2.05 per cent, which means that nominal productivity rises by 3.8 per cent per year.

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

[42] The total productivity growth embedded in the government consumption basket of 0.7 per cent is obtained by multiplying the share of domestic production by domestic productivity growth and adding this to the share of imports multiplied by productivity growth in import production: (0.876 · 0.39) + (0.124 · 2.92) = 0.70. See Table 4 for the respective parameters.

The price deflator for government consumption is therefore determined by the value-added deflator (3.42 per cent) weighted by the import deflator (0.90 per cent). The value-added deflator, in turn, is determined by wage growth (3.81 per cent) less productivity growth (0.39 per cent).

GDP in fixed prices is calculated as a chain index

All calculations are performed in current prices. Each demand component and production in the four sectors are then deflated by constant prices. Expenditure-based and output-based GDP are identical in current prices and previous years' prices. The volume series for GDP for any given reference year (or index level) is calculated with a chain index.

Imports in current prices are calculated with fixed import coefficients for the four components of total demand. This method differs from conventional input-output analysis, where the import content is normally assumed to be constant in volume terms. In the longer term, however, it is more reasonable for the import content to be constant in current prices than in fixed prices. The global specialisation of production has meant that exports and imports have long grown more quickly than GDP. This trend can reasonably be expected to continue, but this is not modelled because it would greatly complicate the calculations. This is not believed to affect the analysis of public finances in this report to any great extent. All key tax bases are unaffected by the import content, and relative prices will adjust to an uptrend in the import content. GDP (and thereby total wages) is not affected by the likely underestimation of the future import content (and thereby exports).

MODEL FOR PUBLIC FINANCES (FIMO)

FIMO calculates net lending for all sectors of the economy using income-based and expenditure-based GDP. The sectors included are government, households, businesses and abroad. Government, in turn, is divided into central government, old-age pension system and local government. Net lending in each sector (based on the national accounts) is also linked together with each sector's wealth (based on the financial accounts). The projections of the sectors' income and expenditure are based on a given macroeconomic scenario and demographic developments. The behaviours and structures prevailing in the economy at the beginning of the projections are assumed to be permanent. For example, the number of people receiving sickness and disability benefits has fallen in recent years due to rule changes; the projections assume that this structural change in the level of benefit payments will persist.

Calculation of government income

Most government income consists of taxes and duties. The model assumes that implicit tax and duty rates are kept constant, i.e. revenue from taxes and duties follows developments in the respective base. Government capital income is calculated with an implicit interest rate and implicit return on a capital stock divided into interest-bearing and non-interest-bearing assets.

Calculation of government expenditure

Government consumption and investment: Government consumption is based on real developments from the KAVEL model in the respective scenario. Investment in the local government sector follows local government consumption. This is assumed to reflect the sector's capital stock in current prices remaining constant as a percentage of production in current prices. Investment in the central government sector follows GDP in current prices. This assumption reflects investment rising at such a rate that the central government capital stock is constant as a percentage of GDP in current prices.

Transfers: Government transfers are projected on the basis of macroeconomic and demographic developments. The bulk of transfers are social security payments. The applicable rules mean that some of these payments move with general levels of income in the economy, two examples being sick pay and parental benefits. Others, such as student allowance, rise with the general level of prices. There are also some that are nominally unchanged in the absence of political decisions, such as child benefit. In the model, replacement rates in these transfer systems are kept constant by having all payments follow movements in hourly wages in the economy. This avoids the gradual erosion of these systems that would result if the calculations were based on unchanged rules (that is, current rules).

Expenditure on income pensions: Expenditure on income pensions depends partly on demographic developments and partly on the applicable rules. This expenditure is calculated using the Swedish Pensions Agency's pension model, which is based on Statistics Sweden's 2013 population forecast. This model calculates pension liabilities, assets, buffer fund, balances and more. The NIER's macroeconomic scenario for real wages and the CPI is then used together with the assumption of a 5 per cent return on capital to calculate payments of income pensions.

Capital costs: Government capital costs are calculated using an implicit interest rate and debt stock.

DEMOGRAPHIC MODEL FOR GOVERNMENT CONSUMPTION (DEMOG)

In DEMOG, government consumption expenditure in fixed prices is projected on the basis of demographic developments. Movements in government consumption in DEMOG can be due to both general population growth and the composition of the population. This method means that the volume of government consumption per person in different age classes is constant over time. This can be seen as the standard of public welfare services being kept constant; the consumption predicted by the model does not include any initiatives to raise standards. The projections in DEMOG coincide with scenario A in the present report. Scenarios B and C are based on the DEMOG projections but also include an increase in standards.

Government consumption is divided into individual and collective consumption. Individual consumption can be linked to a specific individual and includes education, health care, child care and elderly care. Collective consumption comprises services for the community, such as defence or law and order.

The model projects individual and collective consumption for three subsectors: central government, municipalities and county councils. Information from the national

accounts is used to identify individual consumption in each sector. The share of individual consumption in 2012 was 23 per cent for central government, 82 per cent for municipalities and 96 per cent for county councils. These same percentages are assumed to apply at the start of the projections, after which they move with demographic developments. Once individual and collective consumption have been calculated, they are summed for each subsector, and the subsectors are then summed to give general government consumption.

DEMOG is based on information from Statistics Sweden's model for individuals' average consumption of different welfare services (FASIT).[43] Consumption is divided by function (COFOG) and into five-year age cohorts. Examples of functions include child care, elderly care and dental care. The cost matrix thus created shows how the average cost of different types of welfare services is distributed between the different age groups. By applying demographic developments from Statistics Sweden's population forecast to this cost matrix, we can calculate the individual consumption volume for each year. This method means that individuals' consumption patterns are kept constant over time. For example, a person aged 75–79 will, on average, consume the same amount of elderly care in 2060 as today. Collective government consumption is estimated on the basis of overall population growth. This method is rooted in an assumption that the composition of the population does not play a role in the size of collective consumption.

DEMOGRAPHIC MODEL FOR LABOUR MARKET VARIABLES (KAMEL)

KAMEL is the NIER's model for demographic projections of labour market variables. The model contains data from Statistics Sweden's labour force survey (LFS) for a number of labour market variables, such as labour force, employment and hours worked. All variables are broken down by gender, age (one-year cohorts from 15 to 74 years) and origin. The four categories for origin (country of birth) are Sweden, other Nordic, other European and non-European.

Starting from a given base year (in this case 2012), the labour market variables are estimated using demographic developments from Statistics Sweden's latest population forecast (broken down into the same groups as the input data in KAMEL). In this way, the model captures how changes in the composition of the population impact on each labour market variable. The rate of growth in an aggregated variable will therefore reflect changes in both the size and the composition of the population. If the composition of the population changes in such a way that, for example, there is a relatively rapid increase in groups with high levels of labour force participation, the rate of growth in the labour force will be higher than the rate of growth in the population. The demographic projections are performed at the lowest level and then aggregated to give the overall population of working age (15–74 years). The assumption is that the situation in the labour market in the base year continues to apply going forward. The projections do not therefore take account of any trends, such as increased labour force participation or reduced hours worked, in different parts of the population.

[43] FASIT is a simulation model developed by Statistics Sweden. The acronym is derived from the Swedish for "distributional analysis system for income and transfers". The figures data from FASIT are from 2005 and refer to consumption of welfare services in 2004.

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