The Czech Fiscal Council

REPORT ON THE LONG-TERM SUSTAINABILITY OF PUBLIC FINANCES

September 2024
Czech Fiscal Council

Contents

Introduction and summary of the main trends

One of the main tasks of the Czech Fiscal Council (CFC) under Act No. 23/2017 Coll., on the Rules of Budgetary Responsibility, as amended (the "Act"), is to regularly prepare the **Report on the Long-Term Sustainability of Public Finances** (the "Long-Term Sustainability Report") and, in accordance with Section 21 of the Act, to submit it to the Chamber of Deputies of the Parliament of the Czech Republic for consideration.

As in previous Long-Term Sustainability Reports, in this current one the CFC assesses the situation of Czech public finances primarily from a **medium- and long-term perspective.** In the first case, the key assessment indicator is the current and expected level of the structural balance, while in the second case it is the projected evolution of public debt over a 50-year horizon, which approximates the magnitude of long-term fiscal imbalances.

If last year's Long-Term Sustainability Report stated that public finances are at an imaginary **crossroads between long-term unsustainability and a return to the moderate fiscal management** that was typical for the Czech Republic until the outbreak of the COVID-19 pandemic, this year we can see the **first signs of hope for a gradual improvement in the structural fiscal imbalance** in the medium and long term. In other words, it is a cautious step towards more sustainable public finances in the future. Of course, this is only on the assumption that the trends analysed in this year's Long-Term Sustainability Report are maintained, the changes already adopted are maintained and the planned reforms are implemented. That is, there will be no gradual erosion of the established trend.

In terms of the overall general government sector deficit, it is now relatively safe to divide the last five years into roughly three periods. **In 2020–2021, i.e. during the COVID-19 pandemic, the deficit was between 5–6% of GDP** and the government balance deteriorated sharply. **Between 2022 and 2023**, a post-COVID period marked by the energy crisis, the sluggish economic recovery from the pandemic and the conflict in Ukraine, **deficits moved below 4% of GDP**. They would very likely have continued to oscillate around this level had the government not embarked on the gradual consolidation programme announced in its government statement. This, as embodied in the so-called consolidation package**, should bring deficits below 3% of GDP** (the planned and expected outcome this year should be **in the range of 2.3%–2.5% of GDP**) and maintain them at this level or better in the following years. This is the reason why the CFC also supported the consolidation programme and the intended changes to the pension system (see below) in principle – not

necessarily in the individual measures chosen and their calibration – as stated in last year's Long-Term Sustainability Report.

The CFC also actively supported the government's idea to offset **the extraordinary fiscal expenditures related to the energy and war crises** by securing **temporary additional revenue, rather than financing them solely through deficit increases**. However, once the situation normalises and when extraordinary and non-recurrent expenditure is no longer pertinent to public budgets, these extraordinary instruments should also leave the fiscal policy arsenal so as not to create a "budgetary habit" of consuming extraordinary revenues for current expenditure. This is true notwithstanding the fact that the timing of such expenditures in each year has not been synchronised with the timing of revenues, which, on the surface, may obscure or cloud their logical correlation.

However, while these consolidation attempts are bringing the aforementioned numerical improvements to the overall deficit trajectory, as shown in the first chapter of the Long-Term Sustainability Report, **there have not yet been dramatic changes for the better at the level of the structural balance**. If the structural deficit was above 3% of GDP at the peak of the COVID-19 fiscal expansion, it **will remain above 2% of GDP at the end of this year.** According to the CFC, this is not yet a level at which public finances can be considered fully stable and sound in the medium and long term.

After disputes between the CFC and the Ministry of Finance of the Czech Republic (MF CR) in 2022–2023 over the interpretation of the numerical limits for the structural balance in the Act, **there has been a positive development in this area since this year**. This anchors, frames and also limits voluntarism in the budget process not only for this government but also for the next one, and sets a clear political ambition to remain on the path towards sustainable public finances until the end of the process.

However, if there is a need to analyse why the structural balance has not improved significantly despite these consolidation efforts, it can be briefly stated that, while some public expenditure has been cut and some revenues have been increased, the government has continued to increase other expenditure, in many cases indexing it, as already noted in last year's Long-Term Sustainability Report. At the same time, it is still the case that some permanent, i.e. structurally relevant, revenues have been reduced in recent years. It can only be added that the aforementioned unfortunate **tendency to index expenditure continues, and although it does not always concern essential items such as defence or**

education (e.g. also salaries of politicians at local government level, remuneration of full-time PhD students at universities), as a trend it generally works against the sustainability of public finances in the future. Another factor limiting the reduction of the structural balance is the increase in debt servicing costs. The combination of both higher interest rates and growth in the nominal level of public debt leads to 1.4% of GDP being spent on interest payments in 2024, compared with half of this amount in 2019. The Czech public finances are thus weighed down by the debt burden of previous years.

Recent trends also include the long-term growing importance of other, i.e. non-tax, revenues of the public sector, such as revenues from the sale of emission allowances.

Let's just add that the extraordinary development in 2022–2023 also had an impact **on the reporting of the internationally comparable, i.e. accrual, balance of the general government sector in both years.** The initially reported balance for 2022 has subsequently been improved. The considerably significant collection of corporate income tax surcharges in 2023 (which, however, accrued in 2022) made it necessary to restate the balance to a better level. In 2023, the initially reported balance deteriorated again, when Eurostat disagreed with the reported deficit, and deducted from government revenue part of the dividend paid by a state-owned company, which it no longer considered as revenue but as a symmetrical reduction in the value of the state's participation in that company. Subsequently, there was again a movement in the corporate income tax levied. The apparently exceptional performance of the corporate sector in 2022 did not continue with the same intensity in 2023, and the resulting refunds of this tax in 2024 in turn began to retroactively worsen the balance of 2023. None of this would have happened without the coincidence of the energy and inflation crises of 2021–2023, which completely disrupted the stability and predictability of key macroeconomic variables in the economy for a relatively long period of time.

This year, another important circumstance was added, namely **an extraordinary revision of the national accounts by the Czech Statistical Office** (CZSO). In addition to the normal revision of 2021

and 2022, the CZSO also carried out a general revision of the main macro aggregates from 1990 to the present, which clearly affected all ratio indicators. These include, of course, those relating to public finances. This revision has shifted the general government sector deficit data for the pandemic and post-pandemic years to a better level, i.e. to lower deficits.

However, all interim adjustments were typically made after the decimal point of the balance of the general government sector, i.e. they did not change the main story of fiscal policy in the Czech Republic or its long-term trends.

From the point of view of the long-term balance of public finances, 2023 was a turning point because the government **presented a concrete plan of the so-called Great Pension Reform, which is being discussed by the legislators at the time of publication of this text**. Following the limitation of extraordinary pension indexation and the so-called Small Pension Reform, which were approved in 2023, the intended combination of all these system adjustments should significantly improve the long-term sustainability of the pension system as the backbone of the sustainability of the overall public finances (see chapters 3 and 5).

Thanks to the above-described changes in the pension system, together with changes in the demographic projections by the CZSO (see chapter 2), this year's Long-Term Sustainability Report **is significantly more optimistic in terms of the assessment of the sustainability of public finances** compared to the previous one. Debt at the end of the projection is reduced from 311% of GDP to 217% of GDP in the baseline scenario, and the year at which the debt brake threshold would probably be breached has been postponed quite significantly beyond 2030.

It should also be added that new budgetary rules were being developed within the European Union during 2023, with final approval occurring in 2024. However, a description and analysis of this change is the subject of another CFC document, namely *the Report on the Compliance with the Rules of Budgetary Responsibility*, which the CFC is also publishing this year as required by the Act.

KEY FINDINGS in the baseline scenario
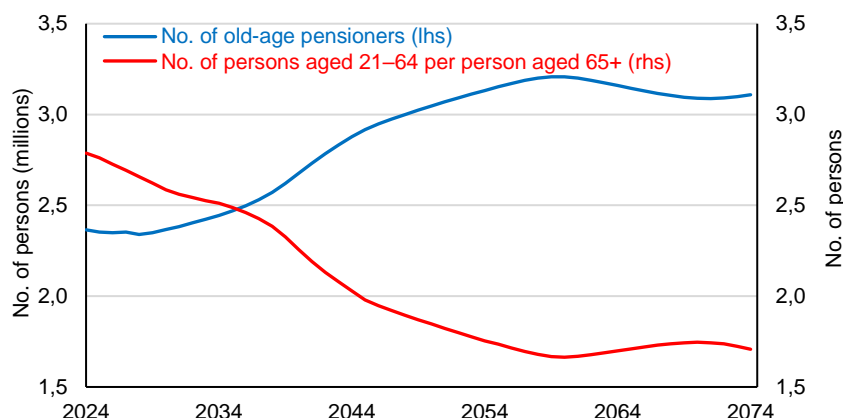
The number of old-age pensioners will peak around 2059 at about

3.2 million.

The number of 21–64 year olds per person aged 65+ will drop around 2060 to

1.66.
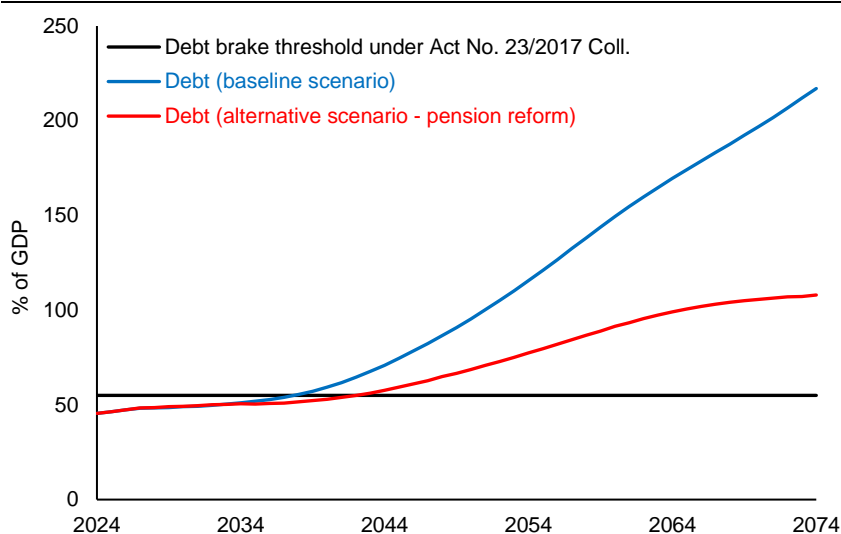
The ratio of general government debt to GDP could reach up at the end of the 50-year horizon under the current tax and spending policy settings

217% of GDP.

If the so-called pension reform is implemented, the debt-to-GDP ratio at the end of the projection could be lower and reach

108% of GDP
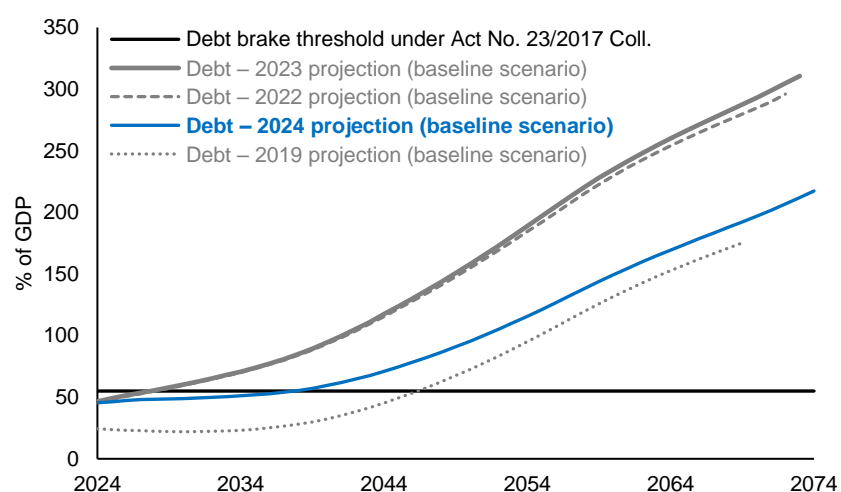
The ratio of general government debt to GDP in the baseline scenario is at the end of the 50-year horizon

94 pp lower

than it was projected in 2023. According to the current projection, the debt brake threshold would probably be breached in

2038,

i.e. ten years later than in the previous projection.

Public finance sustainability gap

3.78% of GDP

is the amount by which the primary structural balance would have to be better from 2024 until 2074 for the debt not to exceed the debt brake threshold (55% of GDP) in 2074.

1 Starting point

This chapter focuses on a summary of the economic developments and performance of the public sector in 2023 and the outlook for the current year 2024. While the MF CR published a forecast for public finances for the next three years (i.e. 2025–2027) in the Convergence Programme of the Czech Republic and the General Government Budgetary Strategy of the Czech Republic for 2025–2027,[1] CZSO[2] published revisions to the national accounts in June 2024. The cited MF CR documents published in April 2024 did not take these revisions into account. The August macro forecast of the MF CR[3], which already took the revisions into account, did not include this forecast. Therefore, we do not focus on the next three years (2025–2027).

1.1 Public sector developments in 2023 and outlook for 2024

The Czech Republic's real gross domestic product (GDP) declined by 0.1% year-on-year in 2023.[4] This was the second year in the last decade that real GDP fell on a year-on-year basis.[5] In 2023, the decline was driven by a change in inventories (–2.7 pp), as firms used the inventories accumulated in previous years (mainly 2021, partly 2022), in which inventories were in turn built up due to concerns about production continuity associated with disrupted global supply and demand chains. A negative contribution was recorded for household final consumption expenditure (–1.4 pp), reflecting both a year-on-year decline in average real wages for the second year in a row[6] (–9.4% in 2022; –2.4% in 2023) and increased savings due to concerns about a receding inflationary wave and uncertainty about the future path of the economy. The balance of services did not contribute to the annual change in GDP (i.e. the contribution was practically zero, 0.0 pp). In contrast, foreign trade in goods (2.6 pp) supported real GDP growth in 2023, reflecting reduced prices and volumes of imported mineral fuels and modest growth in exports of machinery and transport equipment. Gross fixed capital formation also contributed positively (0.7 pp) to real GDP growth. Private sector investment was dampened by restrictive monetary policy and developments in the German economy (a major partner in international trade). The public sector accounted for less than 18% of total investment in the economy in 2023 but contributed significantly to annual growth in gross fixed capital formation. It used both domestic and EU resources to finance its investment activity (including the last year for the 2014–2020 programming period). Government final consumption expenditure also made a positive contribution to real GDP growth in 2023 (0.7 pp), driven by, inter alia, higher intermediate consumption and compensation of employees. From a business cycle point of view, the Czech economy was below its potential in 2023, with the output gap reaching –1.2% of potential output according to the August macro forecast of the MF CR.

The balance of the general government sector in 2023 was –3.5% of GDP.[7] The result was weighed down most by the deficit of the central government (4.4% of GDP) and slightly by the deficit of the social security funds (0.1% of GDP). Local government

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[1] MF CR (April 2024): Convergence Programme of the Czech Republic; MF CR (April 2024): Rozpočtová strategie sektoru veřejných institucí České republiky na léta 2025–2027 [General Government Budgetary Strategy of the Czech Republic for 2025–2027, available in Czech only].
[2] See https://csu.gov.cz/produkty/vysledky-mimoradne-revize-narodnich-uctu for more details [available in Czech only]. Changes resulting from revisions to the national accounts are reflected in the first chapter, not in the remaining chapters of the Long-Term Sustainability Report.
[3] MF CR (August 2024): Macroeconomic Forecast of the Czech Republic. Changes resulting from the release of this macro forecast are reflected in the first chapter. The remaining chapters of the Long-term Sustainability Report do not cover above-mentioned macro forecast.
[4] MF CR (August 2024): Macroeconomic Forecast of the Czech Republic.
[5] The first period was the pandemic year 2020 (5.3% decline in real GDP).
[6] See https://csu.gov.cz/produkty/hmu_ts.
[7] Excluding the 2023 estimates of the general government balance (or its ratio to GDP) from the beginning of 2024, there were frequent changes in the balance and its ratio during 2024. In its April 2024 macro forecast, the MF CR reported a balance of CZK –240 billion and –3.3% of GDP (these figures were taken from the CZSO, which sent them to Eurostat as part of the so-called first notifications and published them at the beginning of April 2024). The Convergence Programme issued at the end of April 2024 already contained values for the 2023 balance for the general government sector of CZK –268 billion and –3.7% of GDP. This difference was due to changes in the fiscal data in the first notifications by Eurostat during April 2024. [The reasons for the difference are also discussed in Box 1 in CFC (2024): Report on the Compliance with the Rules of Budgetary Responsibility for 2023.] The revisions to the national accounts published by the CZSO at the end of June 2024 changed, among other things, the value of GDP for 2023. While the value of the sector balance remained almost unchanged (there was an increase of CZK 10 million), the balance-to-GDP ratio changed to –3.5% of GDP due to the increased nominal GDP for 2023. In its August macro forecast, the MF CR reports the sector balance at CZK –292 billion and –3.8% of GDP. The deterioration of the 2023 balance of CZK 23.2 billion compared to the figures reported by the CZSO after the revision of the national accounts is due to lower corporate income tax revenues and the levy on excess revenues of electricity producers. However, the value of the balance reported in the August MF CR material has not yet been notified. The CZSO will publish the values of the general government balance in the framework of the so-called second notifications only in October 2024. Therefore, in this chapter we use the data on the general government balance (and its sub-sectors) published by the CZSO and confirmed by Eurostat in the framework of the first notifications, see CZSO (2024): Public database, Reporting of government deficit/surplus and debt levels and provision of associated data [accessed 23 August 2024].

subsector, on the other hand, recorded a surplus of 0.9% of GDP.[8]

The structural balance of the general government sector in 2023 is –2.3% of GDP[9] (Chart 1.1.1, blue line). Such a high structural deficit reflects changes in the sector's revenue and expenditure structure, mainly dating back to the COVID-19 pandemic (2020 and 2021). The increase in the structural deficit during the pandemic was made possible by two amendments to the Act. In the original Article 10, the Act capped the structural balance at –1% of GDP (see the red dashed line in Chart 1.1.1). The first

amendment to the Act in April 2020, in Article 10a, set this limit at –4% of GDP for 2021 (see the grey dashed line in Chart 1.1.1).[10] The second amendment to the Act at the end of 2020, in Article 10a, specified the mechanism for calculating the structural balance limit for 2022 only. This limit was set at –5.6% of GDP (see the black dashed line in Chart 1.1.1). According to the CFC's interpretation, Article 10a in the second amendment of the Act did not specify the limit for 2023 and beyond, and therefore the structural balance limit should have been reinstated according to the original text of the Act (i.e. –1% of GDP).[11]

Chart 1.1.1 General government structural balance
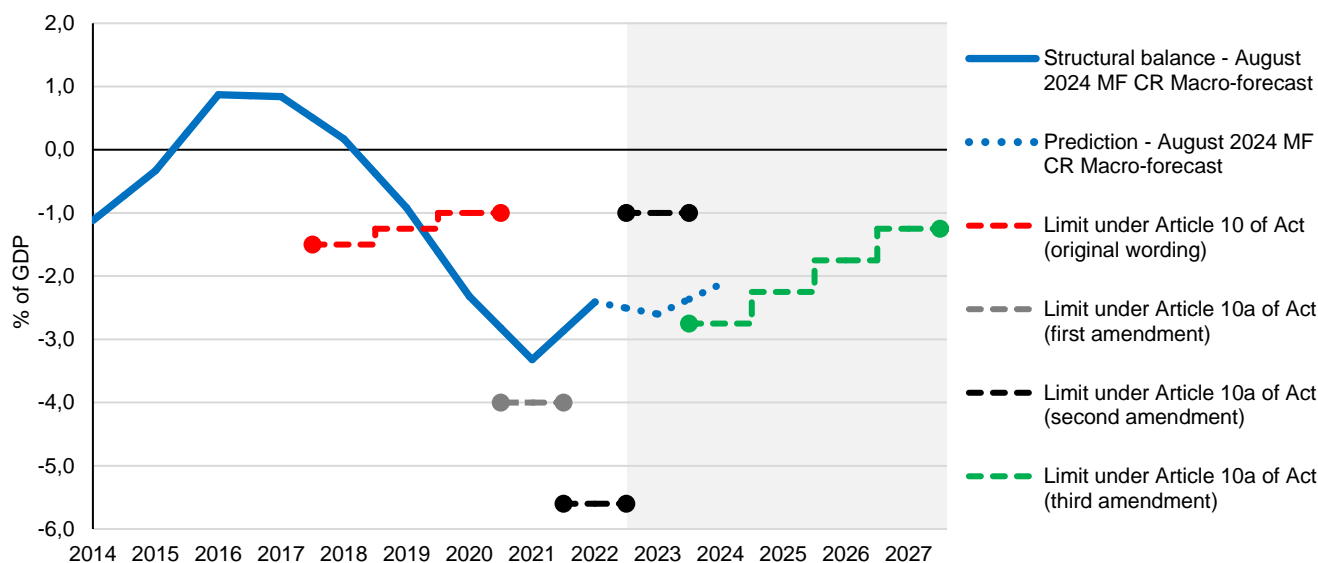
Source: MF CR (August 2024): Macroeconomic Forecast of the Czech Republic, Act (various versions); CFC calculations.
Note: The structural balance for 2023 is derived from the total balance of the public sector -3.8% of GDP according to the MF CR (August 2024): Macroeconomic Forecast of the Czech Republic. This value of the balance for 2023 has not yet been published by the CZSO in the framework of the so-called second notifications (October 2024). Therefore, we consider the structural balance for 2023 presented in this chart to be a forecast and in the text of the Long-term Sustainability Report we present the overall sectoral balance for 2023 at -3.5% of GDP (according to the first notifications of April 2024), or the structural balance derived from it according to the adjustments presented in footnote 9.

The year 2023 brought efforts to consolidate public finances, which included a third amendment to the Act (implemented by Act No. 349/2023 Coll.[12]). This amendment to the Act sets out a trajectory of reduction of the structural deficit limit starting in 2024 and continuing for the following years 2025–2027 (see

green dashed line in Chart 1.1.1) until the 1% threshold of the structural deficit-to-GDP ratio specified in the original version of the Act before the amendments is reached.

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[8] CZSO (2024): Public database, Reporting of government deficit/surplus and debt levels and provision of associated data. For details see also CFC (2024): Report on Compliance with the Rules of Budgetary Responsibility for 2023, where the CFC analyses the evolution of surpluses and their allocation over the period 2013–2023 (see Box 4).

[9] The calculation of the structural balance was based on the total general government balance according to the CZSO (2024) Public database, Reporting of government deficit/surplus and debt levels and provision of associated data [accessed 23 August 2024]. The reasons are given in footnote 7. The cyclical component of the balance and one-off and temporary measures were taken from MF CR (August 2024): Macroeconomic Forecast of the Czech Republic. Chart 1.1.1 shows the value of the structural balance for 2023 and 2024 according to the MF CR (August 2024). As the data for the general government balance for 2023 have not yet been confirmed in the context of the so-called second notifications, we also consider the balance figure in Chart 1.1.1 for 2023 as a forecast.

[10] The first amendment to the Act also set a trajectory of improving the structural balance by 0.5% of GDP each year after 2021. This would imply a return to the 1% deficit threshold in 2027. This trajectory is not shown in the graph for clarity.

[11] Box 2.1 in the CFC (2022): Report on the Long-term Sustainability of Public Finances provides an overview of the first and second amendments to the Act.

[12] Zákon č. 349/2023 Sb., kterým se mění některé zákony v souvislosti s konsolidací veřejných rozpočtů, ve znění pozdějších předpisů [Act No. 349/2023 Coll., Amending Certain acts in Connection with the Consolidation of Public Budgets, as amended; available in Czech only].

In its August forecast, the MF CR estimates the structural balance at –2.1% of GDP for 2024 (see the blue dotted line in Chart 1.1.1). However, this estimate is subject to a number of uncertainties, including lower-than-expected revenues from the sale of emission allowances (see Box 1.1) or calls for an increase in current spending from some budget chapters (but without at least a proportional reduction in spending in other ministries, given the limited scope for incorporating claims from unspent expenditure).

Box 1.1 Issues in estimating revenues from emission allowances auctions

Emission allowances are the main instrument for regulating the amount of greenhouse gas emissions in the European Union under the so-called EU Emissions Trading System (EU ETS). There is a cap on the number of emission allowances, which indicates the maximum amount of emissions that can be emitted by installations and operators covered under the EU ETS. In order to control (reduce) emissions and achieve the European climate targets, the emissions cap is reduced each year.

The European Union allocates part of the allowances to selected companies free of charge. The rest of the allowances are auctioned by individual Member States, and operators of installations (e.g. power plants and other installations) can buy allowances through an auction on the primary market (directly from the Member State) or on the secondary market, where companies can also exchange allowances between themselves. Proceeds from the sale of allowances on the primary market therefore constitute revenue for the Member State.

However, some allowances are allocated and auctioned earmarked for funds such as the Modernisation Fund, the Innovation Fund or, more recently, the Social Climate Fund. Some of the allowances that would otherwise be auctioned by Member States are also earmarked to finance the funds. Emission allowances earmarked for the Modernisation Fund are also referred to as "green allowances" in the Czech environment. However, unlike emission allowances auctioned by a Member State (otherwise also referred to as "yellow allowances"), green allowances are exclusively allocated to selected Member States, including the Czech Republic, and are auctioned by the European Investment Bank.

In addition, from 2024 onwards, revenues from the auctioning of yellow allowances can only be used for the purposes defined in the EU ETS Directive[13].

In order to estimate revenue from yellow allowances, it is necessary to determine the quantity of allowances to be auctioned by the Member State, the price of the allowances and the exchange rate.

The quantity of allowances to be auctioned is determined on the basis of the EU-wide emissions cap and the Member State's share, which is determined on the basis of the share of verified emissions of that Member State. However, several factors are taken into account in the calculation. For example, the calculation of allowances to be auctioned for stationary installations (the vast majority of auctioned allowances by the Czech Republic) is also influenced by deductions to the Innovation or Modernisation Fund, and now also to the Social Climate Fund and other deductions that further reduce the number of allowances to be auctioned. The key factor, however, is the Market Stability Reserve.

The Market Stability Reserve (the "Reserve") has been in place since 2019 and regulates the quantity of allowances in circulation, whereby, based on the total quantity of allowances in circulation, emission allowances are withdrawn or released from the Reserve[14]. The European Commission issues information on the total number of allowances in circulation and on the withdrawal or release of allowances under the Reserve mechanism around mid-year. If allowances are withdrawn to the Reserve, they are withdrawn for a period of 12 months, from September to August. Thus, the Reserve mechanism will affect the quantity of allowances in two budget years, and it is therefore necessary to estimate whether allowances will be withdrawn (or released) and how many will be withdrawn (released). Chart B1.1.1 shows the number of emission allowances to be auctioned by the Czech Republic according to the first and the final auction calendars. The difference is the withdrawal of emission allowances during the year to the Market Stability Reserve. Thus, during the existence of the Market Stability Reserve mechanism, approximately 5.5 to 3.9 million allowances were withdrawn each year that would have been otherwise auctioned by the Czech Republic. Failure to take the Market Stability Reserve into account can therefore have a significant impact on budget implementation. Moreover, the share of allowances withdrawn in the second half of the year in the number of allowances according to the first auction calendar is not stable, which makes it difficult to estimate the final number of allowances to be auctioned. While in 2019 about 17% of the allowances that would otherwise have been auctioned by the Czech Republic according to the first auction calendar were withdrawn to the Market Stability Reserve during the year, this share was 27% in 2024 and even 37% in 2022.

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[13] Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003.
[14] Emission allowances may also be released from the Reserve on the basis of their price. However, this release is unlikely.

Chart B1.1.1 Number of emission allowances auctioned by the Czech Republic according to the auction calendar
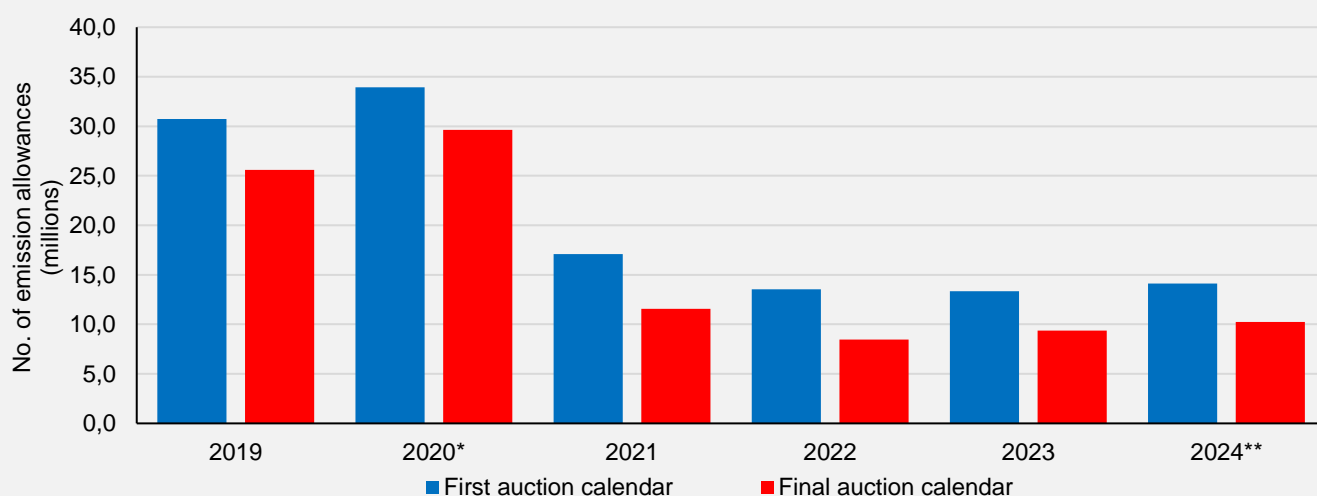

Source: EEX (2019–2023); CFC calculations.
Note: *In 2020, the number of emission allowances for aviation was adjusted in addition to the Reserve adjustment. During the year, 1,000 aviation emission allowances were withdrawn for the Czech Republic. However, this adjustment was not related to the Market Stability Reserve mechanism. **In 2024, it is not the final auction calendar, but only the number of allowances according to the updated auction calendar after the withdrawal of allowances to the Market Stability Reserve.

Another problem is estimating the price of an allowance, which is highly volatile. As a result, there is no fully reliable method for predicting the price of an allowance. Given the decreasing quantity of emission allowances, it is reasonable to assume that the price of an allowance will increase in the long term. However, this assumption may not hold true in the short term. Recent developments are an example of this. While in 2023 the price of an allowance exceeded EUR 100 due to high demand, there was a significant decrease at the beginning of 2024, when the price of an allowance fell below EUR 60 in February.

In order to estimate the revenues from auctions of the emission allowances, it is necessary to focus on the parameters on which the estimate is based. As shown in Chart B1.1.2, in the last two years, the expected revenues from auctions of the emission allowances were overestimated, which not only implies inaccuracy in the estimation of the revenues but also creates pressure to comply with the approved state budget deficit. In 2024, revenues of CZK 40.7 billion were expected in the approved state budget. However, given the decrease of the price of emission allowances and the withdrawal of around 3.9 million allowances that the Czech Republic would otherwise have auctioned to the Market Stability Reserve (see Chart B1.1.1), realised revenues are expected to be approximately CZK 25 billion lower.

Chart B1.1.2 Expected and actual revenues from the emission allowances auctions
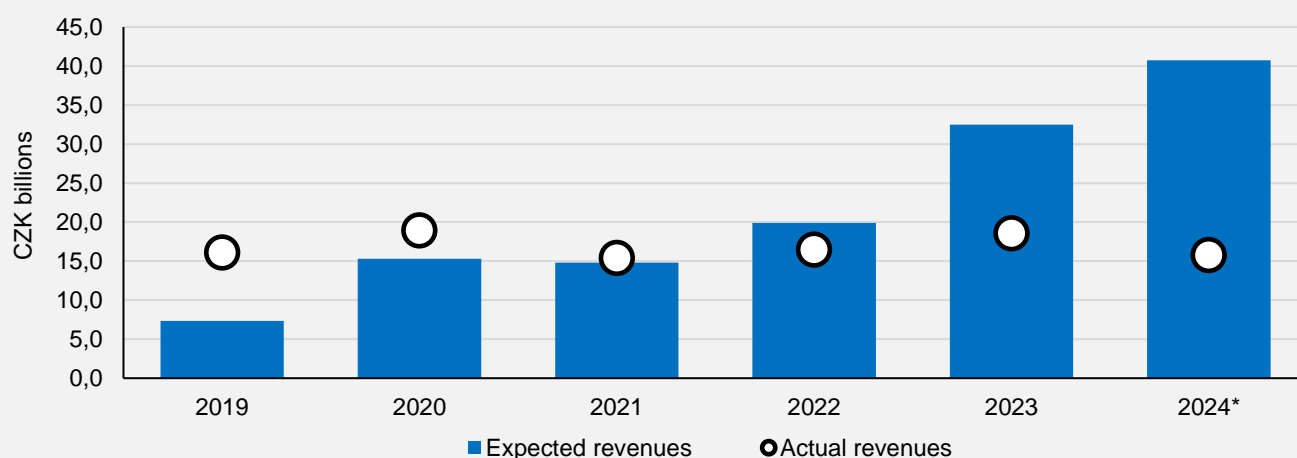
Source: Treasury Monitor (2024), EEX (2024), MF CR (August 2024): Macroeconomic Forecast of the Czech Republic; CFC calculations.
Note: *In 2024, it is not actual revenue but only an estimate at the average allowance price of EUR 61.36 and the exchange rate according to the MF CR (August 2024): Macroeconomic Forecast of the Czech Republic.

The rising government deficit is reflected in an increase in debt, all else being equal. The debt-to-GDP ratio reached 42.4% of GDP in 2023, a decrease of 0.1 pp compared to 2022 (see Chart 1.1.2). However, this slight year-on-year decline in the debt-to-GDP ratio cannot be interpreted as a clear success of fiscal policy. In addition to the primary balance of the general government sector, the (implicit) interest rate, the stock-flow adjustment (SFA)[15], changes in real GDP and the price level[16] influence the ratio.

It was nominal GDP growth (reflecting a significant increase in the price level)[17] and, to a lesser extent, the SFA that contributed significantly to the reduction in the debt-to-GDP ratio in 2023. The SFA item was affected by the super-dividend paid to the public sector by a corporation (co-)owned by the sector.[18] Working in the opposite direction were the primary deficit (reflecting the sector's deficit performance), interest expenditure (the impact of high interest rates and rising debt in recent years) and a slight decline in real GDP.[19]

The revision of the national accounts published by the CZSO in June 2024 led, among other things, to a slight increase in debt in 2023 (by about CZK 17 million). However, this increase was "outweighed" by an increase in nominal GDP, which reduces the sector's debt-to-GDP ratio (by about 1.6 pp).

Chart 1.1.2 General government debt minus the state debt financing reserve
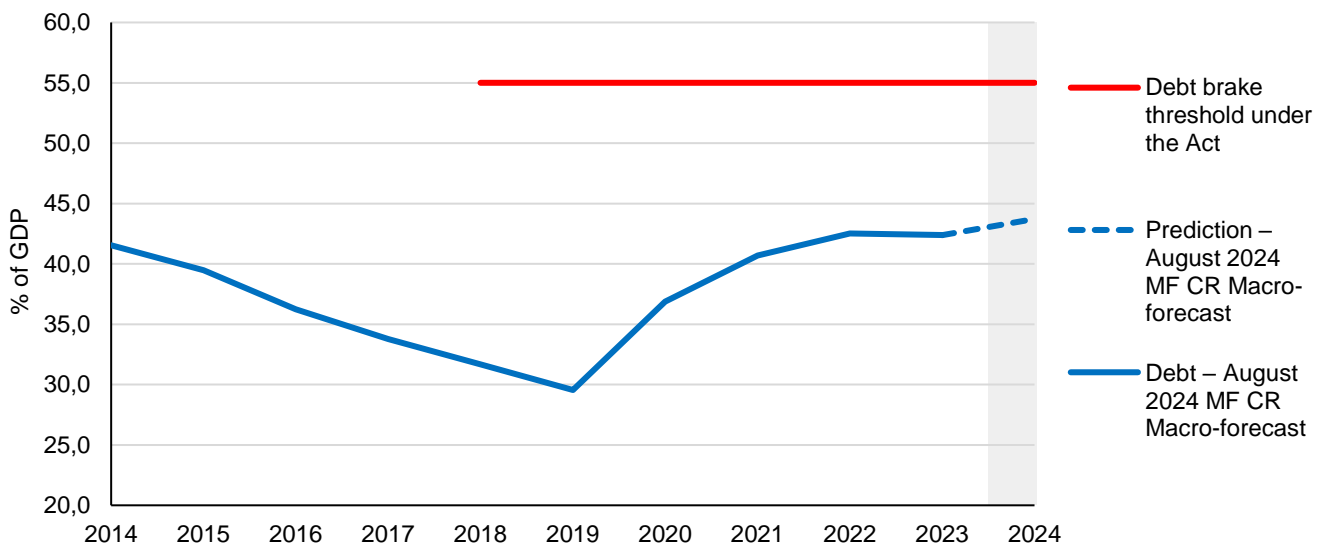
Source: MF CR (August 2024): Macroeconomic Forecast of the Czech Republic, Act; CFC calculations.

From the perspective of the sustainability of public finances, it is not only the level of debt that is important, but also the structure of debt holders, i.e. the entities that buy and hold government debt securities (residents and non-residents). This aspect is important mainly because non-residents are more likely to sell Czech government bonds in case of increased risk aversion on financial markets. If the share of debt held by non-residents increases, the country's net investment position changes as there

[15] The SFA measures the difference between the change in the debt and the general government balance over a given period. The SFA thus "loosens" the link between debt and the balance. The SFA can therefore increase or decrease debt without the change in debt corresponding to the balance. Therefore, because of the existence of the SFA, the debt of the general government sector cannot automatically be considered as the mere sum of the sector's previous balances. The SFA has three main components: (a) net acquisition of financial assets, (b) methodological adjustments, (c) statistical discrepancy. The first component is usually essential, the others are of minor importance. The net acquisition of financial assets may be affected by the issuance of debt securities by the general government sector, where the proceeds of the issue are not used to finance current expenditure but are used to build up a reserve to finance future expenditure. Thus, the issuance of government securities merely takes advantage of favourable conditions in the financial markets without any actual need for the funds raised. Furthermore, the net acquisition of financial assets is influenced, for example, by privatisation revenues. Details on the evolution of SFA are provided by a regular report issued by Eurostat, see currently Eurostat (2024): Stock-flow adjustment for the Member States, the euro area and the EU, for the period 2020–2023 (as reported in the April 2023 EDP notification) or also CFC (2024): Průvodce světem veřejného dluhu [Guide to the World of Public Debt, available in Czech only].

[16] The price level in this case is captured by the GDP deflator.

[17] This does not imply that high inflation has a positive effect on the public sector and its debt. The negative impact of the rising price level is reflected, inter alia, in the pressure to introduce further indexation, which will affect public finances in the future, see Box 1 in the CFC (2023): Report on Compliance with the Rules of Budgetary Responsibility for 2022 or Box 1.1 in the CFC (2023): Report on the Long-term Sustainability of Public Finances.

[18] For more details, see Box 1 in the CFC (2024): Report on Compliance with the Rules of Budgetary Responsibility for 2023.

[19] The determinants of the change in the debt-to-GDP ratio are summarised in Box 2 of the CFC (2023): Report on Compliance with the Rules of Budgetary Responsibility for 2022.

is an outflow of income abroad (interest payments), which has a negative effect on the primary income balance. From the perspective of assessing the riskiness of the public debt structure, a massive sell-off of domestic debt by foreign investors would not only cause exchange rate movements but it would also increase the volatility of Czech government bond market price.

However, from 2020 onwards, we observe a significant increase in the annual nominal gross borrowing requirement together with an increase in the share of domestic entities on public debt holdings. While at the end of 2019 residents held 61.6% of public debt, by the end of 2023 they held as much as 75.0%. This is the highest figure since the Czech Republic joined

the European Union[20]. Within the resident sector, the domestic banking sector in particular plays a key role for government bond absorption.

Non-residents thus held 25.0% of the Czech government debt at the end of 2023. In line with international practice, the CNB considers the critical threshold for the share of public debt held by foreign entities to be 25.9%[21]. The risk of external shocks spilling over into the domestic financial system thus continued to decrease during 2023, as the 25.9% threshold has been consistently exceeded since our accession to the EU, but in 2022 and 2023 the share of debt held by non-residents fell below this threshold, as it reached 25.5% and 25.0% at the end of 2022 and 2023 (see Chart 1.1.3).

Chart 1.1.3 Public debt held by residents and non-residents
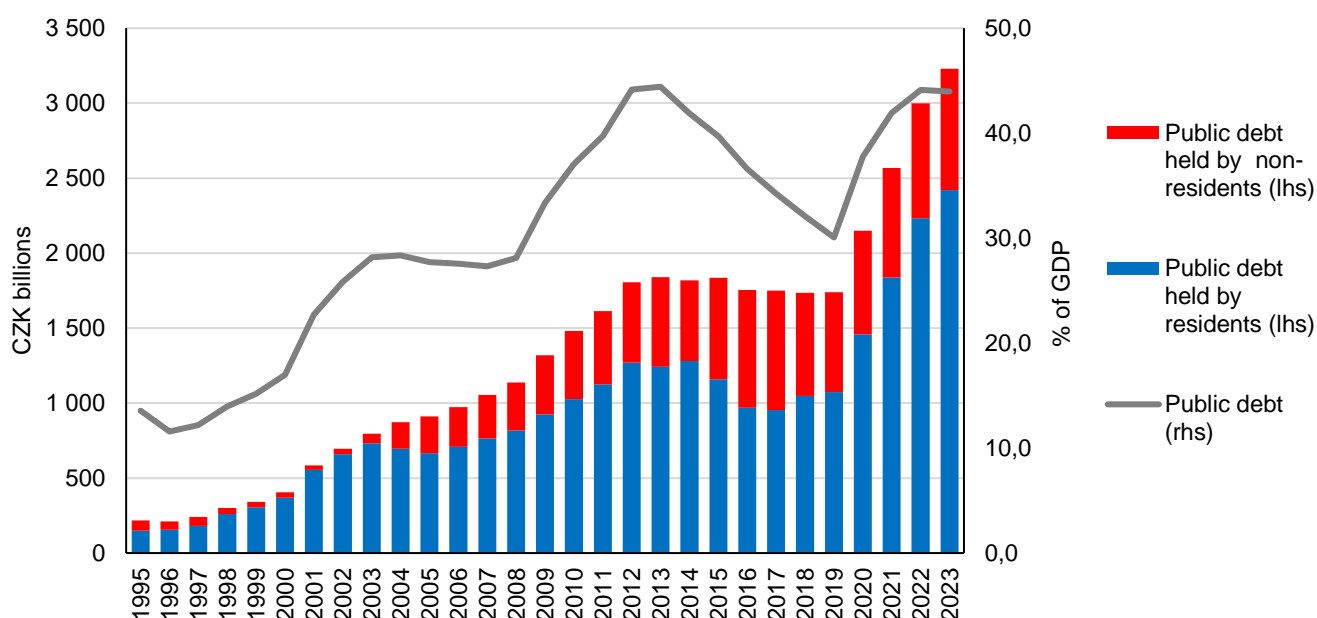
Source: CNB (2024); CFC calculations.

Financial institutions account for the dominant share of public debt held by domestic (resident) entities (see Chart 1.1.4). The largest nominal increase (by CZK 149 billion) in public debt holdings in 2023 occurred in the banking sector, which has been holding debt in excess of CZK 1 trillion since 2021. Domestic banks held 45.0% of public debt at the end of 2023, 1.5 pp more than in 2022 and 13.9 pp more than in 2019. At the end of 2023, Czech public debt held by

banks accounted for 14.7% of banking sector assets. Given the relatively high share of government bonds in banks' balance sheets, an escalation of sovereign risk would have significant impact on the financial system. The CNB had already warned of the risks of concentration of sovereign exposure at the end of 2020[22], when the value of domestic government bonds accounted for 10.3% of domestic banks' total assets.

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[20] Public debt held by residents was 79.5% at the time.
[21] CNB (2022): Financial Stability Report - Spring 2022.
[22] CNB (2021): Financial Stability Report 2020/2021.

Chart 1.1.4 Public debt held by residents
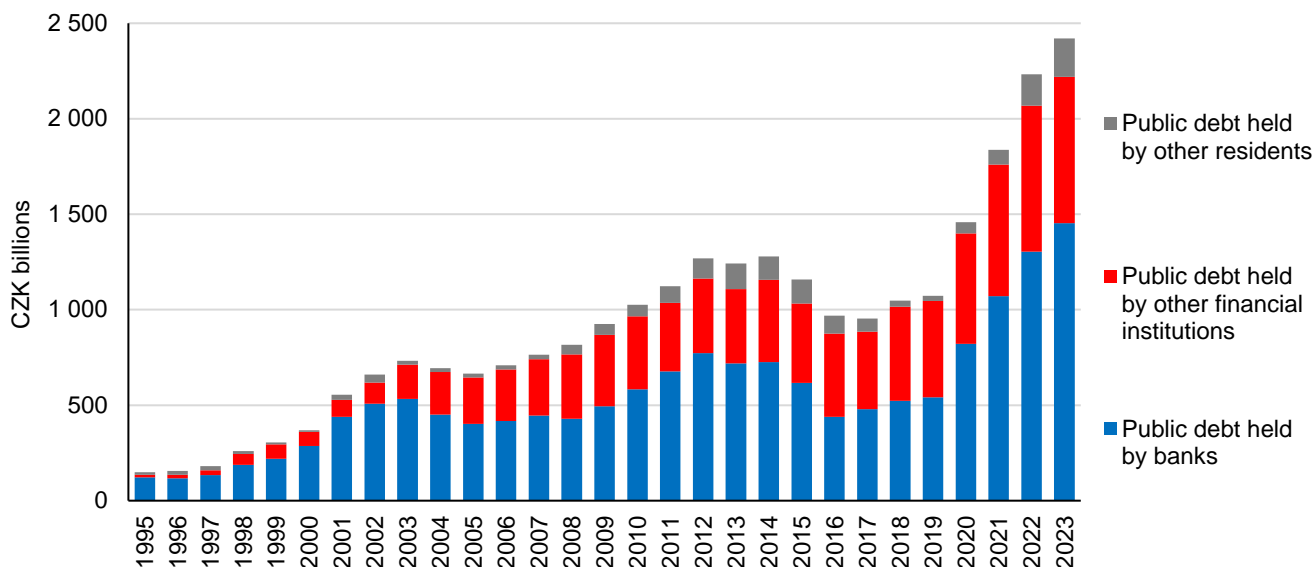
Source: CNB (2024); CFC calculations.

Medium- and long-term government bonds issued in domestic currency continue to play a key role in financing the gross borrowing requirement of the state, which amounted to CZK 585.5 billion in 2023. The average maturity of government bonds issued in 2023 was 8 years and 7 months, with an average yield of 4.51% p.a.[23] The higher average maturity of newly sold bonds also affects the average maturity of government debt, which reached 6.4 years at the end of 2023, an increase of 0.2 years year-on-year. The Czech Republic has managed to maintain the highest rating among the Visegrad Four countries and has been above the average rating of euro area countries for several years.

In 2024, gross issuance of CZK 300 to 400 billion in total nominal value of koruna government bonds is expected. This is due to both a lower planned government budget deficit compared to its actual level in 2023 (by CZK 36.5 billion) and lower government debt repayments (by CZK 159 billion) compared to 2023.

Box 1.2 Public/state debt by holder

State debt can be understood as the volume of government bonds issued[24] to cover the deficits (shortfalls) of the state budget for all previous years. State debt does not include the debt of other central government units (e.g. public universities or the Railway Administration), local governments (regions and municipalities), extra-budgetary funds or health insurance companies. State debt is therefore a subset of public debt, but a dominant one, currently accounting for about 96% of Czech public debt.

Czech government bonds are purchased either by entities belonging to the **resident** sector (banks, pension funds, insurance companies, investment funds, households, local governments) or by entities belonging to the **non-resident** sector (foreign institutional investors). In the history of the Czech Republic, there have been several significant changes in the structure of holders of government bonds (and thus holders of public debt).

Public debt held by non-residents was very low between 1999 and 2004, averaging 7.6% of total debt over this period. After EU accession, public debt held by non-residents increased sharply and by the end of 2005 (one and a half years after EU accession) its share of total debt was already close to 27.0%. Until 2014, the share of non-residents in general government debt was around 30%. Between 2015 and 2017, there was a significant increase in government debt held by non-residents, and at the end of 2017, the share of non-residents in public debt holdings was 45.4%[25] (Chart B1.2.1).

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[23] This is the average yield on fixed-rate Czech koruna medium- and long-term government bonds sold on the primary and secondary markets in 2023.
[24] In addition to the government bonds issued, government debt also includes loans received (e.g. from the European Investment Bank).
[25] The climax was reached in September 2017, when around 50% of the Czech Republic's government debt was held by non-residents.

Chart B1.2.1 Structure of public debt by holder

Source: CNB (2024); CFC calculations.

Foreign investors' interest in Czech government bonds was mainly driven by speculation on strong appreciation of the koruna in anticipation of the Czech National Bank terminating its exchange rate commitment. In addition, non-residents demanded and held most government securities in shorter maturities, which was reflected in a decline in the average time to maturity of state debt over this period (Chart B1.2.2).

Chart B1.2.2 Average maturity of state debt
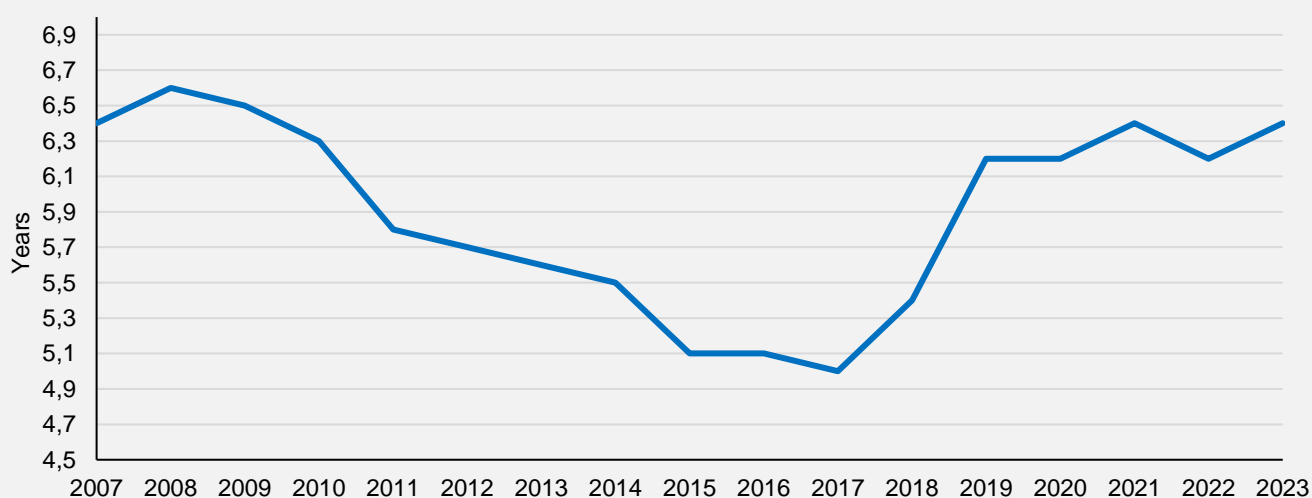
Source: MF CR (2024); CFC calculations.

The last significant change in the structure of debt holdings has been underway since March 2020, i.e. from the outbreak of the pandemic. Since then, not only has the share of public debt held by non-residents declined and the share held by residents increased (Chart B1.2.1), but the structure within the resident sector has also changed. While in 2019 the domestic banking sector held 35% of all government bonds held by residents, by the end of 2021 it was already 60%. This significant change in the structure is due to a nominal increase of CZK 708 billion (from CZK 302.9 billion to CZK 1 011.5 billion) in government bonds held by the banking sector in 2020 and 2021.

In December 2023, the structure of holders of government bonds in the context of the MF CR's statistics reporting changed significantly, with the share of the non-resident sector in government bond holdings rising sharply from 28% to 35% (Chart B1.2.3). However, this is only a technical legal issue with no economic implications and no impact on public debt statistics (Chart B1.2.1).

In fact, transfers of government bonds under financial collateral in selected financial groups between Czech subsidiary companies and parent companies were carried out on a large scale. The reason for the short-term upward swing in the share of non-residents is the change in the legal ownership of the financial collateral received in the form of government bonds. The economic ownership remained in the original domestic banking sector. However, the MF CR statistics capture holdings of government bonds on the basis of the legal ownership principle, and thus also capture government bonds that are held by the entity only as an object of financial collateral at a given date.

Chart B1.2.3 Government bonds held by non-residents

Government bonds held by non-residents (lhs) ▬▬ Share of government bonds held by non-residents (rhs)
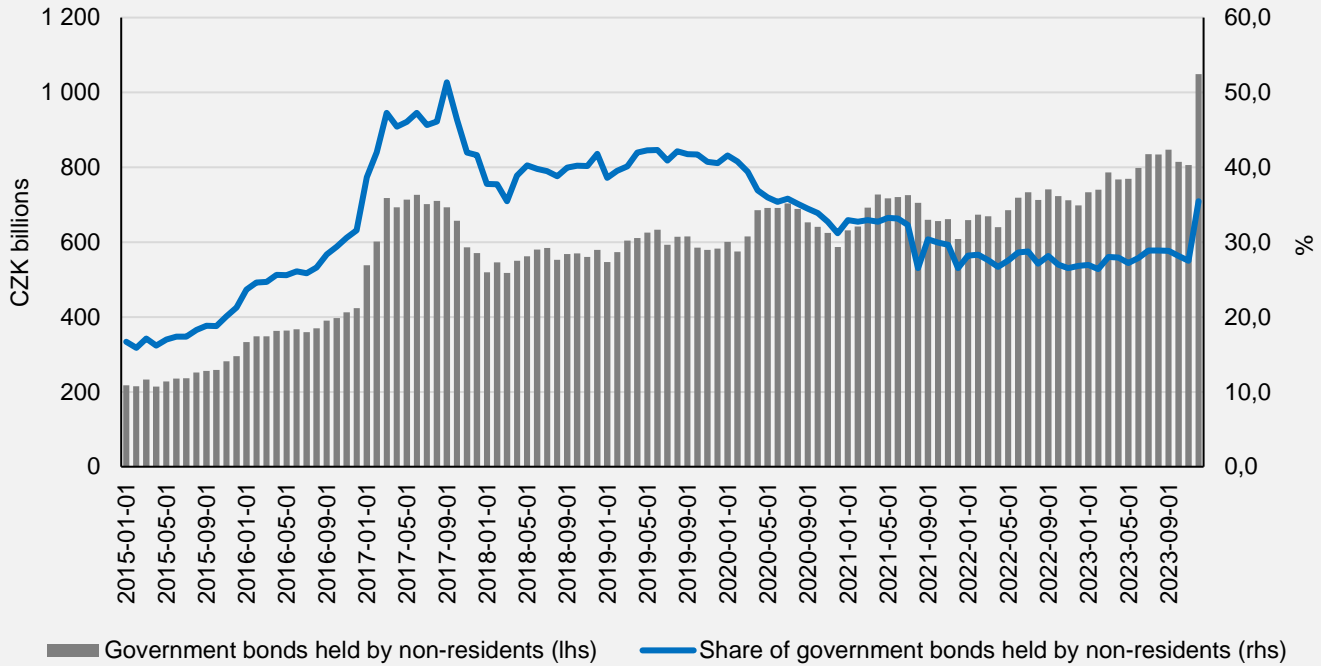
Source: MF CR (2024); CFC calculations.

1.2 Decomposition of fiscal effort

Fiscal effort represents the change in the structural balance between two periods. If it is negative, fiscal policy is eased, if positive, it is tightened. The three main factors influencing the level of fiscal effort are: autonomous developments (e.g. a higher share of wages and salaries in GDP leads to higher revenues for the general government sector due to higher taxation of the factor of production of labour compared to capital), discretionary actions of the government (deliberate government measures) and factors depending on other determinants (e.g. investment activity of municipalities depends in part on the implementation of various operational programmes).

Table 1.2.1 shows the decomposition of the fiscal effort over the period 2018–2023. The decomposition is carried out using the so-called indirect method, i.e. as the year-on-year change in the structural balance followed by a decomposition. In 2023, the fiscal effort is 0.1 pp, i.e. there are no significant changes in the composition of general government revenue and expenditure.

Among the significant discretionary measures of the government affecting the structural balance in 2023 on the government expenditure side were the June extraordinary indexation of pensions, increased interest in early pensions and the introduction of the so-called "child-rearing bonus" in the total amount of CZK 34.5 billion.[26]

Table 1.2.1 shows the high impact of one-off and temporary measures. Although these measures do not affect the structural balance of the general government sector, they do affect the overall sector balance and may also stimulate the economy with possible inflationary pressures.

The measures in the years under review became more important during the pandemic period (see in particular 2020 and 2021) and aimed at limiting the negative consequences of the covid crisis. The following years, 2022 and 2023, were affected by the conflict between the Russian Federation and Ukraine, which had a negative impact on energy and food prices, among other things. These events

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[26] These items are covered by the following legislation: Acts no. 323/2021 Coll., 71/2023 Coll., 270/2023 Coll.

also led to the introduction of one-off and temporary measures.

In 2023, important revenue-raising measures for the public sector included the introduction of a windfall profits tax (CZK 39.1 billion) and a levy on excess revenues of electricity producers (CZK 17.2 billion). Conversely, the waiving of renewable energy levy on households and businesses (CZK 17.3 billion)

reduced the sector's revenue. Government spending in 2023 was boosted by, among others, the following one-off and temporary measures: capping energy prices (CZK 48.4 billion), subsidies to CEPS (CZK 20.0 billion), the accommodation allowance and humanitarian benefit for refugees (CZK 13.7 billion), and reimbursement of part of distribution costs (CZK 13.6 billion).[27]

Table 1.2.1 Decomposition of the fiscal effort (pp)

	2018	2019	2020	2021	2022	2023
Taxes and social contributions	*0.5*	*-0.6*	*2.2*	*-1.4*	*-1.1*	*0.9*
Other revenue	*0.4*	*-0.1*	*0.1*	*-0.1*	*0.6*	*0.0*
in which one-off revenue-side measures*	*-0.1*	*0.0*	*-0.7*	*0.5*	*0.0*	*0.7*
REVENUE	1.0	-0.7	2.9	-2.0	-0.5	0.3
Compensation of employees and intermediate consumption	*-0.8*	*-0.1*	*-1.3*	*0.5*	*1.0*	*0.0*
Social transfers and social transfers in kind	*0.1*	*-0.1*	*-2.6*	*0.5*	*0.6*	*-0.4*
Interest	*0.0*	*0.0*	*-0.1*	*0.0*	*-0.4*	*-0.2*
Investment	*-0.8*	*-0.2*	*-0.5*	*0.2*	*0.1*	*-0.4*
Other expenditure	*-0.1*	*0.1*	*-1.5*	*0.0*	*0.8*	*0.1*
in which one-off expenditure-side measures*	*0.0*	*0.1*	*-1.6*	*0.2*	*0.8*	*-0.6*
EXPENDITURE	-1.7	-0.3	-4.3	1.1	1.3	-0.2
FISCAL EFFORT	-0.7	-1.1	-1.3	-0.9	0.8	0.1

Source: CZSO (2024), MF CR (2019, 2021, 2022, 2023, 2024): Convergence Programme of the Czech Republic, MF CR (August 2024): Macroeconomic Forecast of the Czech Republic; CFC calculations.

Note: *Taxes and social contributions* were cyclically adjusted, other items were not. Cyclical component of the balance taken from MF CR (August 2024). One-off measures on the revenue- and expenditure-side are from the Convergence Programmes of the Czech Republic. Positive values imply a tightening of fiscal policy. Totals in the table may be subject to inaccuracies due to rounding. The fiscal effort in 2023 is significantly different from the published value in the MF CR (August 2024), as the MF CR calculates the fiscal effort on the basis of a general government balance of –3.8% of GDP in 2023 (which has not yet been notified) or a structural balance of –2.6% of GDP. The year 2024 is not included in the analysis because the publication of the MF CR (2024): Convergence Programme of the Czech Republic containing the forecast for the period 2024–2027 was issued in April 2024, i.e. before the publication of the revisions to the national accounts by the CZSO at the end of June 2024.

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[27] These items are covered by the following legislation: Acts No. 65/2022, 66/2022, 176/2022, 198/2022, 365/2022, 366/2022, 5/2023, 75/2023; Government Regulations No. 206/2022, 322/2022; Government Resolutions No. 207/2022, 235/2022, 112/2023.

2 Long-term macroeconomic projection

The long-term projection of general government revenue, expenditure and balance over a 50-year period is based on projections of the main macroeconomic variables. The most important of these are the GDP growth rate, employment, labour productivity and volume of wages.[28] We relate our fiscal projections to GDP and other variables in real terms. In contrast to the medium-term outlook, in the long-term projection we abstract from the business cycle. The estimated evolution of the economy is therefore a simulation of the evolution of potential GDP and other corresponding macroeconomic indicators. In previous years, the economic development in 2020 and 2021 was negatively affected first by the impact of the COVID-19 pandemic and the anti-contagion measures and then by a negative supply shock related to the invasion of Ukraine by the Russian

Federation. The effect of this negative supply shock became fully apparent in 2022 and persisted in 2023. Both these economic shocks affected not only the cyclical position of the economy (negative output gap) but also estimates of current and past potential output growth in the Czech Republic and abroad.

The overall negative economic shock was very large, implying uncertainty about the starting point of our projections. Estimates of potential output in the Czech Republic and abroad may be revised in the future. This uncertainty about the starting point is exacerbated by the regular large-scale revision of national accounts across EU countries (taking place from early summer 2024), which has not yet been reflected in our projections and will likely imply an upward revision of GDP in the Czech Republic.

2.1 Real convergence

As in previous years, our long-term macroeconomic projections assume that the Czech economy is and will remain a converging economy. We continue to view Austria as the Czech economy's convergence target. Austria, like the Czech Republic, is a standard EU member state economy, and is similar to the Czech economy in size and structure.

We model the convergence process as convergence of GDP per worker, i.e. convergence of whole-economy labour productivity. We assume that the

difference between labour productivity in the Czech Republic and Austria will shrink by a constant percentage each year. Thus, the gap between Austrian and Czech GDP per worker levels, which was estimated at 24.8% of the Austrian level in purchasing power parity in 2023[29], will narrow by roughly 2.4% per year on average. This is in line with the speed of convergence over the last 20 years and with the usual empirical convergence results (see Chart 2.1.1).

Chart 2.1.1 Convergence of output per worker to the Austrian level
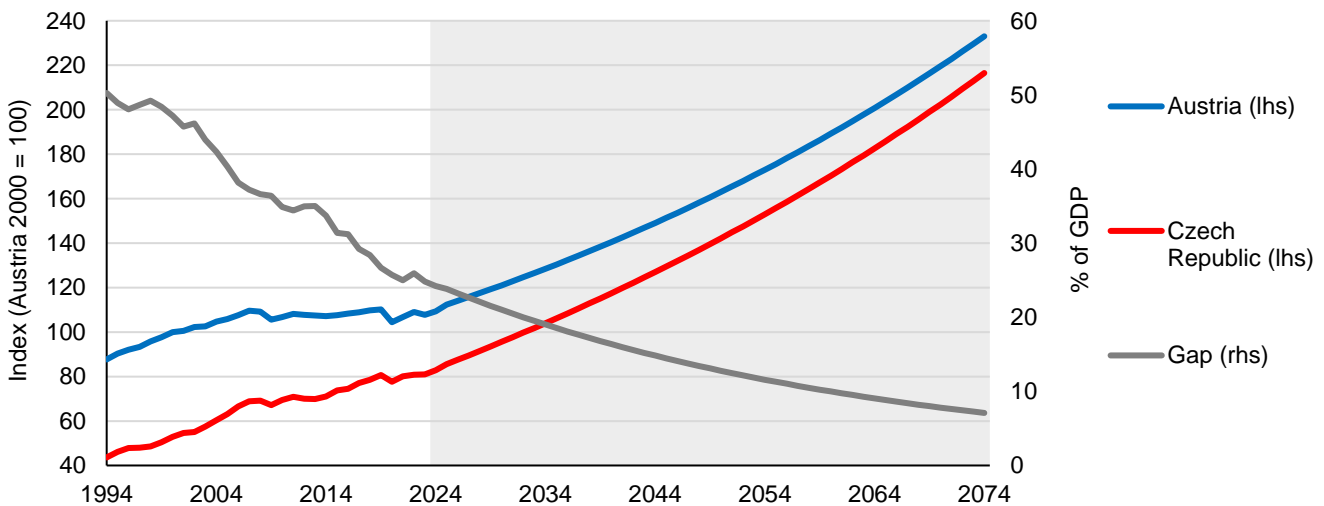
Source: CZSO (2024), OECD (2024); CFC calculations.

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[28] A more detailed explanation of the methodology and the parameters used for the long-term macroeconomic projection is given in OCFC (2019): Dlouhodobá makroekonomická projekce ČR [Long-Term Macroeconomic Projection of the Czech Republic, available in Czech only].
[29] Thus, the initial labour productivity in the Czech Republic was 75.2% of the Austrian level (adjusted for the output gap). In 2023, Austria's GDP per worker fell faster than the Czech Republic's (–1.8% vs. –1.1%), while Austria has a less negative output gap (about half the size of the Czech Republic's). After a brief pause in the convergence of output per worker in 2022 (see the small "tooth" in Chart 2.1.1 for the grey line for 2022), this convergence is corrected and resumed in 2023.

In addition to the convergence component of labour productivity growth, we assume continuous autonomous technology growth (the growth rate of total factor productivity) of 1.5% per year. This is in line with the long-term average for developed countries if we exclude the effect of the financial crisis in 2008 and 2009, the COVID-19 pandemic crisis in 2020 and 2021, and the stagflation crisis related to the invasion of Ukraine by the Russian Federation (2022 and 2023). This technology growth rate is symmetrically reflected in the growth of the Austrian and Czech economies. When estimating the long-term growth of the Czech economy, it is necessary to add it to the convergence component of growth. It should be noted that the assumption of a 1.5% growth rate of Austrian GDP per worker has not been met much in

the last 15 years or so, so that the lower growth of the common labour productivity growth component is a risk factor for the projection (see also the alternative scenario in section 5.1).

In our simulation, the growth rate of GDP per worker thus falls from 2.3% in 2024 to 1.7% at the end of the projection as a result of the convergence component of growth gradually being exhausted. With the given parameter settings, this implies that whole-economy labour productivity could be at 92.9% of the future Austrian level in 2074. We then use the convergence of labour productivity and the projected evolution of the number of workers, which depends primarily on demographic change, to generate the overall GDP projection.

2.2 Demographic projection

The demographic projection is a key parameter for the long-term sustainability of public finances. It significantly affects both the expenditure side of public budgets, such as pensions, health care, education and social benefits, and the revenue side. Demographic projections are also one of the basic inputs for macroeconomic projections and intergenerational accounts. It is used as the basis for simulating the

number of workers, which is affected by both the projected population count and the age structure of the population.

The long-term demographic projection is based on the demographic projection published by the CZSO in November 2023, which is drawn up in three variants: medium, high, and low.[30]

Table 2.2.1 Materialisation of the CZSO's demographic projection in 2022–2023 (‰)

	2022*			2023		
	projection	reality	difference	projection	reality	difference
Net migration	2.426	30.647	28.220	9.072	8.703	-0.369
Natural growth	-0.796	-1.758	-0.963	-1.507	-1.990	-0.482
gross mortality rate	*10.598*	*11.173*	*0.575*	*10.190*	*10.369*	*0.179*
gross birth rate	*9.802*	*9.415*	*-0.388*	*8.682*	*8.379*	*-0.303*
GROSS OVERALL GROWTH RATE	1.630	28.888	27.258	7.565	6.713	-0.852
Gross fertility rate	*1.700*	*1.618*	*-0.082*	*1.500*	*1.453*	*-0.047*

Source: CZSO (2023); CFC calculations.
Note: *Difference from the 2018 demographic projection. Gross birth rate is the number of live births per 1,000 inhabitants (average). Gross fertility rate is the number of live births for each woman of reproductive age (15–49 years), assuming constant female fertility rates by age (the level for the year for which the gross fertility rate is calculated) and zero female mortality during the reproductive cycle.

For the baseline scenario of our projections, we have chosen the medium, i.e. most likely, variant of the demographic projection as the starting point.

As in previous years, we have updated the official demographic projection of the CZSO with new data. First, we replaced the age structure of the population as of 1 January 2024 with the observed reality. Subsequently, using the projected fertility, mortality and migration rates for 2024–2100 taken from the CZSO projection of 2023, we generated new projected population development including its age structure for each variant of the demographic projection.

The original demographic projection of the CZSO was based on the reality for the Czech Republic at the beginning of 2018. However, the actual development during the years 2018 to 2022 differed from this projection, which is discussed in more detail in Box 2.1 and Table 2.2.1. The mortality rate was already slightly higher in 2018 and 2019, then increased significantly in 2020 and 2021 due to the COVID-19 pandemic. In 2022, it remained above the projection, although it declined. Overall, then, for 2018 to 2022, the number of deaths was 9.4% higher than projected (i.e. 0.5% of the 2018 population). The birth rate changed in the opposite direction in 2022, being

[30] CZSO (2023): Population Projections of the Czech Republic 2023–2100. The differences from the original CZSO demographic projection of 2018 are discussed in Box 2.1.

lower than the CZSO projection. In contrast, the number of births in 2018–2021 was 2% higher than projected. However, the main shock in 2022 was a markedly positive migration balance (an increase in the total population by approximately 300,000 people), which included people granted temporary protection in connection with the armed conflict in Ukraine. Overall, population growth in 2022 was 2.7% higher than projected in the original 2018 demographic projection.

The variations discussed above are reflected in the change in the demographic projection (see Box 2.1). Already during the year 2023, deviations from the new demographic projection have occurred, mostly towards lower population growth. Migration, birth and fertility rates were lower, and mortality rates were higher than expected by the new demographic projection.

Using demographic projections, we estimated workforce growth as the population aged 21 years and older minus the projected number of old-age pensioners and level 3 disability pensioners. We estimate the number of recipients of these pensions primarily based on the statutory retirement age.[31] In projecting the number of workers, we assume a stable labour force participation rate for each age group and a constant natural rate of unemployment. By linking the growth (or decline) rate of the labour force to the projection of GDP per worker, we obtain the growth trajectory of total GDP, from which we derive the growth rate of GDP per capita (see Table 2.3.1 in section 2.3).

Box 2.1 Changes in demographic projections of the CZSO

In November 2023, the CZSO published its updated demographic projection. This new demographic projection mainly reflected significant deviations from the previous projection of 2018, which we discussed in detail in our previous Long-Term Sustainability Report. Specifically, these included the impact of excess mortality related to the COVID-19 pandemic (years 2020 and 2021; the number of deaths in both years was 43,000 people higher than the projection), the administrative reduction in the population related to the 2021 Census of Population, Houses and Apartments (reduction of about 207,000 people), and the migration wave related to the armed conflict in Ukraine (about 300,000 people; partial outflow of these refugees is projected over the next five years). In terms of the total population, these effects have roughly cancelled out, so that for the next decade the projected population is quite similar to the 2018 projection (population lower by about 30,000; see Chart B2.1.1).

Chart B2.1.1 Population in 2000–2100 as projected by the CZSO 2018 and 2023
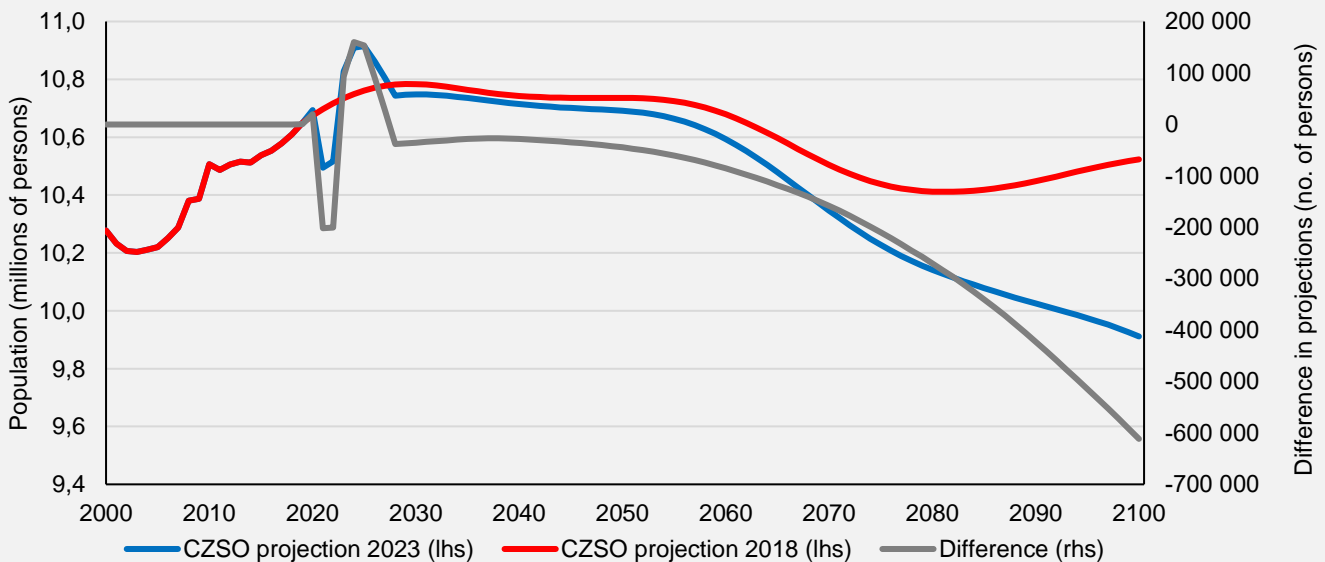
Source: CZSO (2023), CZSO (2018); CFC calculations.
Note: For the 2018 projection, data up to 2018 are actual; for the 2023 projection, data 2018–2022 are actual.

The new demographic projection not only reflects the above-mentioned changes in the initial size and structure of the population, but also brings about relatively significant changes in the parameters of its future development. First of all, there is a decrease in the gross fertility rate. According to the previous demographic projection, the fertility rate was supposed to reach 1.74 children per woman; now it is assumed that the cumulative fertility rate will be 1.5 children per woman throughout the projection period. This will lead to a lower number of births by about

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[31] The methodology and projection of the number of beneficiaries of pension benefits is described in more detail in section 3.1.

10,000 per year at the beginning of the projection, by about 20,000 children at the end of our projection horizon (2074) and by 25,000 children around 2100. On the other hand, the new demographic projection assumes a higher migration rate. After the end of the assumed refugee outflow (i.e. from 2028), the projected positive migration balance will be 35,000 persons per year (in the previous projection it was 26,000 people). At the same time, the new demographic projection assumes lower mortality rates and higher life expectancy at birth. The number of deaths will be on average 1,700 people lower over the horizon of our projection (i.e. 2024–2074). Taken together, these effects will result in a population lower by 200,000 people by the end of 2074.

Chart B2.1.2 Number of persons aged 21–64 per person aged 65 and over – development in 2000–2100 according to CZSO's projections of 2018 and 2023
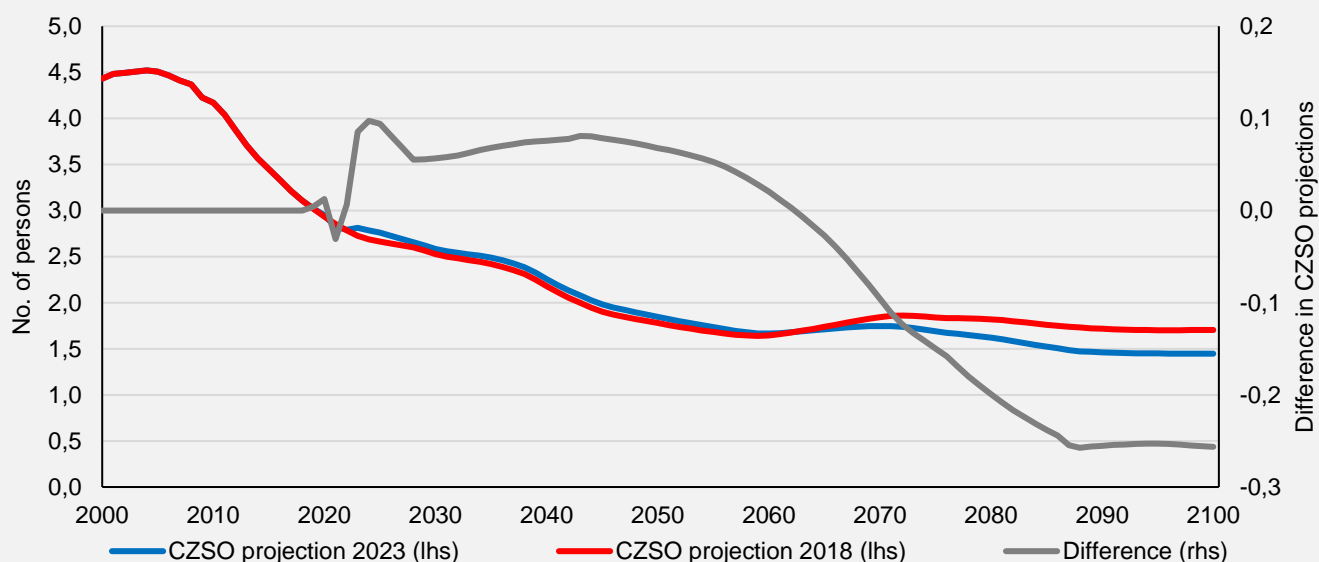
Source: CZSO (2023), CZSO (2018); CFC calculations.

The above changes in the demographic projection assumptions will also be reflected in the ratio of the working-age population (21–64 years) to the population over 65 years of age (see Chart B2.1.2), which is key to our pension projections. The ageing of the population is generally reflected in this indicator. Whereas in 2000 there were 4.4 persons of working age for every person over 65, this fell to 2.8 in 2023 and is projected to further decrease to 1.7 in 2060. In the new demographic projection, however, this ratio will be slightly more favourable for the pension system (by 0.1 person at most, see the right axis of Chart B2.1.2). This reflects the impact of the different timing of the changes in the assumptions underlying the demographic projections. While the projected lower birth rate will start to show a negative effect on the ratio only with a delay of 21 years (in the period when the "missing" children are expected to reach working age, i.e. around 2045), the positive migration balance, which is 9,000 people higher each year, shows an immediate effect on the number of working-age persons (the migration balance is concentrated in working-age persons). The improvement in this indicator will be counteracted by a lower number of deaths (i.e. a higher number of persons over 65). Around 2060, these opposing effects will cancel out, and after 2060 the effect of lower fertility and lower mortality will begin to prevail. At the end of our projection horizon in 2074, the ratio will already be by 0.14 person worse.

The impact of changes in the demographic projection related to deviations of actual developments from the assumptions of the demographic projection and changes in the assumptions of the demographic projection itself is evident from a comparison of the adjusted demographic projections used in previous Long-Term Sustainability Reports.[32] In the adjusted projection from 2020 to 2023, the parameters of the CZSO's 2018 demographic projection were used, and the changes thus reflect mainly changes in the initial situation (in 2021 and 2022, the impact of the revision resulting from the census and the impact of the pandemic COVID-19, and in 2023 the impact of the migration wave). Therefore, the shifts in the adjusted projections were essentially "parallel". The new adjusted projection of 2024 already reflects the shifts in the parameters of the CZSO's demographic projection of 2023 discussed above. It is clear that in terms of population at the horizon of our projection, the impact of changes in the parameters of the demographic projection itself (i.e. mainly changes in fertility rates) is roughly similar to the maximum extent of level changes from the inter-period between the CZSO's demographic projections.

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[32] On the adjustment methodology, see the study OCFC (2021): Alternativní demografické projekce [Alternative Demographic Projections, available in Czech only].

However, the latest demographic projection is the most pessimistic in terms of population at the end of our projection horizon (see Chart B2.1.3).

Chart B2.1.3 Population between 2000 and 2074 according to CFC projections
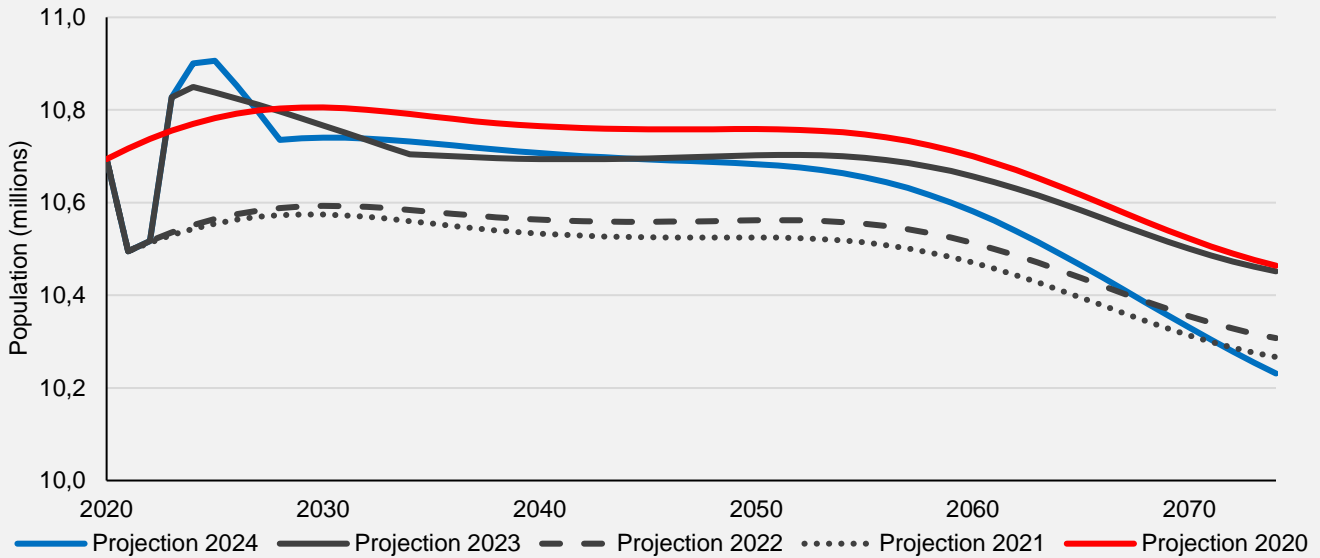
Source: CFC calculations.
Note: The graph shows the development until 2074, i.e. the last year of the long-term projection of the CFC (see also chapter 3).

As the text shows, the development of the size and structure of the population is an important factor in the area of (projected) economic activity. Box 2.2 compares demographic indicators and projections for the Czech Republic and selected EU countries. The text focuses on fertility and birth rates in the era of the so-called "Husák's children" and places it in the context of demographic developments in other countries where a similar trend also occurred in the second half of the 20th century, but in a slightly different period than in the former Czechoslovakia. At the same time, the findings of this box on high fertility rate in the era of Husák's children are applied in one of the alternative scenarios of our long-term projection of public sector revenues and expenditures (see section 5.2). This scenario is intended to provide answers to current questions about the claim that the choice of appropriate population policies is sufficient to ensure the long-term sustainability of the pension system and public finances.

Box 2.2 Comparison of demographic development and projections of the Czech Republic and selected EU countries

This box provides an overview of selected demographic indicators of the Czech Republic and selected EU countries. The comparison is intended to answer questions such as the extent to which the high birth rate in the Czech Republic in the 1970s ("Husák's children") was specific to the Czech Republic and whether the trends in population ageing in the Czech Republic are similar to those in other European countries. In the analysis, we focus on the comparison of the Czech Republic with other countries of the Visegrad Four (Hungary, Poland and Slovakia; labelled "V4" in the graphs) and a selection of Western countries (Belgium, France, Italy, Germany, the Netherlands, Austria; labelled "West" in the graphs). In both groups of countries, the demographic indicators are weighted by population size. The other countries are not included in this analysis due to incomplete time series, structural breaks in the time series, or outlying values.[33] The length of the time series for fertility and birth rates is 62 years (between the years 1960 and 2021) and for the indicator on the ratio of the number of persons aged 21–64 of working age to one person aged 65 and over, the length of the time series is 64 years (between the years 1960 and 2023).

In the birth and fertility rates graphs (see Chart B2.2.1 and B2.2.2), we can observe a similar time series pattern with some fluctuations and delays. At the beginning of the observed period, i.e. the 1960s, the curve of the V4 countries excluding the Czech Republic starts at its maximum, which is especially true for Poland and Slovakia. In the Czech Republic, the birth rate gradually increases during the 1960s, reaching its peak around the mid-1970s. It is not without interest that a similarly strong population wave was experienced in the West about

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[33] For example, the Nordic countries have a different pattern of fertility and birth rates with a strong population wave in both the 1960s and the 1990s.

a decade earlier, where fertility rates in the mid-1960s even surpassed the Czech peak of 1974. Similarly to the Czech Republic, this wave of birth rate increase in the 1970s was also felt in other V4 countries, especially Poland, where it was even stronger than in the Czech Republic and persisted until the 1980s, when fertility rates in the Czech Republic were already declining towards 1960s levels. Thus, a slower decline in birth rates can be observed in the V4 countries, which has an impact on the slightly delayed effect of the ageing of this part of the population in the V4 countries compared to the Czech Republic. It is also worth noting that in the second half of the 1990s, the Czech Republic experienced a significant decline in fertility and birth rates, which was stronger than in the other countries. By contrast, at the end of the period (i.e. in 2022), the Czech fertility rate was one of the highest.

Chart B2.2.1 Birth rates in 1960–2022
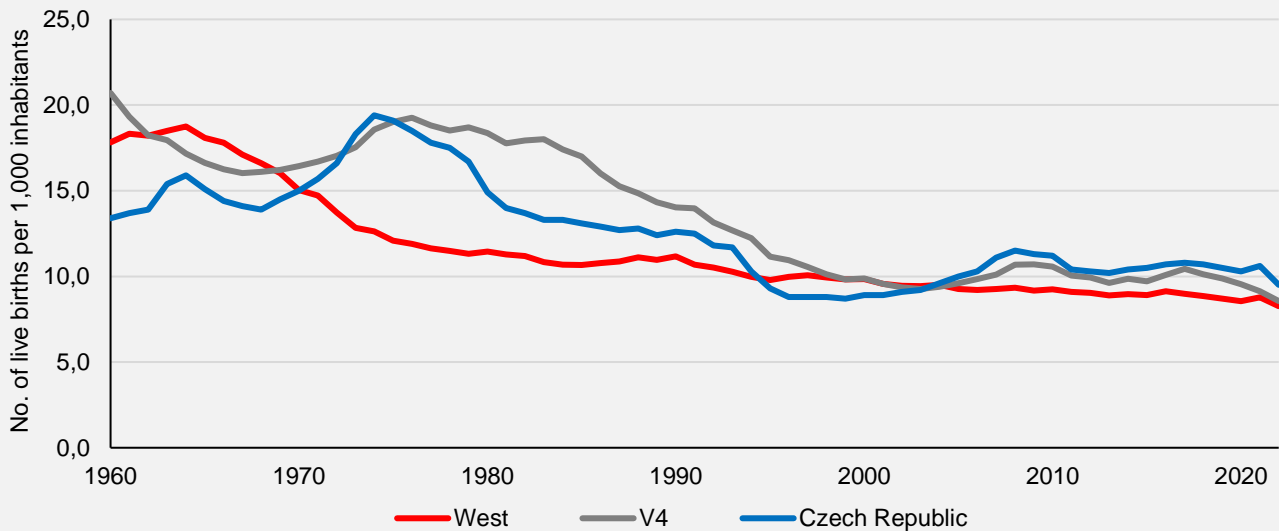
Source: World Bank (2024); CFC calculations.

Chart B2.2.2 Fertility rates in 1960–2022
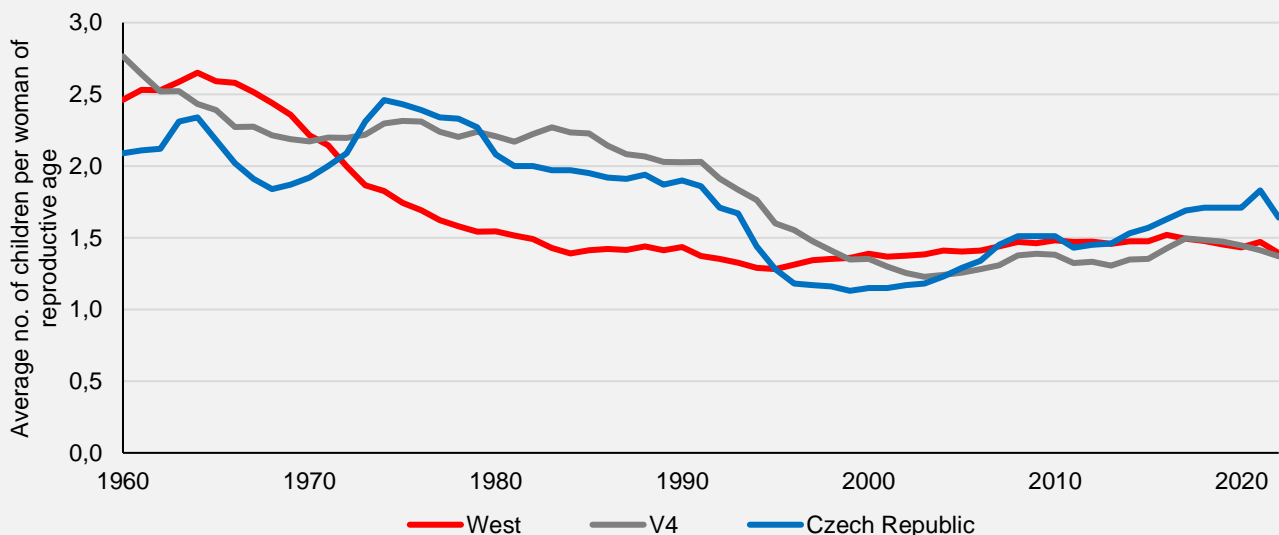
Source: World Bank (2024), Eurostat (2024); CFC calculations.

Chart B2.2.3 shows an increase in the ratio of the number of persons aged 21–64 to the number of persons over 65 in the Czech Republic at the turn of the millennium, when Husák's children turn 21, thus increasing the numerator of this indicator despite the downward trend. Since the mid-1990s, when the V4 countries, including the Czech Republic, experienced a significant decline in fertility and birth rates, all three fertility and birth rate curves have followed a long-term trend that is slightly increasing and, in the case of the Czech Republic, slightly faster than that of the other countries. The decline in the Czech Republic after 2005 is quite sharp by international

standards, but in Western countries the decline occurred about a decade earlier. In the V4 countries, on the other hand, the decline in the ratio occurs about seven years later than in the Czech Republic.

Chart B2.2.3 Ratio of working-age persons (21–64 years) to one person of post-working age (over 65 years), 1960–2022
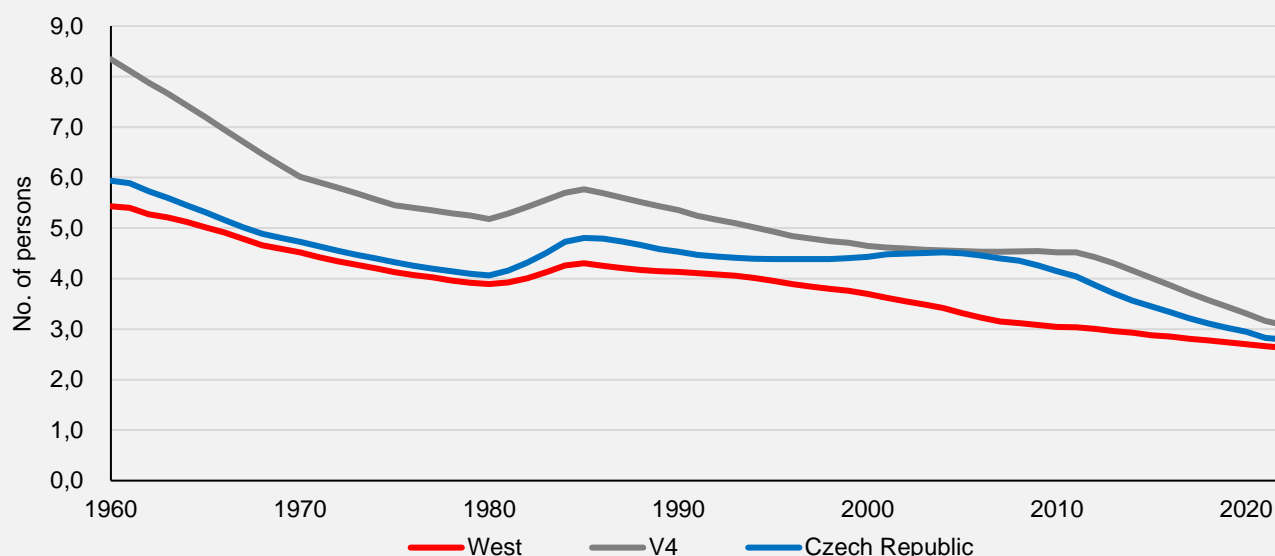
Source: World Bank (2024), Eurostat (2024); CFC calculations.

Chart B.2.2.4 shows that, according to the Eurostat projection[34], the steepest decline in the ratio of persons aged 21–64 to one person aged 65 and over is expected in the Czech Republic in the 2040s, when Husák's children reach retirement age, i.e. about a decade later than projected for the western countries. Due to the longer duration of this population wave in Poland and Slovakia, Eurostat estimates the decline of the indicator for the V4 countries excluding the Czech Republic to be slightly delayed and even more profound than in the case of the Czech Republic. At the long end of this projection, the effect of the convergence of all the geographical groups considered prevails.

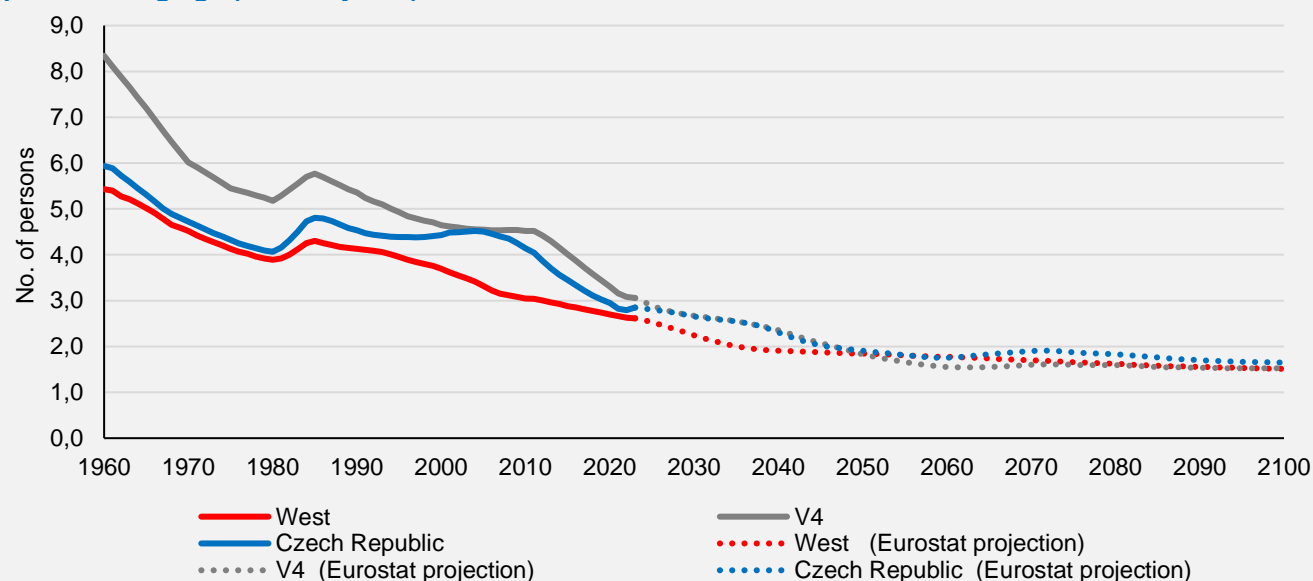**Chart B2.2.4 Actual and projected ratio of working-age persons (21–64 years) to one person of post-working age (over 65 years) between 1960 and 2100**

Source: World Bank (2024), Eurostat (2024); CFC calculations.

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[34] For the sake of international comparability, we use Eurostat's 2023 projection, which differs from the CZSO's 2023 projection in the assumptions used, especially the higher fertility rate.

2.3 Real wages and the primary income distribution

Wage growth plays a major role in projections for the pension system, education, health care and other areas. In our projection, we derive the evolution of real wages primarily from the long-term labour productivity projection, where real wages grow in the projection at least at the rate of GDP growth per worker (see section 2.1). We nonetheless complement this convergence effect of real wage growth with the effect of the growth in the ratio of compensation of employees to gross value added (GVA),[35] as this ratio was and to a large extent still is relatively low in the Czech economy compared to other countries. Thus, in our projection we assume that the convergence of the share of employees' compensation in GVA will continue at the same rate as for GDP per worker. This means that the gap between the share of workers' compensation in GVA in the selected developed countries and the corresponding share in the Czech Republic narrows by 2.4% per year in our projection.[36]

The increasing ratio of compensation of workers to GVA in our projection means that real wages are growing faster than labour productivity. The volume of wages and salaries is likewise growing faster than GDP in the long term, at the expense of the gross operating surplus (profitability) of firms. The change in the distribution of GVA is meanwhile important for, among other things, the level and structure of future general government tax and insurance premium revenues. Real wage growth is also affected by the assumption made about the initial ratio of compensation of workers' GVA. In 2015–2020, it increased relatively rapidly (about 5 pp of increase in the ratio over five years), while in the period of high inflation and falling real wages in 2021 and 2022, the share of compensation of employees to GVA fell (by 1.9 pp over two years). The ratio also declined by 0.3 pp in 2023. In our projection, we consider the 2023 baseline ratio of workers' compensation in GVA to be an equilibrium. Overall, we thus assume that real wages will grow by 2.1% year on average (see Table 2.3.1). This is about 0.2 pp higher than per worker GDP growth. However, the gap between the two growth rates will narrow over time.

In addition to assumptions about macroeconomic convergence, our projection of GDP growth, or GDP per capita, is also influenced by demographic developments. For a given population, on the one hand, a higher number of pensioners leads to a lower working-age population and, for a given productivity, to a lower GDP. The projected number of pensioners is roughly stable for the next 10 years and is similar to last year's Long-Term Sustainability Report but rising rapidly over time (see also section 3.1). This is mainly due to the change in demographic projections (lower mortality and the lagged effect of higher migration). On the other hand, higher migration leads to a higher working population and higher GDP. Conversely, a lower fertility rate reduces the working population, but this effect is delayed by about 20 years compared to migration. Compared to the assumptions of last year's projection, total GDP will thus be around 5.5% higher in 2044 than in last year's projection, while at the end of the projection horizon (2074) the overall level of GDP will be slightly lower (by 0.4%) than last year´s projection.

The projection also includes an assumption about the rate of inflation. We assume that the rate consumer price inflation is equal to the rate of growth of the GDP deflator, namely 2% a year. This rate of price level growth is in line with the CNB's current inflation target.

Table 2.3.1 Average annual growth rates based on the long-term projection (%)

	2024–2034	2035–2044	2045–2054	2055–2064	2065–2074	Entire period
GDP per capita	2.6	1.6	1.3	1.7	1.8	1.8
GDP per worker	2.2	2.0	1.9	1.8	1.7	1.9
GDP total	2.4	1.6	1.3	1.6	1.6	1.7
Average real wage	2.6	2.2	2.0	1.9	1.8	2.1

Source: CZSO (2024), OECD (2024); CFC calculations.

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[35] For the sake of better international comparability, we work with the share of compensation of workers, which we define analogously to compensation of employees except that we include an estimate of compensation of entrepreneurs (self-employed). The figure we use per self-employed person is equal to the average rate per employee.

[36] The selected developed countries here are Austria, Germany, Sweden, Denmark, Belgium, the Netherlands and Finland. For details, see OCFC (2019): Dlouhodobá makroekonomická projekce ČR [Long-Term Macroeconomic Projection of the Czech Republic, available in Czech only].

3 Expenditure and revenue in the long-term projection

This chapter presents a projection of public sector expenditure and revenue based on the macroeconomic and demographic projections in the previous chapter. The projection of general government expenditure and revenue is calculated assuming unchanged revenue and expenditure policies. The projections are therefore not a forecast of what we would consider to be the most likely future outcomes. The results of these projections should be interpreted accordingly – they are all conditional on the existing policy settings and are designed to answer the question of what would happen if the current revenue and expenditure policies were left unchanged.

The baseline projection scenario reflects the government's austerity measures from last year (the so-called "consolidation package"), which affected both the revenue and expenditure sides of the public budget. Changes in the set-up of the pension system ("pension reform") are reflected only in the part that has already gone through the legislative process (i.e.

adjustments to early pensions, changes in the indexation mechanism). Those parts of the pension reform that have not yet been through the legislative process (in particular changes to the retirement age) are not reflected in the baseline scenario. The selected measures are reflected in the alternative scenarios presented in section 5.3.

Some expenditures are directly affected by demographic developments, while others are influenced by the long-term growth of the Czech economy and its convergence to the level of developed countries, in terms of GDP per capita, labour productivity, and real wages. Demographic and convergence influences are intertwined. Demographic influences prevail in the pension system, education, health care, social benefits and long-term care. Convergence effects are more pronounced in the case of public investment spending, public employees' salaries and tax and insurance revenues.

3.1 Pension system

The pension system consists of old-age pensions, disability pensions and survivors' (widows', widowers' and orphans') pensions. The system is managed and administered by the Czech Social Security Administration (CSSA), with the exception of pensions for the armed forces, for which the system is administered by the relevant ministries (the Ministry of the Interior, the Ministry of Defence and the Ministry of Justice). However, the terms for members for the armed forces are basically the same as those for insured falling under the CSSA, so we treat the entire pension system as a single entity in the projection.[37]

The pension system as a whole has been significantly affected by price increases and several waves of ordinary and extraordinary pension indexations in the previous two years (the last extraordinary indexation was in June 2023). The pension system is also

affected by legislative changes, which are mostly in the direction of greater sustainability of the pension system. Some of these legislative changes have already been approved,[38] and are reflected in the baseline scenario of our projection. Other amendments to Act No. 155/1995 Coll., on Pension Insurance, as amended,[39] (the "Pension Insurance Act") have not yet been approved, and we project their impact in the alternative scenario (see section 5.3).

On the expenditure side of the pension system, we first model the number of recipients of each type of pension and then the levels of these pensions. The revenue side of the system is modelled directly on the basis of our macroeconomic projection. Pension insurance contributions are, by their nature, a tax on labour income.

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[37] There are some differences in the calculation of the pensions of the armed forces, for example in the amount of the pension granted in the event that the new pensioner has received a service allowance higher than the amount of the newly granted pension (the pension is then set at the amount of this service allowance). There also appears to be a higher proportion of men among military pensioners. In this Long-Term Sustainability Report we do not take these differences into account and assume that expenditure on armed forces' pensions will account for an average of 2.45% of pension expenditure paid by the CSSA, which is in line with the average over the last five years.

[38] The so-called "Small Pension Reform", i.e. Act No. 270/2023 Coll., amending Act No. 155/1995 Coll., on Pension Insurance, as amended, with effect from 1 October 2023. This amendment included, in particular, changes in the mechanism of pension indexation (indexation by one-third of the increase in real wages instead of the current half) and restrictions on early pensions.

[39] The so-called "Great Pension Reform", currently under discussion in the Chamber of Deputies of the Parliament of the Czech Republic, is expected to be published in the Collection of Laws in November 2024. Most of the changes are expected to take effect from 1 January 2025. These changes include, in particular, linking the retirement age to life expectancy, slowing down the growth of newly granted pensions, limiting the child-rearing bonus (or partially replacing it with a fictitious assessment base), increasing the minimum pension percentage and lowering the retirement age for time worked in a demanding profession. See the alternative scenarios in more detail in chapter 5.

3.1.1 Old-age pensions

Old-age pensions are quantitatively the most important component of the pension system. Around 2.4 million people are currently receiving them. Between the end of 2019 and the end of the first half of 2023, the number of old-age pensioners will fall by 56.4 thousand people (around 2.3%) partly as a result of the increased mortality among the elderly due to the COVID-19 pandemic and partly due to the continued extension of the statutory retirement age (of two months for men and six months for women with two children in 2023). The number of old-age pensioners then increases by 0.5% in the second half of 2023, partly as a result of an increase in the use of early retirement schemes in response to extraordinary pension indexation.[40]

The number of old-age pensioners will continue to be affected predominantly by demographic change and changes in the statutory retirement age. The extension of the retirement age under the current legislation (the Pension Insurance Act) will continue until 2030, when the retirement age for both men and most women should be 65. This statutory age then also enters into the baseline scenario of our projection.[41]

In estimating pension expenditure, we start by estimating the future number of old-age pensions beneficiaries. We base this estimate on the demographic projection and the statutory retirement age, but we also take account of the option of early retirement or, conversely, the option of working beyond retirement age and thus supplementing one's old-age pension.

For these reasons, we use the so-called "rates of retirement", i.e. the proportions of the number of pensioners in the total number of people of a certain age cohort, to project the number of old-age pensioners. In projecting them, we also take into account that the number of old-age pensions beneficiaries interacts with disability pensions, and that the payment of both pensions is mutually exclusive. For these reasons, we work with rates of retirement that do not refer to the whole population of a given age, but only to the part of the population that does not receive a disability pension (see section 3.1.2 for the projection of the number of disability pensioners). We construct the rates of retirement on the basis of time to the statutory retirement age. This is the main determinant of the decision of the elderly in the Czech Republic about when to retire. The rates of retirement used in the projection of the number of old-age pensioners were derived separately for men and women as the average of the empirical retirement rates recorded in reality.[42]

In the baseline scenario of the projection, the number of old-age pensioners initially declines slightly due to a continued rise in the statutory retirement age (a total decline of 1.1% by 2028, the number of female old-age pensioners will fall in particular, see Chart 3.1.1). In the absence of the pension reform, the extension of the retirement age would end in 2030 at 65. However, during this period the baby-boomers born in the 1970s start to retire. This will lead to a steady increase in the number of old-age pensioners, peaking around 2059, when there should be around 3.2 million old-age pensioners, i.e. around 35.9% more than today. The projected number of old-age pensioners reflects, among other things, the changes in demographic projection discussed above, notably the reduction in the projected mortality rate and the associated increase in life expectancy. Compared to the estimate of the number of pensioners in the previous Long-Term Sustainability Report (2023), the number of pensioners at its peak is thus about 94,000 (3%) higher.

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[40] By the end of 2022, the incentive to apply for an early pension has increased, as all pensions awarded in 2022 would automatically be indexed by all extraordinary indexations made in 2022. This has led to a sharp increase in early retirement applications, but a significant proportion of these pensions have only been assessed, these people are still working and have so far merely "frozen" their future pension at a higher level. Therefore, in the first half of 2023, these applications for early pensions have not yet been reported in the statistics on the total number of pensioners. In the second half of 2023, they appear to have gradually started to be reflected in the statistics on the number of pensions in payment. However, the wave of applications for early retirement pensions from the end of 2022 onwards makes estimates of the number and amount of pensions paid in the coming years rather complicated.

[41] In one of the alternative scenarios in section 5.3, we also consider linking the retirement age to the life expectancy according to Section 4a of Act No.582/1991 Coll., on the Organisation and Implementation of Social Security, as amended. According to this Act, the statutory retirement age should be changed every time a new CZSO demographic projection is published, so that, on average, each individual spends a quarter of their life retired. According to the latest CZSO calculations from the end of 2023, the retirement age for people born in 1970 and later should be raised above the current limit of 65 years. On the basis of the "Report on the state of the pension system of the Czech Republic and its expected development with regard to the demographic situation of the Czech Republic and the expected population and economic development", the Government of Czech Republic should increase the retirement age in 2024 according to the new demographic projection of the CZSO. However, the increase in retirement age on the basis of a different scheme is also part of the amendment to the Pension Insurance Act under discussion. Therefore, in section 5.3 we consider both alternative ways of linking the retirement age to demographic parameters.

[42] For women, only a single retirement rate was considered. The model scenario involved a woman with two children as the model situation. In this year's projection, we have adjusted the projected retirement rates slightly in line with their empirical values from 2013–2022. Compared to last year's Long-Term Sustainability Report, the retirement rates are virtually the same for men and slightly higher for women. For a more detailed description and discussion of the rates of retirement and modifications thereof as a result of different rates of increase in the retirement age, see OCFC (2019): Projekce důchodového systému [Projection of the Pension System, available in Czech only] and also Box 4.2 of our 2021 Long-Term Sustainability Report.

In addition to the change in the number of pensioners, there will also be a change in the gender structure, as the equalisation of the statutory retirement ages for men and women will lead to a rise in the proportion of men in the total number of old-age

pensioners from the present level of 40.5% to 46.8% in 2074. The increase in the male share of total pensioners will also reflect the convergence of life expectancy of men and women.

Chart 3.1.1 Projection of the number of old-age pensioners (medium variant of the demographic projection)
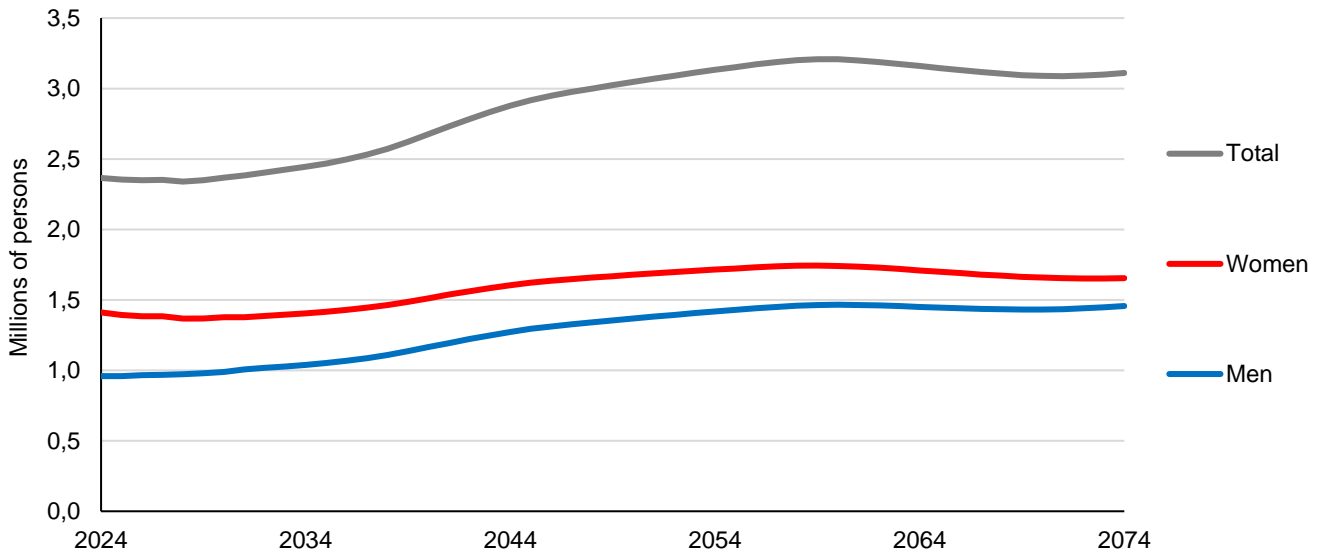
Source: CZSO (2024), CSSA (2024); CFC calculations.

The projection of expenditure on old-age pensions also includes an estimate of the average old-age pension. It is affected, on the one hand, by the starting level of existing pensions granted in the various times in the past. The level of these pensions is then also conditional on their history of indexation (statutory and extraordinary). The second component of the average old-age pension is the amount and number of newly granted pensions. The average pension is then the weighted average of these two types of pensions. Usually, newly granted pensions are higher than those granted in the past, as they are linked to nominal wages in the year when the pension is granted. Older pensions are indexed fully to inflation and only partly to real wage growth. It is therefore the case that the value of older pensions in relation to average wages gradually decreases with increasing distance from the time of pension granted.[43] The change in the average pension then reflects the evolution of existing pensions, the number and amount of new pensions granted and, finally, the number and amount of pensions that have been terminated (pensions that have terminated are usually lower than the average pension). If the proportion of newly granted pensions increases, the overall

replacement rate tends to increase. However, in 2022 and 2023, due to the relatively significant fall in real wages and the way the indexation mechanism is set up, older pensions are, on the contrary, higher than newly granted pensions.

The level of newly granted pensions consists first of a basic flat-rate part, which we assume will stay at 10% of the average wage. This flat rate is the same for all pensioners. The second component of the pension is the so-called earnings-related part, which is derived from the insured person's past earnings indexed to the past trend in average wages and the number of years of contributions (including non-work validated periods). The calculation also includes two reduction thresholds, which represent an element of redistribution and dampen differences in newly assessed pensions. [44]

We simulate the amount of newly granted pensions in relation to the average wage. As the starting point for our projection of the level of newly granted pensions we used the latest known figures, according to which the level of new pensions was 47.1% of the average gross wage for men and 40.6% for

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[43] When real wages rise, old-age pensions rise more slowly than nominal wages. Thus, the pension-wage ratio decreases with increasing age (or the time since the old-age pension was granted). An exception is the one-off increase in pensions on reaching a certain age (according to the provisions of Section 67a(1) of the Pension Insurance Act, the pension increases by CZK 1,000 on reaching the age of 85 and by CZK 2,000 on reaching the age of 100).

[44] For a more detailed description, see the study OCFC (2019): Projekce důchodového systému [Pension System Projection, available in Czech only].

women.[45] The lower newly assessed pensions of women are due both to their lower wages on average and to their lower statutory retirement age and thus shorter coverage period. Following the equalisation of the statutory retirement ages for men and women (i.e. after 2030), the coverage period for women will increase and the difference between men's and women's newly granted pensions will therefore decrease.

For 2024, we assume that the replacement rate will reflect the wave of early pension assessment requests from late 2022 and the first half of 2023, when future retirees sought to "lock in" a higher replacement rate resulting from the extraordinary indexations during this period. However, in 2025, this effect will wear off and replacement rates will fall to their previous levels. In subsequent years, the replacement rate from the new pensions then follows the estimate of the insurance period (see Box 5.1 in section 5.3). For men, we project relative stability or slight increase in the ratio of new pensions to average wages, while for women we gradually increase this ratio in our projection to 44.0% of average wages in 2030. However, the gap between men's and

women's newly granted pensions will persist beyond 2030 due to their different wage levels.

As the recognition of studies as a non-work validated period will be gradually reduced after 2045, the projected ratio of newly granted pensions to average wages will decrease between 2045 and 2055 (see Chart B5.1.2 in Box 5.1 in section 5.3).

In order to calculate the overall average pension, it is also necessary to model the evolution of pensions granted in the past. The replacement rate of older pensions was significantly affected by price dynamics in 2022 and 2023. As already mentioned, in accordance with the statutory setting, in addition to the statutory January indexation, there were three extraordinary indexations of pensions in 2022 and 2023, in June 2022, September 2022 and June 2023. Overall, the average pension increased by CZK 5,208 between December 2021 and January 2024 as a result of the indexations, i.e. by about one third. Given that real wages have fallen in parallel, and pensions do not fall when real wages fall, the overall replacement rate has risen from 40.2% at the end of 2021 to 46.3% in 2023.

Chart 3.1.2 Ratio of average old-age pension to average wage (%)

Source: CZSO (2024), CSSA (2024); CFC calculations.

Chart 3.1.3 Ratio of old-age pension expenditure to GDP (%)
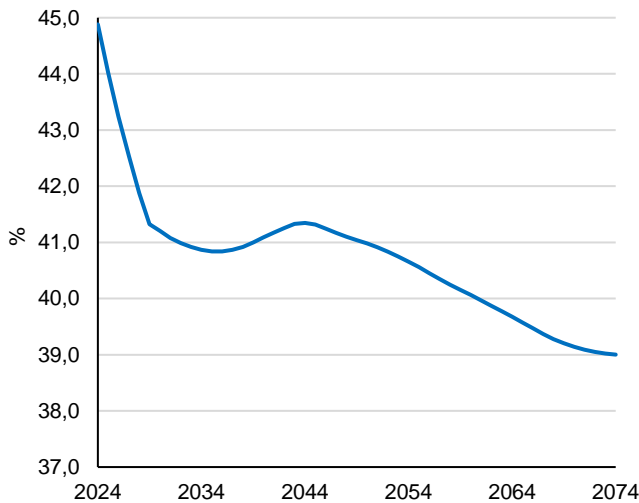
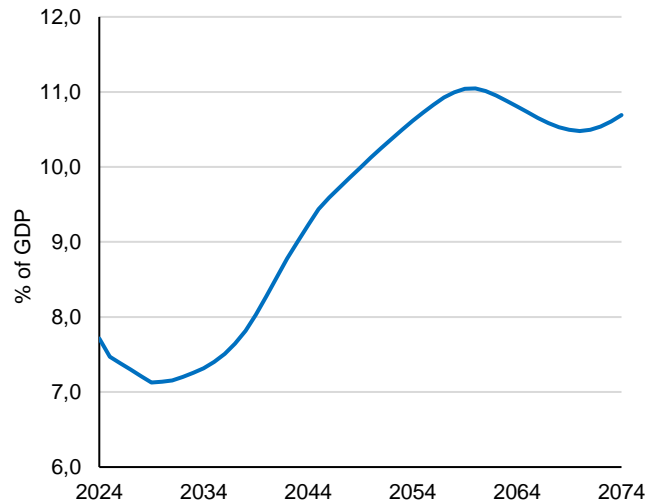Source: CZSO (2024), CSSA (2024); CFC calculations.

In our projection, we assume that the indexation scheme will be followed in the future. In accordance with the provisions of Section 67 of the Pension Insurance Act, we thus assume that existing pensions will be indexed by one-third of the growth in real wages[46] and by the full rate of inflation. Only the cost-

of-living index for pensioners' households is taken into account as the inflation rate. In our projection, we assume a 0.3 percentage point increase in the pensioners' cost-of-living index compared to the CPI

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[45] MoLSA (2023): Statistická ročenka z oblasti práce a sociálních věcí 2023 [Statistical Yearbook of Labour and Social Affairs 2023, available in Czech only]. We use the average ratio of new pensions to the average monthly wage for the last three years included in the yearbook, i.e. for 2020–2022.

[46] Pensions are indexed to real wage growth only during the statutory indexation period and with a delay. The last time pensions were indexed to real wages was in January 2023, based on real wage growth in 2021. As real wages fell in 2022 and 2023, pensions will only be indexed to real wage growth again when real wages exceed their 2021 level. This is expected to happen in 2028, so indexation to real wages will start in January 2030.

inflation rate.[47] In the long run, it will grow in line with the CNB's 2% inflation target.

The development of the average old-age pension will also be affected by other changes in the pension system, such as the introduction of the so-called "child-rearing bonus" (an increase in the old-age pension for one child raised by CZK 500 per month from 1 January 2023). In the calculation of the replacement rate, we take into account the age structure of the amount of retirement pensions for both men and women. [48]

The combination of all these assumptions with the demographic projection implies the development of average old-age pension. After the strong increases of 2022 and 2023, the ratio of average old-age pension to average wage will fall quite rapidly to 40.8% around 2035 (Chart 3.1.2). This will reflect the "switch-off" of pension indexation to real wages and the start of restrictions on the inclusion of study time in newly granted old-age pensions.

Consequently, as the inflow of new pensioners increases, the replacement rate rises to around 41.4% by 2045, before falling below 40% at the end of the projection horizon.

The evolution of pension expenditure as a share of GDP can be derived from the number of pensioners and the evolution of the ratio of pension to average wage. Expenditure peaks around 2060 at 11.1% of GDP (see Chart 3.1.3). The increase in expenditure compared to the present is mainly driven by the growth in the number of pensioners as well as the increase in the starting level of old-age pensions.

Box 3.1 International comparison of pension systems – taxation of old-age pensions

When making international comparisons of old-age pension expenditure, it is important to bear in mind that simple comparison is misleading. In fact, statistics usually report gross pension expenditure, i.e. expenditure on pensions before compulsory contributions and taxes are paid on them. It may therefore be wrong to conclude that, for example, the Czech Republic has low pension expenditure compared to the EU average. The Czech Republic spent 7.3% of GDP on old-age pensions in 2022, while the average spending on old-age pensions in the EU countries was 8.4% of GDP.

However, most EU countries levy taxes on pensions paid out, and some even levy social contributions. Table B3.1.1 shows, for each country, whether pensions are taxed and whether social contributions are also levied on pensions. The table shows that while social contributions are not deducted from pensions in many countries, taxation of pensions is common practice in most European countries. In addition to the Czech Republic, Bulgaria, Hungary, Lithuania and Slovakia are among the countries that do not tax or levy social contributions on pensions. Countries that do tax pensions have higher public expenditure at similar levels of net pensions, but also higher public revenue as a result. For the purposes of international comparison, therefore, pension expenditure must be net of pension taxation.

Chart B3.1.1 shows a comparison of gross and net pension expenditure. The level of pension expenditure is also compared with the average of gross and net expenditure of EU countries. In terms of net pension expenditure, the Czech Republic is around the EU average and does not spend significantly less than other EU countries. However, the international comparison of the size of pension expenditure is not only distorted by whether it is taxable or not. Individual countries differ in a number of other parameters that affect the level of public spending on pensions. These include the demographic structure of the population, the pension replacement rate and the income structure of GDP.[49]

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[47] Over the period 2008 to 2023, the annual growth in the pensioners' cost of living index was, on average, around 0.4 pp higher than growth in the standard consumer price index. The difference between the annual increases in the two indices was higher in periods of relatively high price increases due to the higher weight of food, energy and health care prices in the pensioners' CPI compared to the standard CPI.

[48] See Box 3.1 of the previous 2023 Long-Term Sustainability Report for more details.

[49] The methodology for adjusting pensions for levies, taxes and other parameters can be found in the study OCFC (2019): Mezinárodní komparace výše veřejných výdajů na důchodový systém [International Comparison of Public Pension Expenditure, available in Czech only].

Table B3.1.1 Taxes and social contributions on old-age pensions

Country	Taxation	Social contributions	Country	Taxation	Social contributions
Belgium	✓	✓	Hungary	✗	✗
Bulgaria	✗	✗	Malta	✓	✗
Czechia	✗	✗	Germany	✓	✓
Denmark	✓	✗	Netherlands	✓	✓
Estonia	✓	✗	Poland	✓	✓
Finland	✓	✓	Portugal	✓	✗
France	✓	✓	Austria	✓	✓
Croatia	✓	✓	Romania	✓	✗
Ireland	✓	✗	Greece	✓	✓
Italy	✓	✗	Slovakia	✗	✗
Cyprus	✓	✗	Slovenia	✓	✗
Lithuania	✗	✗	Spain	✓	✗
Latvia	✓	✗	Sweden	✓	✗
Luxembourg	✓	✓			

Source: Eurostat – COFOG (2024), MISSOC, EUROMOD – Country Reports (2020–2023), European Commission – 2024 Ageing Report; CFC.
Note: ✓ = applied, ✗ = not applied.

Chart B3.1.1 Comparison of gross and net expenditure on old-age pensions (2022)
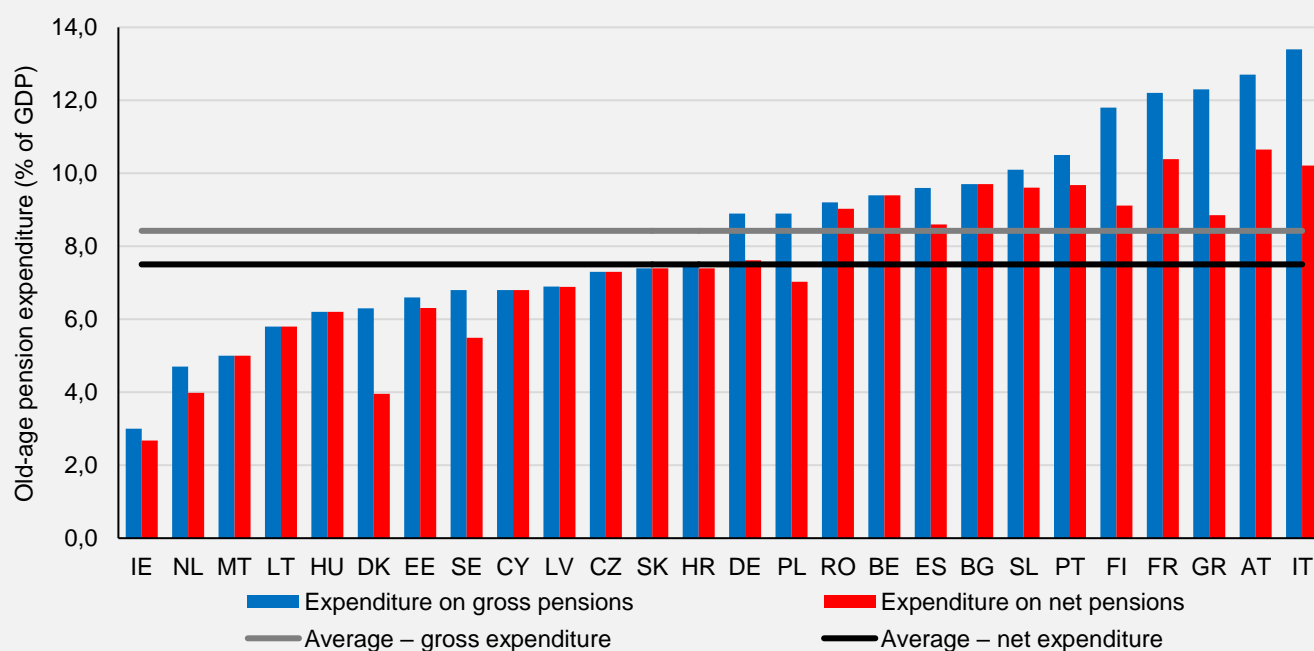
Source: Eurostat – COFOG (2024), MISSOC, EUROMOD – Country Reports (2020–2023), European Commission – 2024 Ageing Report; CFC calculations.

3.1.2   Disability pensions

As with old-age pensions, we first project the number of beneficiaries and then the average disability pension. The projection of the number of disability pensioners is based on assumptions about the proportion of people receiving a disability pension in each age cohort (the rate of disability). As with the retirement rate, we distinguish between the rates for men and women.[50] The rate of disability increases with age. In the past it peaked between 60 and 63 years for men and 56 and 60 years for women. The peaks of the age-specific disability rate curve are currently lower than they were in the past, especially
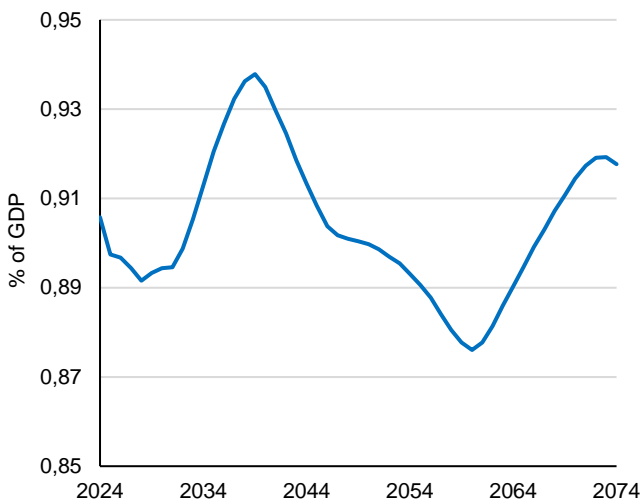
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[50] For a more detailed description of how the number of disabled pensioners is projected, see the study OCFC (2019): Projekce důchodového systému [Pension System Projection, available in Czech only].

for men. This is primarily a manifestation of the healthy ageing hypothesis.

Close to retirement age, disability rates are mainly influenced by the conversion of some disability pensions to old-age pensions. Disability rates fall here because some of those receiving disability pensions opt for old-age pensions and are thus removed from the disability pensioner register. Some disability pensioners with higher disability pension draw that pension until the age of 65, when their disability pension is automatically converted into an old-age pension and the disability rate falls to zero.

In our projection of age-specific disability rates, we take the rising retirement age into account. For the under-55s, we assume the same disability rates as in the past. We also assume that the disability rate curve will peak two years before retirement age. The disability rate will thus rise steadily to this peak from the age of 55. We again assume an even decline in the disability rate from its peak until the age of 64. From 65 up, we assume a zero disability rate.

In our projection, the number of disability pensioners rises steadily and peaks in 2037, when it will be 10% higher than now. The growth in the number of disability pensioners is linked on the one hand with population ageing and on the other hand with the raising of the statutory retirement age. In 2038–2060, the number of disability pensioners will fall as they switch to old-age pension. In 2060, the number of disability pensioners will be 9.4% lower than it is at present and then increase slightly over the projection horizon.

We project the average disability pension by assuming a constant ratio between the average disability pension of a given level and the average old-age pension. The dynamic of the average disability pension thus follows the growth of old-age pensions.

Overall, our projection of the share of disability pension expenditure to GDP fluctuates around 0.9% (see Chart 3.1.4 and Table 3.1.1).

Chart 3.1.4 Ratio of expenditure on disability pensions to GDP (%)

Source: CSSA (2024); CFC calculations.

Chart 3.1.5 Ratio of expenditure on survivors' pensions to GDP (%)

Source: CSSA (2024); CFC calculations.

3.1.3 Survivors' pensions

Survivors' pensions include widows', widowers' and orphans' pensions. Again, we first simulate the number of recipients of each type of pension. For orphans' pensions, we assume that the proportion of beneficiaries in the population of 0 to 21-year-olds is stable.[51]
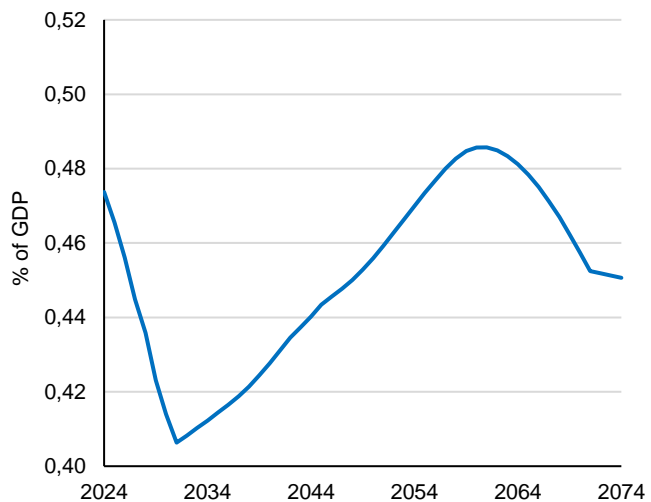
In the case of widows' and widowers' pensions, it is necessary to distinguish between pensions paid individually (solo) and pensions paid out concurrently, i.e. in combination with old-age (or disability) pensions. For solo widows' and widowers' pensions we

assume an approximately constant share in the part of the adult population (i.e. for our purposes, people aged over 21) not receiving an old-age or disability pension.

Both the number of recipients of orphans' pensions and the number of recipients of solo widow/widower pensions are projected to decline slightly, as both defined demographic groups used as the basis for the projection are shrinking slightly despite the increase in the retirement age. For orphans' pensions, this is

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[51] An orphan's pension can be drawn by a beneficiary up to the age of 26 years (if studying at university).

mainly due to lower projected fertility rate and therefore a lower number of children.

We use a more complicated approach to project the number of widows' and widowers' pensions paid out in combination with old-age or disability pensions. For the projection, we use age-specific rates of receipt of widows' (and, by analogy, widowers') pensions, which show what proportion of women (or men) of a given age receive this type of pension. The curve of these age-specific rates increases with age. We adjust the age-specific rates of receipt of the survivors' concurrent pensions in the projection for the extension of the statutory retirement age until 2030 and for the extension of life expectancy.[52] The

increase in the statutory retirement age reduces the number of people entitled to a combination survivor's pension, as, ceteris paribus, it reduces the number of pensioners. If life expectancy rises, or if male and female life expectancy converges, the event of widowhood moves to a higher age on average. So, despite the increasing number of senior citizens in the population, there is a slight decline in the number of concurrent survivors' pensions paid in our projection.

We again model the level of survivors' pensions as a fixed ratio to the old-age pension. Overall, the projection of survivors' pensions shows a relatively insignificant evolution, fluctuating between 0.41% and 0.49% of GDP (see Chart 3.1.5 and Table 3.1.1).

### 3.1.4 Total revenue, expenditure and balance of the pension system

We model pension system revenue on the basis of the expected evolution of compensation of workers. In our macroeconomic projection we expect the ratio of such compensation to GDP to increase as a result of convergence (see section 2.3). The ratio of pension system revenue to GDP will thus rise proportionately as well. Overall, the revenue of the system will thus go up from 8.7% of GDP (in 2024) to approximately 9.4% of GDP at the end of the projection. Such an increase in revenues to the system cannot be sufficient to cover the sharp increase in expenditure, especially on old-age pensions, described above.

The pension system as a whole is projected to improve over the next few years, with deficits initially decreasing and even modest surpluses thereafter (maximum 0.2% of GDP in 2031). The main impact here will be the postponement of the indexation of

pensions to real wages until 2030. However, after 2031, due to the significant increase in the number of pensioners, the system will start to move into substantial deficits, peaking around 2059, when deficits of up to 3.5% of GDP per year are projected (see Chart 3.1.6). The subsequent decline in expenditure and improvement in the pension balance will be driven by a reduction in the number of pensioners.

In our projection, we assume that the pension system operates according to the current statutory setup. However, the development of the deficits mentioned above will make pension reform necessary. Some parametric changes in the pension settings have already been approved, while others are still in the legislative process. We discuss the impact of these changes under alternative scenarios in sections 5.2 and 5.3.

Chart 3.1.6 Annual balances of the pension system
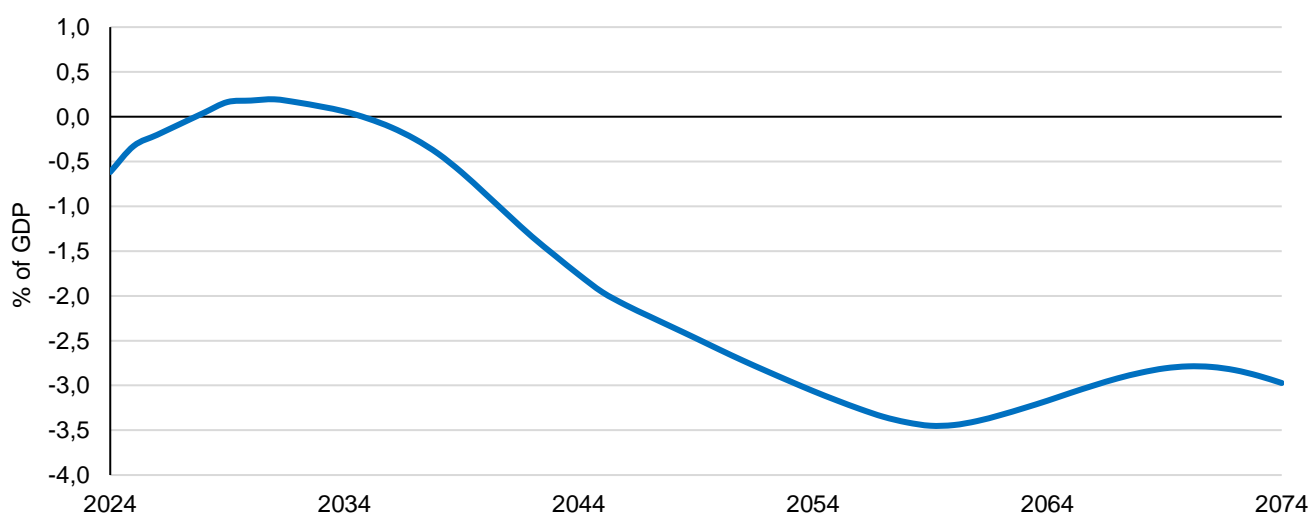
Source: CZSO (2024), CSSA (2024); CFC calculations.

[52] For details, again, see the study OCFC (2019): Projekce důchodového systému [Pension System Projection, available in Czech only].

Table 3.1.1 Summary of pension projections for selected years (% of GDP)

	2024	2034	2044	2054	2064	2074
old-age pensions	*7.9*	*7.5*	*9.5*	*10.9*	*11.1*	*11.0*
disability pensions	*0.9*	*0.9*	*0.9*	*0.9*	*0.9*	*0.9*
survivors' pensions	*0.5*	*0.4*	*0.4*	*0.5*	*0.5*	*0.5*
Total expenditure	9.3	8.9	10.8	12.3	12.5	12.4
Total revenue	8.7	8.9	9.1	9.2	9.3	9.4
BALANCE	-0.6	0.1	-1.8	-3.1	-3.2	-3.0

Source: CZSO (2024), CSSA (2024); CFC calculations.
Note: Old-age pensions include pensions for members of the armed forces. Totals in the table may not add up due to rounding.

3.2 Health care

In the Czech Republic, health care expenditure has long been covered primarily by public funds. Public funds account for approximately 85% of health financing. The largest share of health expenditure is covered directly by payments from health insurance companies, which account for around 70% of total health expenditure.[53] It is this part of expenditure that we focus on in our projection. On the revenue side, we also focus only on the public health system.

The basis for the projection of the expenditure side is the profile of health expenditure per capita for a given age, distinguishing separately age-specific health expenditure for men and women. We assume that these costs are sufficiently stable over time. Despite the assumption of stability of the cost curve, it may change over the projection period. For example, the cost curve may change in line with the concept of healthy ageing or the morbidity effect.[54]

In our macroeconomic projection, we assume that real wages will grow faster than labour productivity or GDP per capita (see section 2.3). If we assume that wages in health care maintain their current relative level to the average wage, an increase in the wage-to-GDP ratio will, other things being equal, lead to an upward shift in the health care cost curve, as wage costs are a significant component of health care expenditure.

On the other hand, the relative price of some non-wage cost items, such as imported pharmaceuticals or medical equipment, may be falling precisely because of real convergence. In fact, real convergence causes, among other things, the convergence of the domestic price level to the foreign price level, and thus the appreciation of the real exchange rate, which may in turn hamper the growth of health spending. Given the above uncertainties about the direction of the age-specific health expenditure curve, we use a stable curve empirically derived as

the average of the respective curves over the period 2010 to 2019 in the simulation, working separately with the curve for men and the curve for women. We deliberately do not use post-2019 data in the average, as the COVID-19 pandemic has led to an increase in health care costs. In the long run, however, we expect unit costs to return to pre-pandemic levels.

A stable cost curve over time assumes that health care costs per person of a given age change in proportion to GDP per capita. If the demographic structure remained unchanged, health expenditure would increase in proportion to economic growth. Thus, any changes in the share of health expenditure are only a consequence of the changing age structure of the population. Given the shape of the curve, which shows increasing costs covered by health insurance with age, population ageing implies a gradual increase in total health expenditure (see Chart 3.2.1).

At the same relative cost level as in 2010–2019, health insurance expenditure would be equivalent to 5.6% of GDP today.[55] Under the medium variant of the demographic projection, the total amount of costs covered by public health insurance would increase gradually to approximately 6.9% of GDP at the end of our projection horizon in 2074, i.e. it would increase by 1.3 pp. As a result of the change in the demographic projection consisting of a lower mortality rate and therefore a higher number of elderly people compared to the 2023 projection, health expenditure does not decline towards the end of the projection but continues to increase (see Chart 3.2.2).

The revenue side of the public health insurance system relies on contributions paid by employees, employers and self-employed or individuals without taxable income, and on contributions paid by the state for the so-called "state insurees", i.e. mainly children, students, old-age and disability pensioners, the

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[53] See CZSO (2023): Výsledky zdravotnických účtů ČR 2010–2021 [Health Accounts of the Czech Republic 2010–2021, available in Czech only].
[54] See CFC (2021): Report on the Long-term Sustainability of Public Finances, Box 4.3.
[55] However, the actual expenditure of the health insurance system was higher between 2020 and 2023 (by about 0.8% of GDP), which was predominantly due to the COVID-19 pandemic.

unemployed, etc. However, payments for state insurees are budget neutral from the perspective of the overall government deficit, because they constitute revenue to one public budget component – health insurance companies – on the one hand, and expenditure of another public budget component – central government – of an equal amount on the other.

We estimate the contributions collected from the first group as a constant ratio to compensation of workers. Here we project a modest increase in contributions collected due to the projected increase in the ratio of wages and salaries to GDP.

Due to increased expenditures of the public health insurance system in connection with the COVID-19 pandemic, the reference base for the payment of health insurance for state insurees was raised from 22% in 2019 to approximately 35% of the average wage in 2021. In 2022, the reference base remained at the 2021 level. In 2023, the reference base is set at CZK 14,074 by an amendment to the Act of the Czech National Council No. 592/1992 Coll. on Public Health Insurance Premiums, as amended. For the period after 2023, a mechanism of automatic indexation of payments for state insurees has been adopted. According to the automatic valorisation under the amendment of the Act of the Czech National Council No. 592/1992 Coll., on Public Health Insurance Premiums, as amended, from 2024 the payments for state insurees will automatically be indexed to the consumer price index and to half of the

growth in real wages.[56] This indexation is already included in the projection.

We therefore assume that the reference base will automatically increase in line with the indexation mechanism. Inflation is assumed to be at the inflation target level, i.e. 2%. Nevertheless, over the projection period, health insurance revenue for state insurees will fall from around 2% of GDP today to 1.5% of GDP in 2074. This is due to the indexation mechanism itself, which guarantees lower growth than nominal GDP growth. This decline will thus compensate for the previous excessive growth in revenue for state insurees in the context of the COVID-19 pandemic (see above).

Total revenue to the health insurance system, which will reach 6.6% of GDP in 2024, will gradually decline to 6.4% of GDP at the end of the projection horizon, assuming automatic indexation of the reference base for payments for state insurees.

Thus, under the medium variant of the demographic projection, the public health insurance system will be in a slight deficit from 2053 onwards. As already noted, this scenario also assumes that unit costs, which increased during the COVID-19 pandemic, return to pre-pandemic levels. However, there is some risk that this cost increase could become entrenched at higher levels, leading to a deterioration in the balance of the health insurance system.

Chart 3.2.1 Costs covered by the health insurance by age group
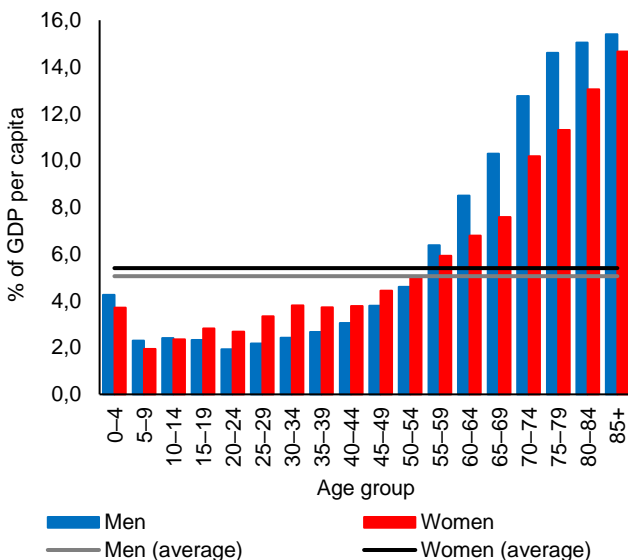
Source: CZSO (2024); CFC calculations.

Chart 3.2.2 Ratio of public health care expenditure to GDP (%)
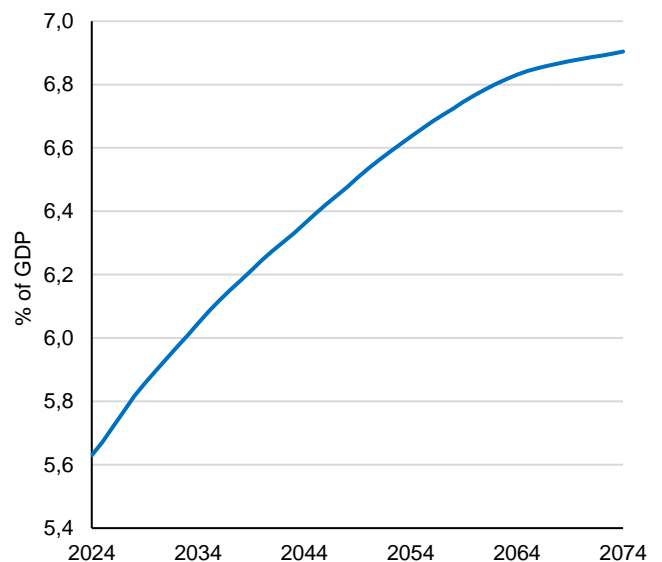
Source: CZSO (2024); CFC calculations.

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[56] See Act of the Czech National Council No. 592/1992 Coll., on Public Health Insurance Premiums, as amended.

3.3 Non-pension social benefits in cash and long-term care

Other expenditure items are non-pension social benefits in cash and long-term care. In the model, we first simulate benefits that are sufficiently fiscally significant with a share of GDP above 0.1%. At the same time, it must be possible to identify a link to demographic change for these benefits. Expenditure on maternity benefits, parental allowance, care allowance and housing allowance fulfil these two criteria. These non-pension social benefits also include tax advantage for dependent children.[57] We then estimate the evolution of other benefits, assuming that their share of GDP remains constant at the current level. Other benefits include unemployment benefits, child allowance, foster care benefits, birth and funeral grants, sickness benefits and social assistance/need benefits.

We simulate expenditure on fiscally significant social benefits separately and use their link to demographic change for the simulation. In the case of housing allowance, we have verified the link to demographic change on the basis of past trends. For some benefits, such as maternity benefit and parental allowance, the link to demographic change follows from the design of the benefit itself. For the simulation, we use our modified CZSO demographic projection. At the same time, we assume that the ratio of the average benefit amount to the average wage is maintained and that the current non-take-up rates of some benefits are maintained.

We base our simulation of **maternity benefit** on the construction of that benefit. We use a constant ratio of the average benefit amount to the average wage multiplied by the duration of receipt of the benefit as the basis. We link the projection of this benefit to the projection of the number of new births.

The projection of **parental allowance** expenditure is linked to the development of the number of children up to the age of three. This is a change from the previous projection as the length of parental leave has been reduced from four to three years. The simulation is based on data on the structure of parental allowance recipients by age of child, the number of parental allowance payments and the number of terminations by age of child at the time of termination. We then calculated the proportion of recipients in each age cohort and their average monthly parental allowance amount. In the simulation, we assume that this share, together with the ratio of the average monthly benefit to the average wage, is constant over time. The parental allowance has been increased to CZK 350,000 from 2024.[58]

To estimate the **care allowance**, we use the shares of individuals receiving an allowance in the given age categories and in the given dependence category in the years 2014–2022.[59] Under the assumption of a constant share of the number of individuals of a given age drawing an allowance, we then use the demographic projection to determine the total number of individuals drawing an allowance in the various dependence categories. The care allowance amount is determined by the approved legislation.[60] In 2024 (from 1 July), the amount of the allowance was increased by up to CZK 7,800 (40.6%) for people in the highest dependency category in home care. However, the increase in the amount of the allowance for people in the highest dependency category using residential social services[61] was roughly half (CZK 3,800, i.e. 19.8%). From 2025 onwards, we assume a stable ratio of the amount of the allowance to the average wage.

The projection of **housing allowance** is also linked to demographic change. We simulate the allowance according to past trends based on CZSO data. This shows that approximately 25% of the number of housing allowance payments are made to people

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[57] This change was made as part of a change in the methodology of national accounts. However, from the point of view of the overall balance of the general government sector, this change is budget-neutral, as the tax advantage for children is now classed under social benefits (i.e. an increase in public budget expenditure), but personal income tax revenue is increased by the same amount. See section 4.6 of this Long-Term Sustainability Report.

[58] For parents of two or more children born at the same time, the total amount of the benefit is CZK 525,000. However, in the model, we simulate a uniform parental allowance of CZK 350,000 for all children. According to the CZSO data, the share of multiple births in all births was only 1.3% in 2019 (in 2009, this share was 2.1%).

[59] The share of individuals receiving care allowance increases significantly after the age of 75. In the calculation we combine data from the Czech Labour Office and the Ministry of Labour and Social Affairs of the Czech Republic (MoLSA). For a detailed description of the method of calculation, see the study OCFC (2019): Odhady nákladů příspěvku na péči v návaznosti na stárnutí populace [Estimates of the Cost of the Care Allowance as the Population Ageing, available in Czech only].

[60] Section 11 of Act No. 108/2006 Coll. on Social Services, as amended. From 1 July 2024, the monthly amount of care allowance for people over 18 years of age ranges from CZK 880 in the lowest level 1 of dependency to CZK 27,000 in the highest level 4. The allowance is higher for people under the age of 18.

[61] The care allowance is usually used as part of the client's payment to the social service. For people in dependency levels I to III, the amount of the allowance does not depend on whether the care is provided at home or in a residential social service. The increase in the allowance, both in absolute and percentage terms, was more pronounced for higher dependency levels. In the lowest dependency level I, the allowance did not increase at all.

over 65 years of age.[62] The remaining three quarters of beneficiaries are between 18 and 64 years old.

The evolution of the **tax advantage for children** is linked to the evolution of the number of children and the proportion of secondary school and higher education students. Minors under the age of 18 are eligible for the benefit. It also applies to people under 26 who have student status or who, for health reasons, are unable to undertake continuous training for future occupation or to engage in a continuous gainful activity. In 2024, as in 2023, the annual amount of the tax benefit is CZK 15,204 for the first child, CZK 22,320 for the second child and CZK 27,840 for the third and each subsequent child. In the simulation we use the average of the values of the benefits for the first and second child, i.e. CZK 18,762. We assume that the amount of the tax advantage for children will increase in line with the average wage.

Projections of expenditure on individual benefits as a share of GDP are shown in Chart 3.3.1. Due to the ageing of the population, expenditure on long-term

care allowance will grow the fastest among social benefits, rising from 0.5% of GDP today to more than 1.3% of GDP in 2074.

Expenditure on parental allowance will decrease until around 2030, then increase until the early 1950s, after which it will alternate between a period of slight decrease and a period of slight increase. This is due to the expected evolution of the number of children under the age of three. The amount of tax advantage for children will fluctuate around 0.6% of GDP. Total social benefits other than pensions will increase slightly from 2.9% to 3.1% of GDP by the 2030s, as rising expenditure on care allowance and falling expenditure on parental allowance and tax advantage for children roughly balance each other out. Thereafter, the volume of non-pension social benefits will increase, mainly as a result of rising expenditure on care allowance. From the early 1960s onwards, total expenditure will grow more slowly, reaching 3.7% of GDP in 2074.

Chart 3.3.1 Projections of non-pension social benefits in cash
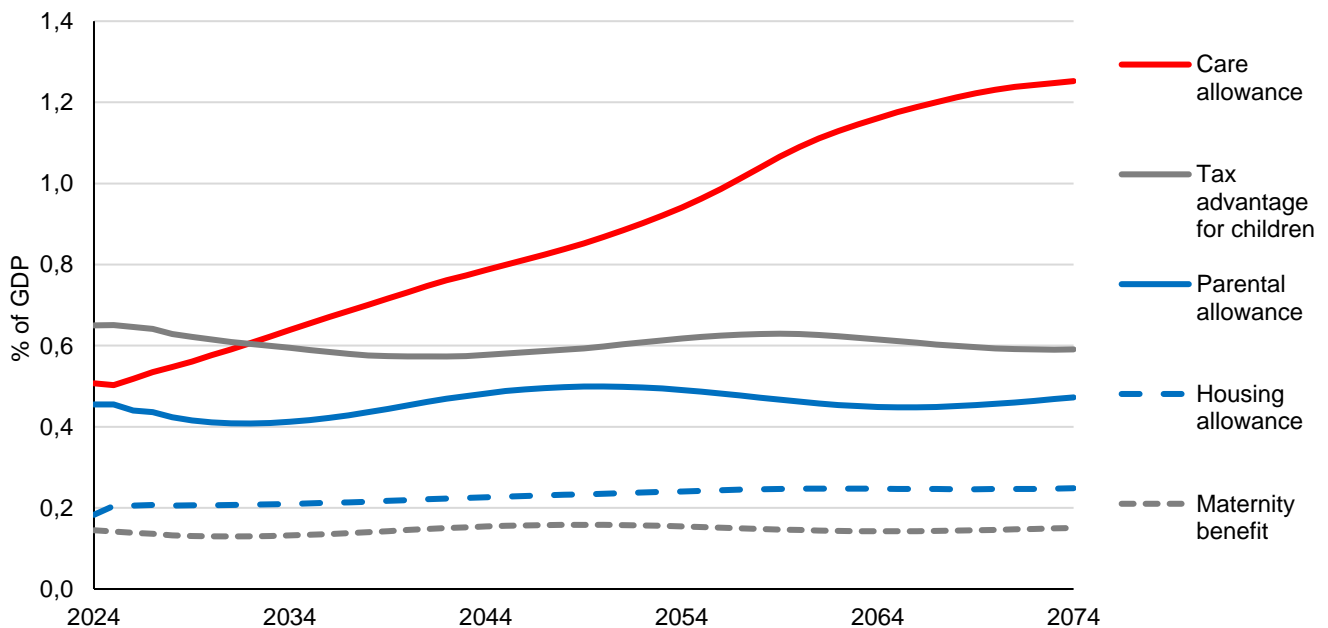
Source: CZSO (2024), MoLSA (2024); CFC calculations.

3.4 Education

The share of education expenditure relative to GDP in 2023 was around 4.8%, with the largest part of it being financed through the Ministry of Education, Youth and Sports of the Czech Republic (MEYS). More than three quarters of the expenditure of its budget are transfers to local public budgets. Besides the MEYS, municipalities and regions, which are

responsible for establishing and administering educational establishments from pre-schools to vocational colleges, also contribute to education expenditure.

Wage costs in regional education account for the largest part of public education spending. Their projection is linked to wage growth in the economy and

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[62] We also verified this figure with EU-SILC data for the Czech Republic for 2018, according to which the share of people aged 65+ receiving housing allowance is 20% and their share of total expenditure on housing allowance is 22.5%.

to the number of staff, which is directly related to the number of pupils. In the projection of education expenditure shown in Chart 3.4.1, we assume that the ratio of teaching and non-teaching staff to 1,000 pupils in each type of school remains unchanged over the projection horizon. The share of pupils in each age category is also kept in the projection at the average of the actual shares over the period 2015–2019. After an initial acceleration, the dynamic of public education expenditure will slow down, especially in the 2030s, due to demographic developments, when fewer teaching and non-teaching staff will be needed in the education system due to fewer pupils. Chart 3.4.2 compares this year's and last year's projection of the number of students in regional education (i.e. the number of students excluding university students). The change in the demographic projection has resulted in a decline in the number of regional education students, which has a significant impact on total public expenditure on education.

The total education expenditure growth is mainly influenced by the dynamics of salaries of teaching and non-teaching staff. Between 2019 and 2021, the dynamic of average salaries in the education sector was higher than the growth of average wages in the economy, as the previous government had pledged in its policy statement to increase the pay of teaching and non-teaching staff to 150% of its 2017 level by 2021. For the following years, we assume salaries will grow at the same rate as the average wage in the economy for all employees in regional education except teachers. For teachers, the projection assumes a guaranteed salary level so that, on average, the salary per full-time equivalent is 130% of the average monthly nominal wage in the calendar year before last.[63]

A significant part of the expenditure of the MEYS consists of payments to universities for current activities and for research and development (R&D). In particular payments to universities show the opposite trend to transfers to local public budgets. Their share of the ministry's total costs is decreasing. While in 2013, expenditure on universities accounted for almost one third of the total expenditure of the MEYS, in 2023 it was only 19%. Going forward, however, we project that spending on universities will stop declining, mainly because of rising wage costs. The share of university students aged 18 to 26 in the

total population in the same age group is comparable to the level of this indicator in Austria. For this reason, we leave the ratio of students to the total population in the same age group at the current level for the purposes of the projection. In view of the demographic projection, an increase in the number of students can thus also be expected, with a peak at the end of the 2030s. Thereafter, the number of university students will decline until 2055, when it is expected to start increasing slightly. At the end of the 2060s, however, we expect the downward trend to resume.

In universities' operating costs, wage growth will be reflected in growth of the compensation of academic workers, whose number is also largely dependent on the number of students. Given demographic trends, the number of university students will continue to grow for another decade, which will be reflected in the need to expand the capacities and equipment of universities. Thus, the bulk of the operating costs of public universities in our model depends on demographic trends, and for the remaining one-third of these costs we assume that they grow at the same rate as GDP.

We also expect universities' R&D spending to increase in real terms over the long term. We assume that 60% of R&D spending is affected by the growth of salaries in education, while 40% of the costs grows in line with GDP.[64]

We incorporate a further 1.5% of GDP of education spending into our projection to cover, for example, capital expenditure and other current expenditure, which we assume will grow in line with GDP.

Total education expenditure in real terms will rise over the entire projection period. In relation to GDP, it will increase in 2025 due to the growth in wage costs. Thereafter, education expenditure relative to GDP will decline due to demographic change as the number of pupils in public schools (excluding universities) declines. Around the mid-2040s, however, public education expenditure relative to GDP will start to rise again to 4.9% of GDP in the second half of the 2050s. In the last thirteen years of our projection, the ratio of public education expenditure to GDP starts to fall again, due to demographic changes (see Chart 3.4.1).

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[63] See Act No. 563/2004 Coll., on Teaching Staff and on Amendments to Certain Acts, as amended, and the press conference of the MEYS of 3 October 2023 (https://msmt.gov.cz/ministerstvo/novinar/do-skolstvi-pujde-ze-statniho-rozpoctu-o-4-mld-vic-nez-letos, available in Czech only).
[64] This assumption is based on Eurostat statistics, according to which, given a five-year average, payments to employees account for about 60% of total expenditure on tertiary education.

Chart 3.4.1 Ratio of public education expenditure to GDP (%)
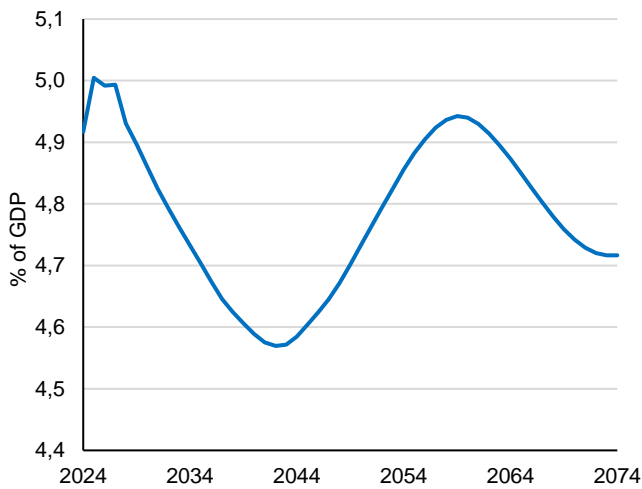
Source: MEYS (2024), CZSO (2024); CFC calculations.

Graph 3.4.2 Projection of number of students in regional education (2023 vs. 2024)
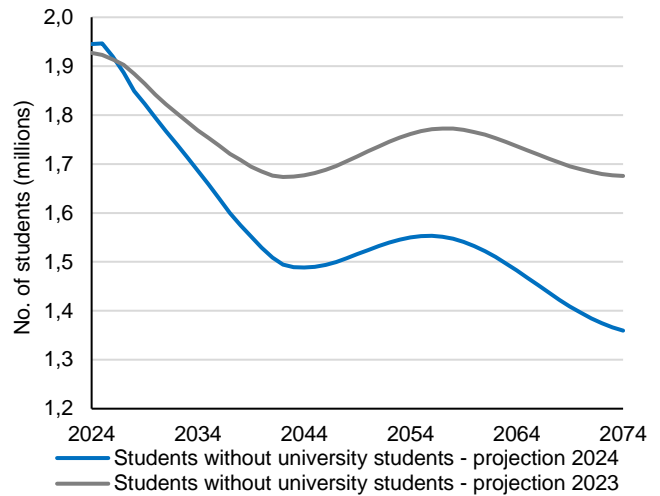
Source: MEYS (2024), CZSO (2024); CFC calculation

3.5 Expenditure associated with convergence effects and other expenditure

We have discussed above those expenditures that we expect to be related to demographic change. For the rest of the public sector expenditure, we can assume that its share in GDP will remain stable. Irrespective of demographic developments, however, the very fact that the Czech economy is a converging economy will systematically affect some other expenditures in the long run. However, our aim is not to simulate the shares and evolution of individual expenditure categories in detail. Rather, we aim to capture the systematic and long-term changes that will result from convergence. For this reason, we focus on the contribution of convergence effects to the growth or decline of total expenditure (expressed as a percentage of GDP).

Compared to the previous Long-Term Sustainability Report, the baseline level of this expenditure is 17.6% of GDP, not 17.1% of GDP. This is a consequence of the adopted Defence Financing Act.[65] We assume that the Czech Republic will meet its commitments to the North Atlantic Treaty Organisation (NATO) and spend the equivalent of 2% of GDP **on defence** from 2024 onwards over the entire horizon of our projection (in 2023, actual spending was 1.5% of GDP). Thus, while the previous 2023 Long-Term Sustainability Report worked with a baseline spending level of 17.1%, however, it assumed increased defence spending by 0.5% of GDP from 2024 onwards compared to the baseline year. So, fundamentally, nothing has changed.

The first category of expenditure where convergence effects can occur is **public investment**. This relationship is based on analyses carried out on a sample of EU countries, which show an inversely proportional relationship between a country's level of economic development and the ratio of public investment to GDP. Less developed countries generally spend a higher percentage of GDP on public investment. There are probably several reasons for this. Less developed (but converging countries) try to eliminate the inadequate level of infrastructure (highways, railways, urban infrastructure, etc.) and hence show higher levels of public investment. Another possible reason is the higher relative price level of capital goods in less developed countries, which directly leads to a higher share of investment in GDP. The higher relative price level of investment may be due to the laws of economics (different endowment of less developed economies with capital, labour and technology), but also to the lower quality of public administration, as indicated for example by the quality of governance indices.[66] The CFC projection assumes that these effects will diminish as the Czech Republic progresses, leading to a decline in the share of public investment by 0.3% of GDP over the projection horizon (see Table 3.5.1).

The convergence of the Czech economy will also affect the **remuneration of employees in the general government sector**, which will bring about additional expenditure pressures. This is due to the assumption of a gradual increase in the costliness of

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[65] Act No.177/2023 Coll. on Financing the Defence of the Czech Republic and on Amending Act No.218/2000 Coll., on Budgetary Rules and on Amending Certain Related Acts (Budgetary Rules), as amended.
[66] See, for example, Kalabiška (2024): Vztah hospodářského růstu a tvorby kapitálu v Evropě [The relationship between economic growth and capital formation in Europe, available in Czech only] or World Economic Forum (2020): The Global Competitiveness Report 2020.

the activities provided by organisations in the general government sector. The growth in labour productivity and the increase in the share of compensation of employees in the private sector will cause wage pressures which will necessarily spill over to the general government sector. However, the activities in this sector are mostly of a service nature, and, moreover, such that it is not possible to fully compensate for wage growth by labour productivity growth (public administration, justice and internal security, etc.). As a result, even if the scope of services produced by public sector employees remains the same, costs will rise and, therefore, the relative share of this expenditure in GDP will rise. This is a manifestation of the so-called Baumol-Bowen effect: goods whose production does not lead to a long-term increase in labour productivity (if they are to be provided in the same quality) necessarily become relatively more expensive because of wage growth in other sectors. This section does not simulate the effects of the Baumol-Bowen effect on health, education and defence spending[67], as these are already included in the sub-projections presented in the previous sections of the Long-Term Sustainability Report. In the remaining areas, our projection assumes that this

effect will gradually increase and represent an additional 0.3% of GDP on the expenditure side at the end of the projection period.

In addition to convergence effects, we also consider the increase in **payments to the EU**. The adoption of the Multiannual Financial Framework for the period 2021–2027 has led, among other things, to a permanent increase in the ceiling on payments to 1.40% of EU GNI.[68] However, in the previous programming period 2014–2020 (except for 2020), annual payments to the EU did not reach the then applicable ceiling. Thus, as in previous Long-Term Sustainability Reports, we continue to assume (compared to the current situation) an increase in payments to the EU of 0.1% of GDP from 2028.

For other expenditures, we do not assume sensitivity to demographic developments, convergence or other effects and therefore hold their level constant until the end of the projection horizon. It should be noted that the initial level of these expenditures (17.6% of GDP) is derived from the cyclically adjusted evolution of general government expenditure between 2013 and 2022.

Table 3.5.1 Ratio of expenditure associated with convergence effects and other expenditure to GDP (%)

	2024	2034	2044	2054	2064	2074
Other expenditure – baseline scenario	17.6	17.6	17.6	17.6	17.6	17.6
Convergence-related changes in other expenditure	0.0	0.1	0.1	0.1	0.1	0.1
public investment	*0.0*	*-0.1*	*-0.2*	*-0.3*	*-0.3*	*-0.3*
defence expenditure	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
growth in general government costs	*0.0*	*0.1*	*0.2*	*0.3*	*0.3*	*0.3*
growth in payments to EU	*0.0*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
OTHER EXPENDITURE INCLUDING CHANGES	17.6	17.7	17.7	17.7	17.7	17.7

Source: CFC calculations.
Note: The totals in the table may be subject to inaccuracies due to rounding.

3.6 Revenue in the long-term projection

Government revenue in the long-term projection is subject to interrelated demographic and convergence effects. For the purposes of this Long-Term Sustainability Report, government revenues are divided into the following groups: revenues from personal and corporate income taxes, statutory social security contributions, consumption tax revenue and other revenues (e.g. property income, income from the sale of goods and services, income from the EU).

In projecting **personal income tax** (PIT) revenue, we assume that it is primarily dependent on

compensation of employees. According to our estimates, the convergence effect will gradually increase the share of compensation of employees in GDP (see section 2.3), and the share of this tax on GDP will rise proportionally. This effect will outweigh the fact that the share of workers in the total population will decline for demographic reasons. According to our macroeconomic projection, wages will grow fast enough to more than compensate for the decline in the number of workers.[69]

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[67] Wage expenditure in the Ministry of Defence is also expected to increase, but we do not expect the share of defence expenditure in GDP to exceed 2% over the horizon.
[68] Council Decision (EU, Euratom) 2020/2053 of 14 December 2020 on the system of own resources of the European Union and repealing Decision 2014/335/EU, Euratom.
[69] It should be noted that we deviate in part from carrying out the projection strictly in accordance with current legislation. Tax regulations often include deductions and discounts or thresholds in nominal terms. Thus, growth in nominal wages and other incomes can lead to an increase

Compared to the previous report, the tax revenue increased by 0.4 pp (from 3.5% of GDP to 3.9% of GDP), mainly because of the increase in the share of wages and salaries on GDP and the measures of the consolidation package[70]. The higher importance of withholding tax and rental income in the total collection of this tax category also plays a role. The expected increase in PIT revenue from the current 3.9% of GDP to 4.2% of GDP at the end of the projection is then only a consequence of convergence developments (see Table 3.6.1).

The **corporate income tax** (CIT) revenue is highly sensitive to the business cycle and therefore its level fluctuates over time. The construction of the tax base also makes the tax difficult to predict. However, in the long-term projection, we disregard cyclical effects and project its revenue according to the evolution of the net operating surplus for logical consistency. This should explain the evolution of the tax revenue better than the evolution of GDP, since the net operating surplus is the macroeconomic counterpart of net operating profit before tax.[71] As in the case of the PIT, there will be convergence effects, but in the opposite direction. A rise in the share of compensation of employees in GDP will necessarily lead to a fall in the share of the gross operating surplus on GDP. The share of the net operating surplus on GDP will then fall even more sharply, as we assume that the share of fixed capital consumption in GDP remains unchanged. As a result, the share of corporate income tax revenue in GDP will fall from 3.9% at the beginning of the projection to 3.0% at the end of the projection.

Compared with the previous Long-Term Sustainability Report, corporate income tax revenues increase by 0.2 pp at the start of the projection (from 3.7% of GDP to 3.9% of GDP), mainly due to the increase in the tax rate from 19% to 21% as part of the consolidation package.

For **other current taxes (e.g. administrative charges)**, we assume a fixed share in GDP. Their share of GDP has been stable in the past and we are not aware of any reasons to change it given the tax policy settings.

Mandatory social security contributions comprise pension contributions (including the systems of the Ministry of Defence, the Ministry of Interior, the Ministry of Justice and the Ministry of Finance), public health insurance contributions excluding state insurees, payments for state insurees, and other mandatory social security contributions (sickness insurance and state employment policy contributions). All these payments are linked to compensation of employees in our projection in a similar way as the PIT, given their construction. Here again, the convergence effect is evident and the share on GDP increases proportionally with the increase in the share of compensation of employees. Compared to the previous Long-Term Sustainability Report, social and health insurance contributions increased by 0.8 pp at the beginning of the projection (from 13.9% of GDP to 14.7% of GDP), partly due to the increase in the share of wages and salaries in GDP, but also due to changes in the consolidation package[72].

In the case of payment for state insurees, we consider the demographic evolution of the cohorts belonging to state insurees (see section 3.2 for more details). Recall that in the general government sector, payments for state insurees are both revenue (for health insurance companies) and expenditure (for the state budget). Thus, they do not affect the balance of the sector, but they are presented separately because they affect the data on the structure and size of the general government sector.

Consumption taxes (**taxes on production and imports**) mainly include receipts from VAT and selective excise duties. The revenue of these taxes is simulated by the share of household final consumption expenditure in GDP, which approximates the most important part of the tax base of consumption taxes. This does not change according to our macroeconomic projection (a change in the structure of income in favour of compensation of employees does not necessarily translate into a change in the structure of household spending), so that the revenue from consumption taxation will also maintain a constant share of GDP.[73] Compared to the previous Long-Term Sustainability Report, there has been an increase of 0.2 pp (from 11.2% of GDP to 11.4% of GDP), mainly

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[70] This includes an increase in tax progression associated with the lower threshold for higher marginal tax rate (from 48 to 36 times the average wage) and the abolition of certain tax exemptions (e.g. tax deductions for placement of child in a pre-school facility).

in the average tax rate, all other things being equal. This means that without a change in legislation, there is, for example, an erosion of the real value of deductibles and discounts, a shift to higher tax bands and the associated taxation at a higher tax rate, etc. In our projection, however, we do not work with these and similar effects and assume that, for example, the real value of deductible items and discounts will be constant.

[71] Once again, we do not take into account the effects of inflation (which would manifest itself in particular in the erosion of the real value of the tax depreciation of firms' fixed capital or in the valuation of inventories).

[72] These include, in particular, the adjustment of the assessment base for social insurance for the self-employed and the introduction of sickness insurance for employees at the rate of 0.6%.

[73] Again, we deviate slightly from strict compliance with the legislation, as some excise rates are constructed in terms of a nominal amount per certain quantity of goods. We therefore assume that, in the long run, the legislation will change in such a way that the revenue from this group of taxes will develop as if they were all constructed as *ad valorem* taxes.

due to an increase in the real estate tax, which accounts for the vast majority of this tax category.

Property income consists mainly of dividends and profit shares of state-owned enterprises. Here too, we assume a stable share in GDP. At the same time, we do not expect the state to change its share in the major firms it (co-)owns. Overall, we assume that the share of ownership income in GDP will remain constant at 0.6%.

Other revenue comprises mainly revenue from the sale of goods and services and revenue from the EU. Interest income from the placement of surplus liquidity is not considered regarding the functioning of the Treasury. The share of revenue from sales of goods and services in GDP is broadly stable and therefore fixed for the long-term projection. EU revenues are also assumed to represent a constant percentage of GDP. However, the evolution of these revenues is subject to a large degree of uncertainty, which further complicates their quantification. Although the energy and geopolitical situation is likely to lead to an increase in these revenues in the short term, we have no information on a structural change in the long term. It should also be noted that our projection only includes EU public sector revenue, not total EU revenue for all entities in the Czech Republic, which is more likely to decline in the future given the convergence towards advanced economies.

Table 3.6.1 General government revenues in selected years (% of GDP)

	2024	2034	2044	2054	2064	2074
Personal income taxes	3.9	4.0	4.1	4.1	4.2	4.2
Corporate income taxes	3.9	3.6	3.4	3.2	3.1	3.0
Other current taxes	0.2	0.2	0.2	0.2	0.2	0.2
Social security contributions	16.7	16.8	17.1	17.3	17.3	17.3
pension insurance	*8.7*	*8.9*	*9.1*	*9.2*	*9.3*	*9.4*
public health insurance (excl. SIs)	*4.6*	*4.7*	*4.8*	*4.9*	*4.9*	*5.0*
payments for state insurees (SIs)	*2.0*	*1.8*	*1.7*	*1.7*	*1.6*	*1.5*
other	*1.4*	*1.4*	*1.5*	*1.5*	*1.5*	*1.5*
Taxes on production and imports	11.4	11.4	11.4	11.4	11.4	11.4
Property income	0.6	0.6	0.6	0.6	0.6	0.6
Other revenue	4.8	4.8	4.8	4.8	4.8	4.8
TOTAL REVENUE	41.5	41.4	41.5	41.6	41.6	41.5

Source: CFC calculations.
Note: The totals in the table may be subject to inaccuracies due to rounding.
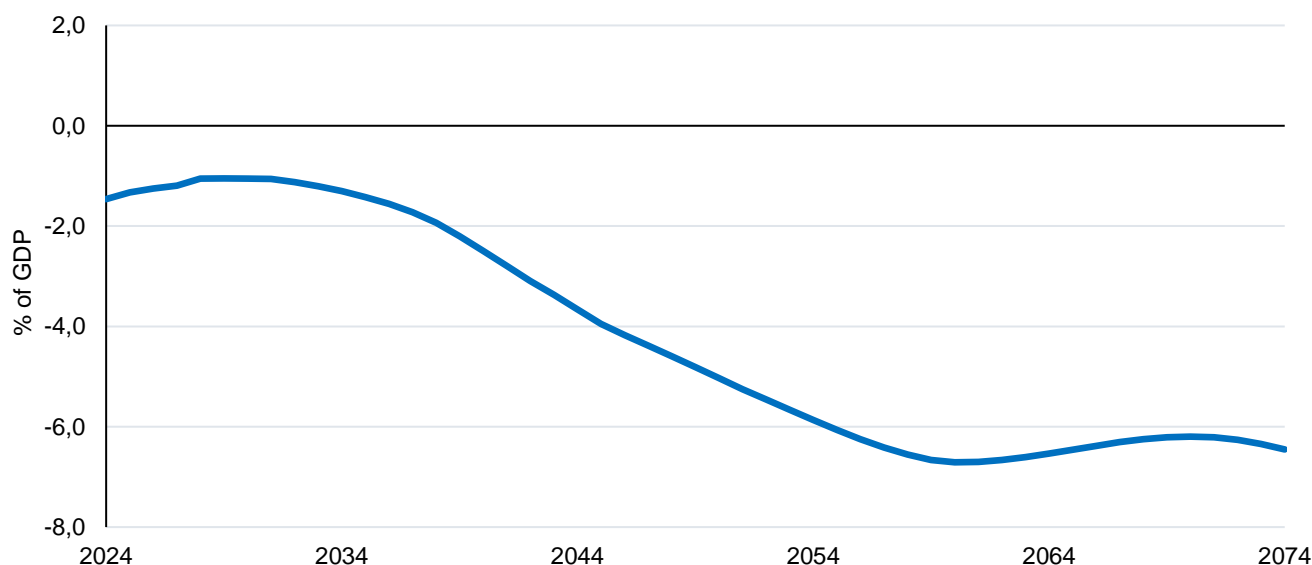
4 General government balance and debt

4.1 Primary balance

The projections of individual revenue and expenditure items allow us to produce a projection of the primary general government balance (see Chart 4.1.1).

Our projection shows negative primary balances throughout the period under review. The trend of rising primary deficits is evident since the second half of the 2030s. This is due to the expenditure side, which is increasing mainly for demographic reasons

(pensions, healthcare, and care allowance). Negative primary balances are projected to stabilise after 2060 as this is when the weaker age groups start to retire. Nevertheless, primary deficits will remain significant until the end of the projection period. The revenue side will be broadly stable over the projection period and will not contribute to offsetting the rising expenditure.

Chart 4.1.1 Primary general government balance

Source: CFC calculations.

4.2 Interest costs

To obtain a comprehensive picture of the evolution of the general government balance, we need to add the interest costs associated with general government debt to the trajectory of primary balances. Until now, we have expressed both expenditure and revenue items in relation to GDP, and the inflation rate has been irrelevant to them. However, this is not possible for interest costs. Interest costs are generally determined by the nominal interest rate, which already incorporates the inflation rate. The nominal interest rate is approximately the sum of the real interest rate and the inflation rate, while the real interest rate is determined by real factors such as the marginal productivity of capital or the time preferences of economic agents. Thus, the inflation rate, via nominal interest rates, affects the share of interest costs in GDP, and hence the overall size of the share of public sector spending in GDP. In our projection of nominal interest costs, we assume 2% inflation,

which corresponds to the midpoint of the central bank's target band.

In our context, general government debt is predominantly made up of state debt (which has long accounted for more than 90% of the total), which is the focus of our projection. The interest cost on the remaining part of government debt (e.g. municipal debt) is assumed to behave similarly. Government debt is financed by a whole range of instruments, from non-marketable borrowings to a wide variety of debt securities with different maturities, coupon yield and denominations.[74] In the projection, we are therefore forced to simplify and split the total debt of the general government sector into two parts: short-term debt (i.e. debt maturing within one year) and long-term debt. For the short-term part of the debt, we assume that it is financed at a short-term rate and has to be refinanced every year at the current rate. In contrast, long-term debt is assumed to be financed

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[74] For more details, see MF CR (2024): Report on the management of the Czech Republic's state debt in 2023.

by bonds with an original maturity of 10 years and a coupon that corresponds to a 10-year nominal interest rate (the 10-year maturity was chosen because it is the longest maturity for which we have a sufficiently long time series that is also internationally comparable). We keep the shares of short-term and long-term debt in total debt constant at 10% and 90%, respectively. Indeed, the 10.6% value represents the average share of short-term government debt over the last five years (2019–2023).

We model the total interest cost as the product of the government debt and the so-called implicit nominal interest rate, which is the weighted average of the nominal interest rates paid on the short- and long-term portions of the debt. The weight of the short-term interest rate on the implicit interest rate is the same as the share of short-term debt, i.e. 10%. The short-term interest rate will be held constant in our projection at 1.8% p.a. – this corresponds to a real short-term interest rate of –0.2% p.a. (this was the

average real three-month interest rate between 2004 and 2019) plus a 2% inflation rate.[75] By analogy, the interest rate on the long-term portion of the debt has a 90% weight on the implicit interest rate. For simplicity, however, we assume that the interest rate for the long-term portion of the debt is equal to the 10-year moving average of 10-year interest rates in individual years. This takes account of the fact that the current interest rate is not relevant for the servicing costs of the 10-year bonds already issued, but only the interest rate at the time of issue. Furthermore, we assume that the 10-year nominal interest rate converges to 2.8% p.a. in the baseline scenario, of which 0.8 pp is the real interest rate (its average value for the period 2001 to 2021) and the rest is the expected inflation rate. Taken together, the assumptions chosen lead to the modelled implicit interest rate gradually increasing to 3% p.a. by 2031 due to higher interest rates in 2022–2025. Thereafter, the rate declines to a long-term equilibrium of 2.71% p.a.

4.3 Debt[76]

Interest costs are included in the calculation of the overall general government balance, thereby increasing annual deficits. These deficits accumulate in the general government debt, and the increasing debt leads to a further increase in interest costs (see Table 4.3.1 for data for selected years). The accumulated debt of the general government sector over a 50-year horizon is heading towards approximately 217% of GDP in 2074 (the baseline scenario). The year of hitting the debt brake is 2038. This evolution is mainly driven by primary balances, not by modelled interest costs. Even if we were to assume that long-term real interest rates were zero throughout the projection period, the debt would still head towards roughly 189% of GDP (see Chart 4.3.1).

In addition to this version of the interest expenditure projection, we also carry out an alternative projection with interest feedback, in which we consider the relationship between the debt relative to GDP on the one hand and the interest rate on the other. In the simulation, we assume that each percentage point of the debt-to-GDP ratio above the 55% threshold increases the current 10-year real interest rate by 0.039 pp.[77] Under these assumptions, debt growth would be accelerated compared to the baseline scenario from 2038 onwards, when our projection suggests that debt exceeds the debt brake. Around 2050, the debt would become unsustainable, and the Czech Republic would be in a debt trap as the implicit interest rate would exceed the growth rate of nominal GDP.

Table 4.3.1 Interest costs and budget balances (% of GDP) in selected years

|	2024	2034	2044	2054	2064	2074
Interest costs (baseline scenario)	1.4	1.4	1.8	3.0	4.4	5.7
Total balance (baseline scenario)	-2.9	-2.7	-5.5	-8.8	-10.9	-12.1

Source: CFC calculations.

[75] Data on nominal interest rates according to the CNB; the conversion to real interest rates was made using the GDP deflator from the CZSO data.
[76] At this point, it should be noted that our Long-Term Sustainability Report works with a baseline general government debt-to-GDP ratio of 44.0% in 2023. However, following the June revisions of the CZSO, GDP has been reassessed, resulting in a reduction of the debt-to-GDP ratio to 42.4%. As we work with pre-revision ratios to GDP for other indicators, we have chosen to do so for debt for consistency reasons, too. The dynamics of the debt and the main conclusions are not affected.
[77] For an estimate of the risk premium, see Tománková (2020): The Effect of general Government Debt on Government Bond Interest Rates.

Chart 4.3.1 General government debt
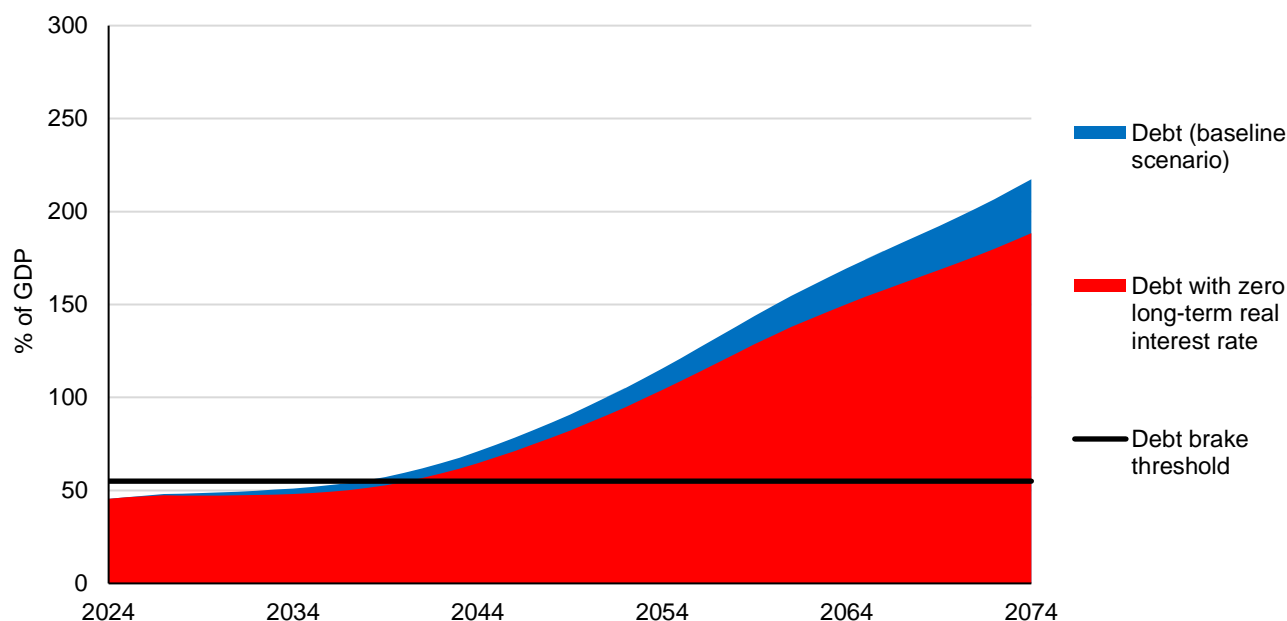
Source: CFC calculations.

4.4 Public finance sustainability indicator

The S1 indicator is used as an overall indicator of the sustainability of public finances. It is generally defined as the number of per cent of GDP by which the primary structural balance must change (by the same number of per cent of GDP in each year) over the entire pre-selected period for the debt to reach a pre-specified value at the end of that period.[78]

So, in our case, we choose a period of 50 years and ask by how many percent of GDP the primary balance would have to be better than our projection every year for the general government debt to be at 55% of GDP, i.e. at the debt brake, at the end of the projection period. Constructed this way, indicator S1 captures the sustainability gap in public finances. It should be stressed, however, that this is an indicator whose main purpose is to allow a quick comparison of whether the sustainability of public finances is improving or deteriorating. On the contrary, it is not a recommendation that the balance improve by a given value each year.

According to our simulation, the public finance sustainability gap is now 3.78 (last year's value was 6.22). This means that if the primary deficit were to be better by 3.78% of GDP each year throughout the projection period from 2024 onwards, the debt would be heading towards 55% of GDP in 2074. Since in this case the debt trajectory would never exceed the

debt brake, there would also be no feedback loop between interest and debt.

If action to reduce the long-term imbalances in public finances is delayed, the magnitude of adjustments in tax and expenditure policies to ensure that debt does not exceed 55% of GDP in 2074 will have to be more substantial than the value of the sustainability indicator presented above. If the measures are delayed until the debt brake is reached (i.e. 2038 in our projection), the indicator rises to 5.12.[79]

It should be noted that the European Commission constructs a similar indicator (S2), whose value is 4.8 for the Czech Republic in 2023.[80] This indicator works with an infinite horizon instead of a 50-year projection period and expresses the fiscal effort required for discounted revenue to equal discounted expenditure. Given the requirement to balance expenditure and revenue, the S2 indicator is stricter than the sustainability gap when calculated with identical data.

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[78] For a more detailed description see European Commission (2024): Debt Sustainability Monitor 2023.
[79] Thus, for the debt to remain on track to reach 55% of GDP in 2074, the primary deficit would have to be lower by 5.12% of GDP each year between 2039 and 2074.
[80] European Commission (2024): Debt Sustainability Monitor 2023.

5 Alternative scenarios and additional analyses

The baseline scenario of our projection used in the previous sections was calculated on the assumptions that the adjusted medium variant of the CZSO's demographic projection will materialise and that the current tax and expenditure policies will be maintained. To at least partly illustrate potential deviations from our baseline scenario, which can generally be significant in long-term projections, we prepared a set of alternative scenarios described in more detail below. The first of the alternative scenarios is drawn up for the medium variant of the demographic projection, whereby we consider a more optimistic assumption regarding the long-term growth of the economy. In the second scenario, we consider alternative parameters of the demographic projection, specifically assuming an increase in the fertility rate over the next 10 years from the current 1.45 to 2.46 children per woman. This fertility rate corresponds to the 1970s, when fertility was at its highest since the late 1950s. In the last scenario, we simulate the effects of the pension reform, mainly with respect to the adjustment of the retirement age.

5.1 Faster productivity growth due to technological progress

The first alternative scenario captures the effect of robotisation and digitalisation and their impact on labour productivity. To assess this factor, we draw up a scenario in which labour productivity rises 1 pp faster each year than in the baseline scenario, both in developed countries and in the Czech Republic.[81] We do not consider such an increase in the growth rate to be entirely realistic. The waves of technological innovation seen in recent decades have not been reflected too strongly in total productivity growth. This alternative scenario is also less realistic considering the current decline in GDP linked with the COVID-19 pandemic, the war in Ukraine and the related negative supply shock. As a result, GDP per person employed in the developed EU countries has tended to stagnate over the last 15 years. The alternative scenario thus serves rather to illustrate the sensitivity of the projection to changes in labour productivity growth and can be viewed symmetrically.

In the technological acceleration scenario, we keep the other parameters, such as the rate of convergence of the Czech economy to other countries or the growth in the ratio of compensation of workers to gross value added, the same as in the baseline scenario.

Higher GDP growth per worker will lead to higher real wage growth compared to the baseline scenario. The number of workers in this scenario is the same as in the baseline scenario. Therefore, we do not assume an increase in structural unemployment, which could temporarily arise due to the deployment of new technology.

The revenue side of the budget, expressed as a percentage of GDP, is not affected because real incomes and GDP grow in parallel. On the expenditure side, there will be an improvement in spending on pensions. Permanently higher real wage growth causes pensions granted in previous years to lag further behind real wages than in the baseline scenario, because the statutory indexation of pensions covers only one third of the real wage growth. Thanks to the higher GDP growth in this scenario, the debt carried over from previous years will also be lower in relation to GDP. Overall, the general government debt ratio is as much as 57 pp lower than in the baseline scenario, but even this very optimistic scenario does not in itself lead to a sustainable public finance path (see Chart 5.2.2).

5.2 Different variants of demographic projections

The next scenario is an analysis of the sensitivity of the baseline scenario to different assumptions about demographic development (high and low variants of the CZSO demographic projection). The different demographic scenarios differ from each other mainly in terms of different population sizes[82], but are very similar in terms of the projected age structure of the population. The ratio between the number of people of working age (for our purposes, aged 21 to 64) and the number of people aged 65 and over is essentially the same in all scenarios, differing only at the very end of the projection horizon (see Chart 5.2.1). The similarity in population structure for these demographic options is due to opposing mechanisms within each demographic option. For example, in the high demographic variant, higher fertility and higher migration rates cause the ratio of the working-age population to the population 65 and over to increase

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[81] See chapter 2. We assume a symmetric effect on both the Czech Republic and Austria (convergence objective). The speed of closing the labour productivity gap between the Czech Republic and Austria will thus not be affected.
[82] While in the adjusted medium variant of the demographic projection the population remains basically stable at around 10.7 million inhabitants and then declines from 2050 to 10.2 million inhabitants in 2074, in the low variant it declines to 8.7 million inhabitants and in the high variant it rises to 11.5 million inhabitants in the same year.

compared to the medium demographic variant, but lower mortality and higher life expectancy reduce this ratio. As a result, the medium, high and low demographic options produce similar projections for the debt ratio.

Chart 5.2.1 Ratio of persons aged 21–64 per person aged 65 and over
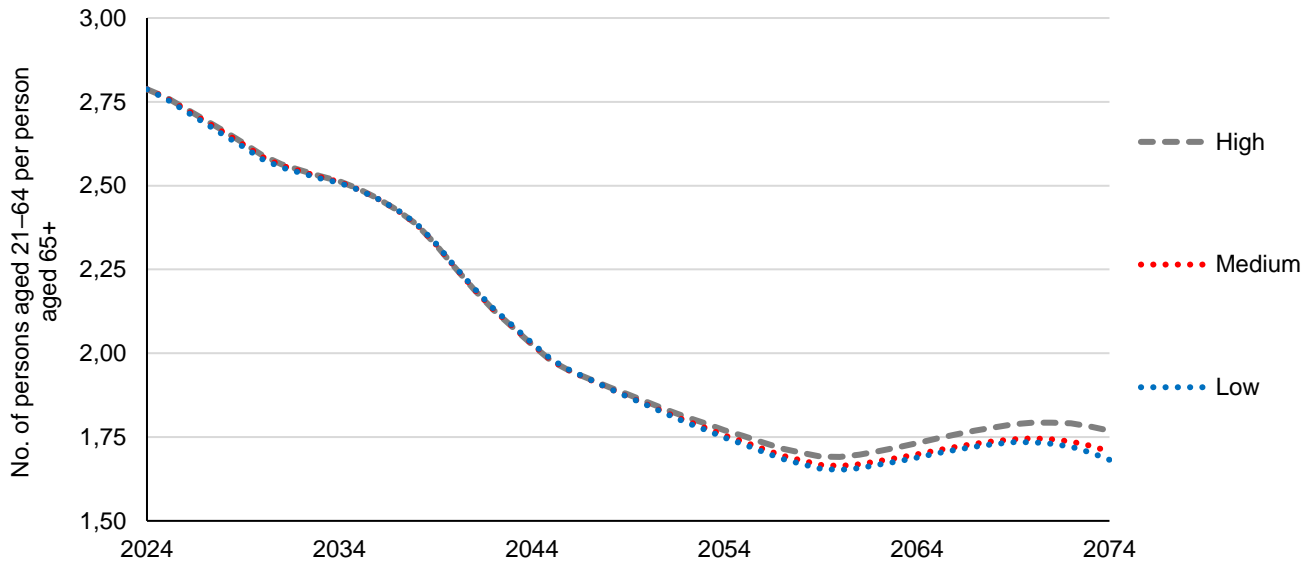
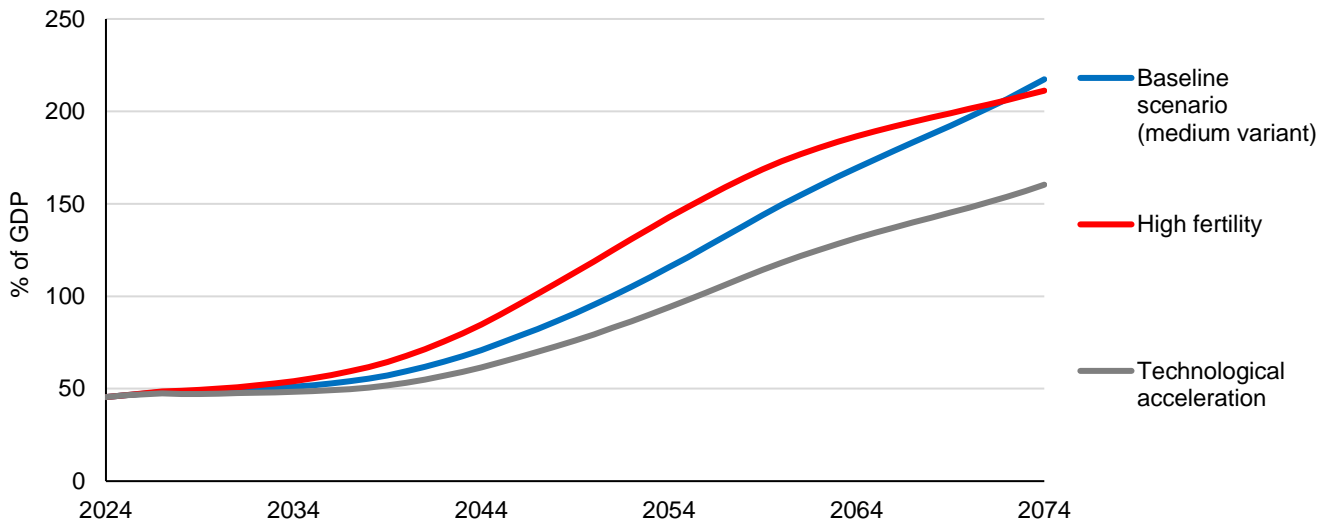
Source: CZSO (2024); CFC calculations.

Given this similarity between the official demographic variants, we have constructed a demographic sensitivity scenario labelled "high fertility".[83] This scenario responds to some of the claims that an appropriate population policy can be sufficient to make a pension system sustainable. Therefore, we consider a scenario in which the fertility rate rises from the current 1.45 to 2.46 children[84] per woman over the next 10 years and remains at this level until the end of the projection. This fertility rate corresponds to the 1970s, when fertility was at its highest since the late 1950s ("Husák's children"), see also Box 2.2 in section 2.2. The main result of this sensitivity analysis is that even an extremely favourable combination of demographic parameters will not lead to stability of the pension system, although pension deficits are between 1 and 2.3% of GDP lower in 2060–2074 than in the baseline scenario. However, their decline comes too late after 2050, when new births start to enter the labour market. Until then, pension deficits are even slightly worse compared to the baseline scenario (at most 0.1% of GDP due to higher spending on orphan and disability pensions). At the same time, the higher fertility projected at this time leads to significantly higher non-pension spending (education, social benefits, health care). These increased expenditures then lead to higher primary deficits and a faster increase in debt in this scenario (see Chart 5.2.2). The above-mentioned improvements in pension deficits only become apparent at the end of the projection horizon (6.2% of GDP lower debt ratio in 2074).

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[83] For a more detailed description of the development of these sensitivity demographic scenarios, see the study OCFC (2021): Alternativní demografické projekce [Alternative Demographic Projections, available in Czech only].
[84] Data according to the World Bank database (2024).

**Chart 5.2.2 General government debt – comparison of alternative scenarios with the baseline scenario**

Source: CZSO (2024), CSSA (2024); CFC calculations.

5.3 Impact of pension reform

The pension system has recently been affected by changes to the Pension Insurance Act, some of which have already been approved and are reflected in the baseline scenario of our projections. The change that has had the greatest impact on the pension projections so far is the change in the pension indexation mechanism, whereby pensions will be increased only according to one-third of real wage growth when pensions are indexed on a regular basis, instead of the current half of real wage growth. The impact of this change is illustrated in Chart 5.3.1, with the lower indexation range improving the pension balance by up to 0.5% of GDP.

Chart 5.3.1 Pension balance – comparison of alternative scenarios with the baseline scenario
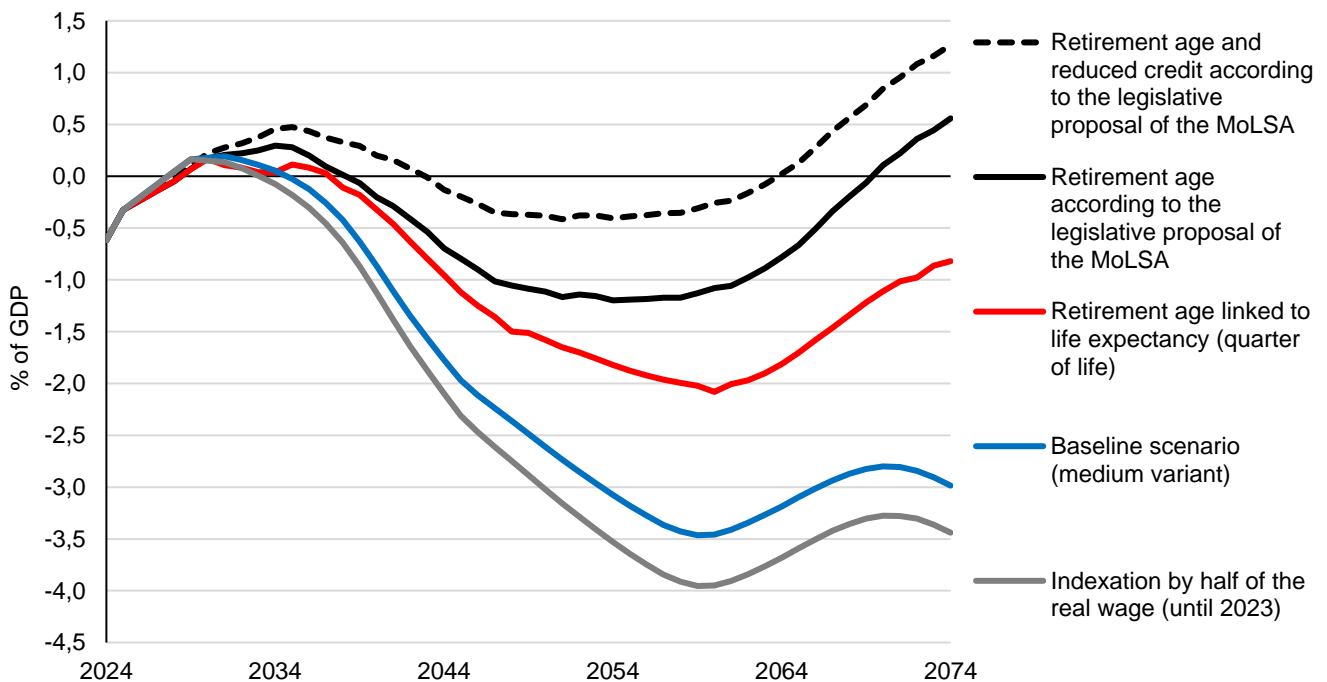
Source: CZSO (2024), CSSA (2024); CFC calculations.

Within this chapter, we also project the impact of other changes to this act that have not yet been approved (the so-called "Great Pension Reform"). The main part of this pension reform is mainly the adjustment of the retirement age after 2030. In this respect, the Ministry of Labour and Social Affairs of the Czech

Republic is in a somewhat schizophrenic situation, where on the one hand, following the new demographic projection and related CZSO outputs[85], it published its Report on the state of the pension system in June 2024.[86] In that report, it proposes, in accordance with the provisions of Article 4(a) of Act No 582/1991 Coll., on the organisation and implementation of social security, as amended, to raise the retirement age so that for those who reach it, their life expectancy (i.e. the time they receive old-age pensions) represents a quarter of their total life expectancy. On the other hand, the new pension reform proposal abolishes the subject part of Act No.582/1991 Coll. and replaces it with a new mechanism where the retirement age limit will be linked to the life expectancy of persons aged 50 reported annually by the CZSO. Compared to the current approach, the retirement age will thus be linked to "hard demographic data" instead of demographic projections. It will also be announced annually instead of every five years. Each generation would spend the same fixed period of time in retirement (the same as the 1965 generation) instead of the current proportional one-quarter of life. At the same time, changes in the retirement age will be restricted so that the retirement age cannot decrease from year to year, but neither can it increase by more than two months. If the new demographic projection is met, the retirement age should increase by two months each year, faster than under the current approach of linking the retirement age to the demographic projection (which sees the retirement age increasing by 1–1.3 months each year after 2030).[87]

The gradual increase in the statutory retirement age above the current maximum level of 65 is projected to cause lower deficits and lower debt through several channels. First, it will increase the projected level of GDP as the number of workers in the economy gradually increases due to later retirements relative to the baseline scenario. Proportionately, this will increase general government revenues. However, the main change will occur on the expenditure side of public budgets. Within the pension system, disability pension expenditure will increase slightly

and the average newly granted old-age pension will also rise due to the increase in the insurance period (see Box 5.1). However, the increase in the retirement age will mainly be reflected in a decrease in the number of old-age pensions, which will lead to lower pension expenditure. Thus, the number of old-age pensioners will be 17.5% (one-quarter of lifetime pensionable age) and 24% (retirement age under the reform) lower in 2074 compared to the baseline scenario. The effect of the increase in retirement age will be stronger for the variant with a faster increase in retirement age under the pension reform than under the current approach with one-quarter of lifetime pensionable age. In the latter, the pension deficit will be around 1.4% of GDP lower around 2060, while it should be around 2.4% of GDP lower under the pension reform (Chart 5.3.1). The reduction in pension deficits leads to a corresponding decrease in primary structural deficits and, together with the higher level of GDP, to a lower level of debt, which is 60.4% of GDP (or 86.5% of GDP) lower than in the baseline scenario by 2074 (see Chart 5.3.2). These are therefore scenarios with a significant positive impact on future debt levels.

Another fundamental measure of the pension reform proposal is to slow down the growth of newly granted pensions so that the ratio of an average newly granted pension to the average wage does not increase (this would occur as a result of the extension of the retirement age and the related increase in the insurance period). There should be a gradual reduction in the level of earnings taken into account under the first reduction threshold from the current 100% to 90% and a reduction in the crediting rate per insurance year from the current 1.5% to 1.45%, both to be phased in between 2026 and 2035. This adjustment reduces the estimated replacement rates of newly granted pensions quite substantially (see Box 5.1). The pension balance is improved by up to an additional 0.8% of GDP as a result of this change (Chart 5.3.1). When combined with the increase in the retirement age, projected public sector debt would grow only slightly above 100% of GDP (Chart 5.3.2).

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[85] See CZSO (2023): Zpráva o očekávaném vývoji úmrtnosti, plodnosti a migrace v České republice [Report on the Expected Development of Mortality, Fertility and Migration in the Czech Republic, available in Czech only].

[86] See MoLSA (2024): Zpráva o stavu důchodového systému České republiky a o jeho předpokládaném vývoji se zřetelem na demografickou situaci České republiky a na očekávaný populační a ekonomický vývoj [Report on the State of the Pension System of the Czech Republic and its Expected Development with Focus on the Demographic Situation of the Czech Republic and on the Expected Population and Economic Development, available in Czech only].

[87] In September 2024, the government is discussing a more modest increase in the retirement age, which would rise by one month each year from the generation of 1965 until the generation of 1978, instead of the two months originally planned. This is roughly in line with our scenario of the retirement age indexed to life expectancy.

Chart 5.3.2 General government debt – comparison of alternative scenarios with the baseline scenario
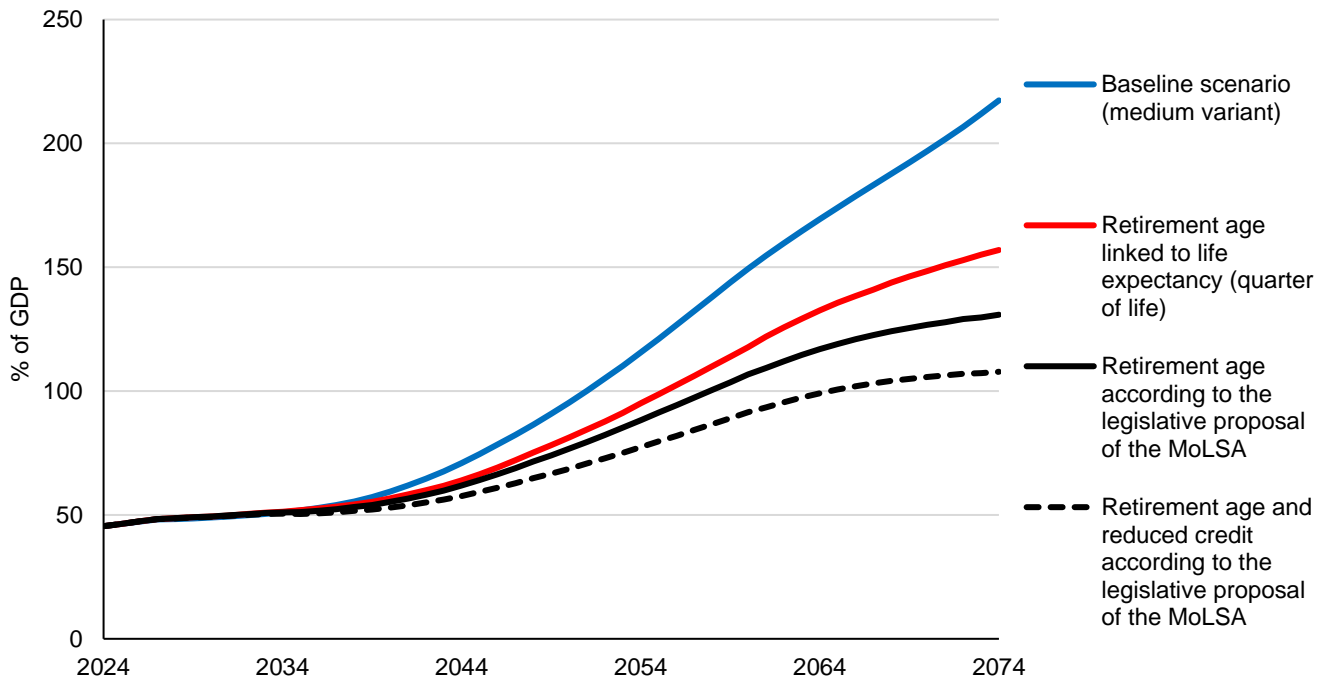
Source: CZSO (2024), CSSA (2024); CFC calculations.

Box 5.1 Calculation of the replacement rate of newly granted pensions

In projecting the cost of the pension system, the key parameter for determining the future average pension is the replacement rate of newly granted pensions. The amount of the newly granted pension consists firstly of the flat rate, which is the same for all pensioners and is 10% of the average wage in the year the pension is granted. The second component of the pension is the earnings-related part, which is specific to each pensioner and depends on his or her indexed lifetime earnings after 1986 (personal assessment base) and on the length of insurance period (time worked plus non-work validated periods[88]). So-called reduction thresholds are applied to the personal assessment base, whereby 100% of income up to the first reduction threshold (currently 44% of the average wage in the economy) is taken into account, 26% of income between the first and second reduction thresholds is taken into account, and income above the second reduction threshold (4 times the average wage) is not taken into account at all. For a person who has received the average wage all his/her life, the following applies for the replacement rate of the newly awarded pension $NP = 0.1 + R \cdot k \cdot [r \cdot z_1 + (1 - r) \cdot z_2]$, where 0.1 reflects the flat-rate (10% of the average wage), R the period of insurance, k the crediting rate for each year of insurance (currently 1.5%), r the first reduction threshold (i.e. 44%), z_1 the percentage of earnings counted up to this reduction threshold (currently 100%) and z_2 the percentage of earnings counted above it (currently 26%). We then use this formula to estimate the future replacement rate as average wages and insurance periods evolve.[89] While the insurance period will increase in line with the increase in the retirement age, it will be reduced by the restriction on counting studies as a non-work validated period.[90] The hypothetical upper limit of the insurance period, calculated from the retirement age of those reaching that age in a given year and the projected study periods of each generation[91], is shown in Chart B5.1.1. The alternative changes to the retirement age (baseline scenario in which the retirement age remains at 65 after 2030; scenario with the retirement age set so that the person spends a quarter of his/her life in retirement; retirement age under the pension reform) differ with respect to the duration of insurance. There

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[88] Validated insurance periods are defined in Section 5(2) and Section 102(3) to (45) of the Pension Insurance Act. These include, for example, periods of unemployment or registration with the Labour Office of the Czech Republic (maximum three years), periods of study until 2009, periods of receiving a level 3 disability pension or periods of caring for a child or another dependant.

[89] This estimate is rather rough as it does not distinguish between the average replacement rate and the replacement rate on average wages. Changes in the labour market (changes in the share of the unemployed, the number of entrepreneurs, changes in the wage distribution, the use of early retirement, etc.) may affect this relationship. We implicitly assume in the estimation that they do not change.

[90] Until 1995, studies up to the age of 18 counted for 100%; since 1996 it does not count at all. Studies after the age of 18 (i.e. mainly university studies) counted for 80% (maximum of 6 years of study) until 2009, but since 2010 it does not count at all.

[91] We estimate the duration of study for each generation using data from the 2021 Census of Population, Houses, and Dwellings, especially from the data on the educational structure of men and women of different ages.

is also a difference in the insurance period for men and women (different retirement age by 2030 and different duration of studies).

Until 2030, this insurance period increases as the retirement age rises (i.e. faster for women than for men). This increase then stops in the baseline scenario, but continues until 2044 in the scenarios with increasing retirement age. The insurance period then decreases after 2045 (the effect of no longer counting studies before the age of 18 as a non-work validated period from 1996), and further decreases after 2050 (the effect of no longer counting studies after the age of 18 as a non-work validated period from 2010). The impact is stronger for women than for men due to their higher share of university graduates in the younger cohorts.

Chart B5.1.1 Expected duration of insurance (upper limit in years)
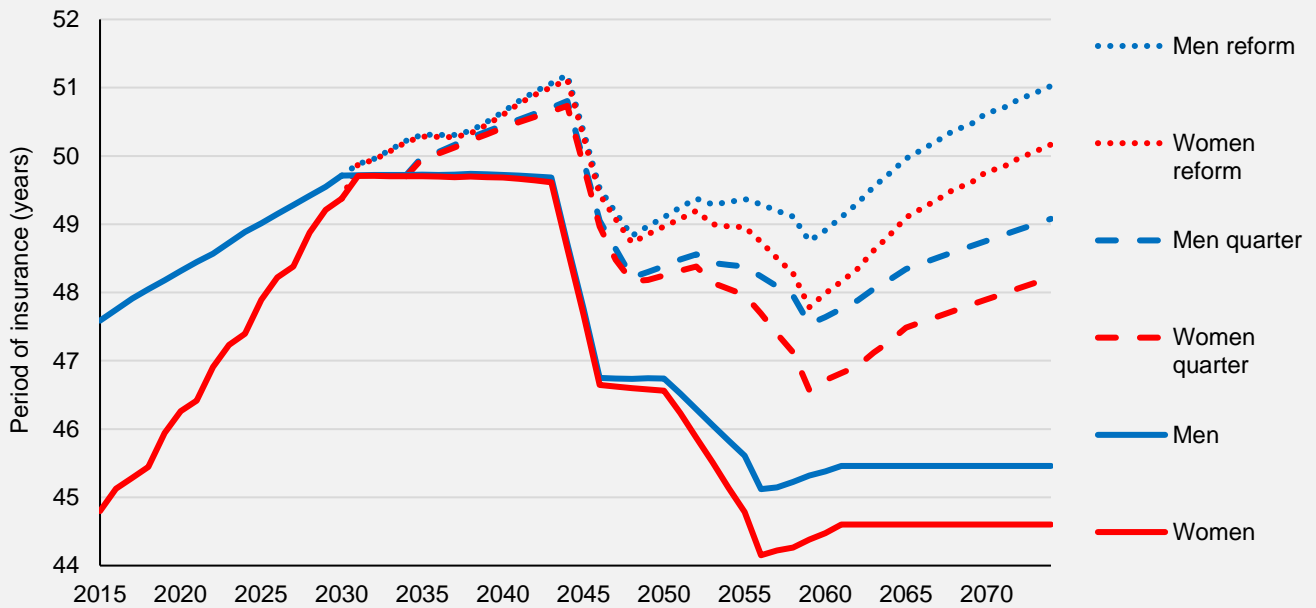
Source: CSSA (2024), MoLSA (2024), CZSO; CFC calculations.

On the basis of the estimated duration of insurance, we then estimated the evolution of the replacement rate of newly granted pensions (see Chart B5.1.2). In the medium variant, compared to the replacement rates we used in the previous Long-Term Sustainability Report, the projected replacement rates for men are initially slightly higher and then lower after 2045, while the replacement rates for women are the same or lower. The new approach has the advantage of both better capturing the impact of extending the retirement age in alternative scenarios (extending the retirement age *ceteris paribus* leads to a higher replacement rate) and of allowing projections for those parts of the pension reform that consider changes in accounting for income below the first reduction threshold (a gradual decline from 100% to 90% from 2025 to 2035) and the crediting of pensions for each year of insurance (a decline from 1.5% to 1.45%). In the scenarios with an increase in the retirement age, the replacement rate is up to 4 pp higher than in the medium variant, while in the long run the limited crediting of earnings reduces the replacement rate by about the same amount. As the increase in the retirement age included in the reform only starts after 2030, while the reduction in credited earnings takes effect from 2026, the reform as a whole will lead to a relatively significant decrease in the replacement rate of newly granted pensions in the short term.

Chart B5.1.2 Projected replacement rates of newly granted pensions (%)
a) Men   **b) Women**
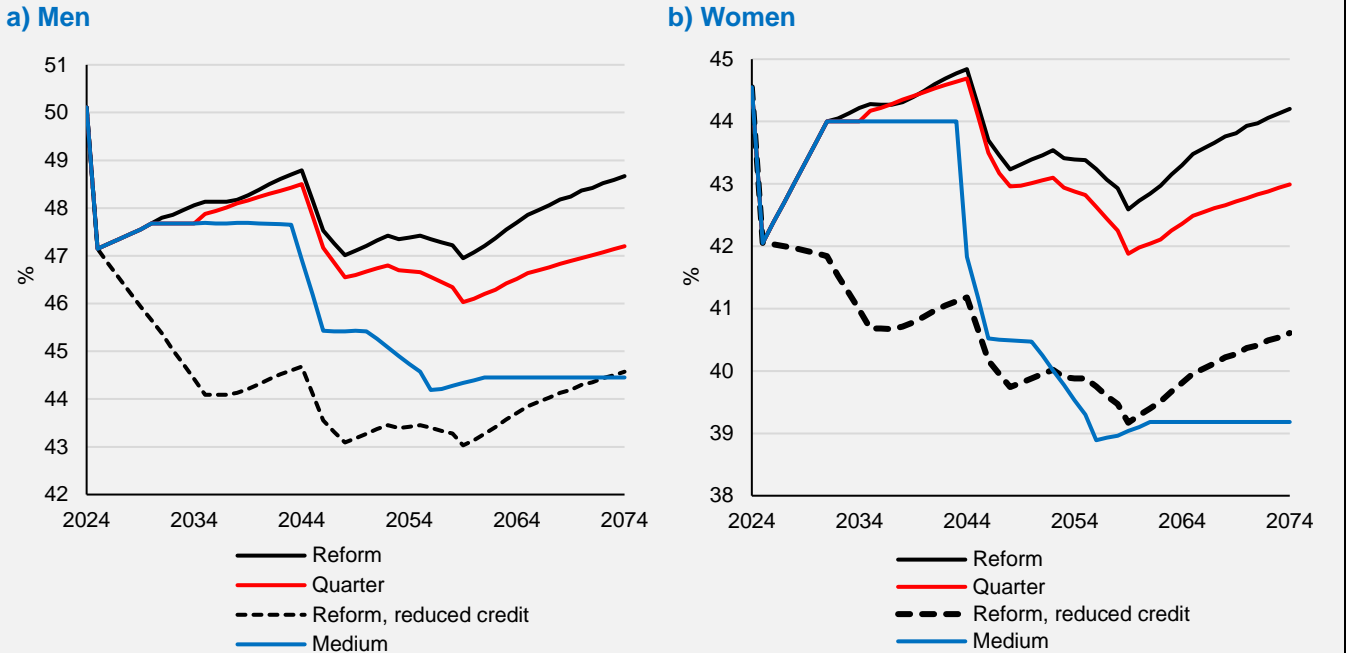
Source: CSSA (2024), MoLSA (2024), CZSO; CFC calculations.

The pension reform also includes other changes, some of which have the potential to increase the stability of the pension system, while others have the opposite effect. These changes are not included in the simulations above. A significant proposed change is the limitation of the so-called "child-rearing bonus" for newly granted pensions. For the third and subsequent children in the family, the current calculation of the child-rearing bonus will be retained. Instead of child-rearing bonus, the care of the first and second child would now be valued in the form of notional assessment bases, which will be derived from the general assessment base ("average wage") and which may be particularly beneficial for lower income households. Overall, the change in the child-rearing bonus could mean a reduction in pension expenditure of around 0.1% of GDP. On the other hand, the proposed extension of the pool of people in demanding occupations will work in the direction of higher expenditure, allowing people in these occupations to retire up to five years before their official retirement age without a reduction in pensions.[92] Estimating the impact of this change, which will counteract the effect of extending the retirement age discussed above, is complicated due to the lack of statistics, but it could amount to around 0.3% of GDP.[93] The increase in the minimum earnings-related part of the pension to 10% of the average wage (from the current CZK 770) will also contribute to higher pension spending.[94] Another important change is the possibility for spouses and registered partners to voluntarily share the calculation base by mutual agreement. Again, the impact of this change may be in the direction of higher pension expenditure within the range of 0.1% of GDP, as the sharing may redirect part of the pension of the higher earning partner (usually the man) to the pension of the lower-earning partner (usually the woman). In this context, women typically spend longer in retirement than men.

The bill also contains a number of other changes, such as a more modest reduction of the pension in the case of early retirement upon obtaining 45 years of insurance, the recognition of doctoral studies as a non-work validated period of insurance, lowering the age required to qualify for the so-called deferred retirement pension, the extension of the time limit for

[92] The classification of "demanding occupations" should be linked to the job classification register and cover all workers in the fourth job category and parts of the third category (with work involving physical stress, vibration, cold or heat). Approximately 119,000 people could be covered.
[93] Years of service in a demanding profession will be retroactively documented up to ten years before the law comes into force. It will thus be possible to qualify for a 15-month reduction in the retirement age after having worked 2,200 shifts (which corresponds to about 10 years of work in a demanding profession). A reduction of up to 30 months will be possible after having worked 4,400 shifts (about 20 years), with a further reduction of one month for every additional 74 shifts, up to a maximum of five years. The reduction in the retirement age for people in demanding occupations will therefore be phased in gradually as the period of possible registration increases from the current 10 years. At the same time, there should be a parallel increase in employers' social security contributions for these workers (a gradual increase in the rate of up to 5%), which should increase the revenues of the pension system and cushion the effects of the reduction in the retirement age. Overall, it is difficult to estimate the long-term impact of this change.
[94] The minimum pension will therefore amount to 20% of the wage.

renewing entitlement to a widow's/widower's pension from two years to five years, and some administrative changes. However, the impact of these changes will be negligible compared to the changes mentioned above.

Box 5.2 Long-term interest yields on government bonds

In the political discussions related to the pension reform, there has also been a proposal to create a product that would allow citizens to conveniently save for their retirement through government bonds[95], and to provide additional funds to the government for the construction of key infrastructure. The idea behind all saving products is that they should provide citizens with significant real returns, which they would then draw on in retirement. In this box, we focus on whether government bonds are an appropriate instrument in the context of historical real returns on Czech government bonds.

Although nominal interest rates are the key variable for annual interest payments on the state debt (a mandated expenditure of the state budget), the real interest rate[96] (the yield after deducting inflation) is also important from the perspective of the citizen as a potential investor. The nominal interest rate of a government bond is the average yield of a 10-year government bond in each year (CNB, 2024) from which we "subtract" the inflation rate expressed by the increase in the average annual consumer price index in that year (CZSO, 2024).

Table B5.2.1 and Chart B5.2.1 show the long-term development of the real yield on Czech government bonds. Looking at the whole period for which comparable data are available (2001–2023), the average real yield on government bonds was 0.04% p.a. The inflation episode of 2022 and 2023 obviously had a significant impact on the real yield, but even without these years (2001–2021) the real yield on government bonds was low, at 0.76% p.a. A similar real yield was achieved by Czech government bonds from the time of our accession to the EU until the coronavirus pandemic (2004–2019), namely 0.70% p.a. The yield of around 0.70% p.a. can thus be described as the average long-term real annual yield of Czech government bonds over the past two decades. It should be noted, however, that in some periods (including those characterised by low inflation) the average annual real yield was negative, namely -0.18% p.a. in 2012–2019.

Table B5.2.1 Average annual real yield on Czech 10-year government bonds in individual periods

| Period	Real yield on Czech 10Y government bond (in % p.a.)
2001–2023	0.04
2001–2021	0.76
2012–2019	-0.18
2004–2019	0.70

Source: CNB (2024), CZSO (2024); CFC calculations.

As can be seen from the above, the MF CR has been able to finance itself on average (in the long term) at a real rate below 1% p.a. The proposal to create a product that would be part of the pension reform and would allow citizens to save for their retirement in government bonds does not make economic sense for either party, mainly for the following two reasons:

1) If citizens were to invest their money in government bonds, they would earn an average real return of less than 1% p.a. over the long term. However, if the objective of citizens is to invest in safe government bonds with the acceptance of lower yields, then already there are pension funds that invest clients' money exclusively in government bonds.

2) If the government is able to finance itself in real terms at less than 1% p.a., but "deliberately" issues bonds at a higher real yield (e.g. 3% p.a. to give citizens a higher profit), then the government is no longer merely covering its financing needs, but is providing a subsidy to individuals in the context of retirement savings. The government would thus pay more each year in servicing state debt than if it was financed at market rates. The difference between the cost of servicing the state debt at market rates and at "deliberately" higher rates would represent an additional expenditure for the state budget, and this would be no different from a situation, in which the government provides a direct subsidy to citizens who save for retirement or increases pension expenditure; however, such transfers would be regressive in nature.

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[95] Or other government securities issued for a specific purpose (e.g. construction of a nuclear power plant).

[96] The real interest rate is calculated according to the Fisher equation $1 + r = \frac{1+i}{1+\pi}$, where r is the real interest rate, i is the nominal interest rate and π is the inflation rate.

Chart B5.2.1 Average annual real yield on Czech 10-year government bonds 2010–2021
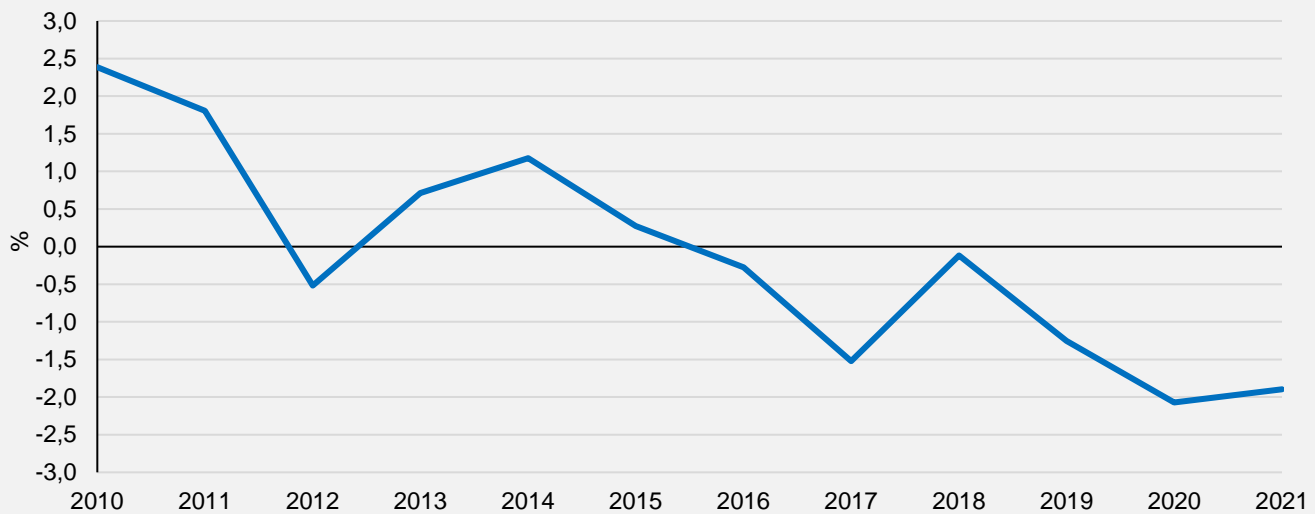
Source: CNB (2024) and CZSO (2024); CFC calculations.

Looking at past government bond yields and their trend over the last decade, it can be concluded that the real return is not attractive from the perspective of citizens and is insufficient to provide for retirement. At the same time, the proposal would go against the logic of other proposed changes in the pension reform (e.g. efforts to motivate citizens to switch to more dynamic products, diversification of resources, etc.).

5.4 Generational accounts in the pension system

5.4.1 Generation-specific revenue and expenditure

In this section, we examine generation-specific revenue and expenditure in individual years. These show how the fiscal burden is distributed across the generations.[97] The largest generation-specific item is undoubtedly pension system revenue and expenditure, which we analyse in more detail in the following section. However, population ageing and the entry of baby-bust cohorts into the labour force affect not only the pension system, but also health care expenditure and generation-specific social benefits. We consider around 43.9% and 42.4% of total government revenue and expenditure in 2023, respectively, to be generation-specific.

Chart 5.4.1 depicts the age profile of revenue and expenditure per person of a given age. It is clear that children in the first three years of life are net recipients, mainly because of maternity and parental leave payments and also because of increased health care costs. Education benefits follow from the age of two years up, dominating until around the age of 18. Child/student-linked personal income tax discounts, which are also considered to be a social benefit and which we assign to children, are also significant.

Conversely, people of working age are on average net contributors, as their contributions to the system in income tax, health insurance and social security contributions exceed the benefits that these generations receive from the system. Post-working age generations are again net beneficiaries, benefiting most from the pension and health care systems. On average, a person aged between 22 and 60 years is therefore a net contributor to public budgets at present.

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[97] For a description of the generational accounting methodology, see OCFC (2021): Metodika mezigeneračních účtů [Generational Accounting Methodology, available in Czech only]. See also Box 6.1 Generational accounting methodology in the 2021 Long-Term Sustainability Report.

**Chart 5.4.1 Payments and receipts per person of a given age in 2022**
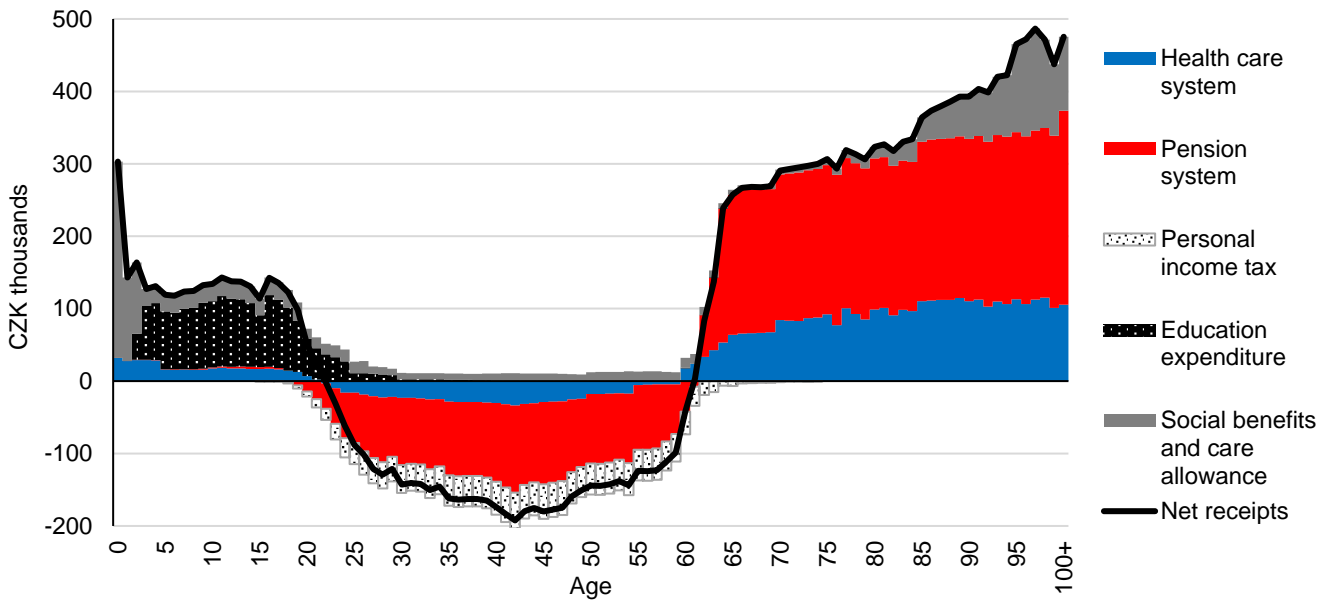
Source: CZSO (2024), CSSA (2024); CFC calculations.

The generational accounts also reveal that the average individual born in 2000–2004 (i.e. from the first generation whose entire life cycle we cover) will receive CZK 9.7 million more from public budgets over their lifetime than they will contribute to them. However, each member of the generation born 50 years later will receive CZK 9.1 billion more than they contribute if policies are left unchanged.[98] As Chart 5.4.2 shows, generations born up to 2065 are net beneficiaries in the public finance system in our projection. Generations born later are still economically active in our defined period, but their entire retirement period is not covered. They are therefore net contributors overall. However, in the long term, beyond 2150, these generations will also become net beneficiaries under unchanged policies.

Chart 5.4.2 Public budget payments and receipts of a given generation[99]
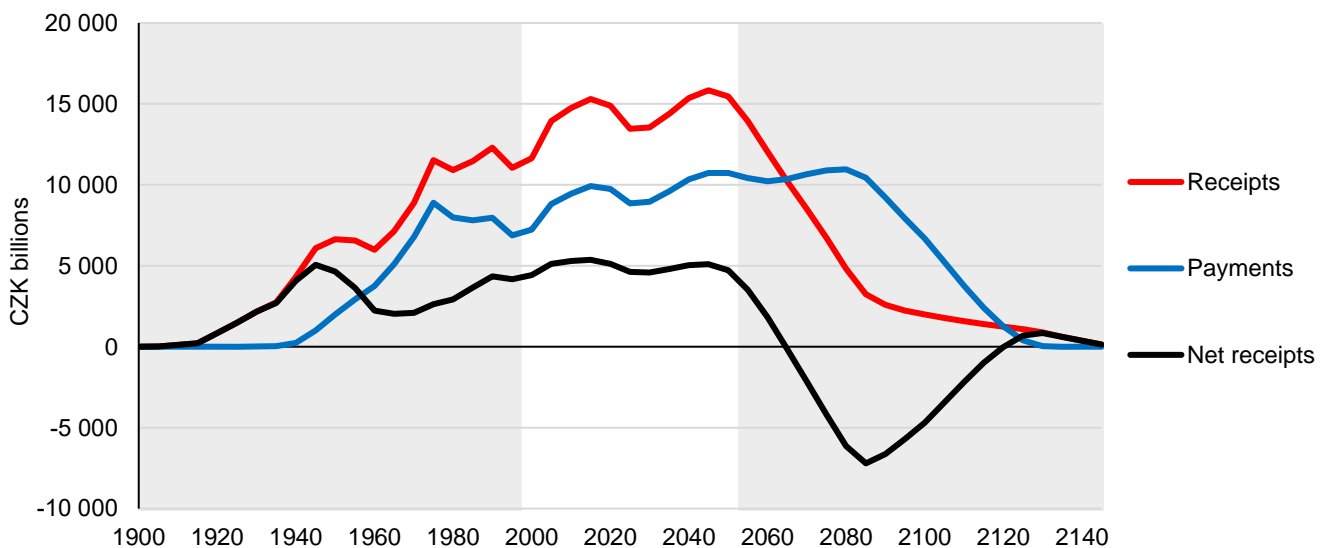
Source: CZSO (2024), CSSA (2024); CFC calculations.

[98] Revenue and expenditure are expressed in real terms in 2023 prices and are discounted by real interest rate of 1%.
[99] The figures in the charts in sections 5.4.1 and 5.4.2 covering the period 1900–2150 (and 1950–2100, respectively) are in 2023 prices, discounted by a 1% real interest rate. The *x*-axis shows the individual generations by five-year birth periods. Generations whose entire careers or entire pensions are not covered are indicated in grey.

Chart 5.4.3 shows how the net receipts of each generation would change if we assume higher taxation at a rate at which general government debt would stay at the debt brake level (55% of GDP) until 2074. We assume that the tax burden is increased in 2039, a year after the debt brake is reached. In this case, net receipts would rise for all generations from 1950 on, while the burden would increase for generations born after 1990. The overall increase in the tax burden would be around 15%. Comparing the baseline no-change scenario with the alternative sustainable finance scenario, it is clear that future generations, especially those born later than the 1940s, will bear the greatest burden (Chart 5.4.3).

Chart 5.4.3 Net receipts of each generation – baseline and alternative scenario[99]
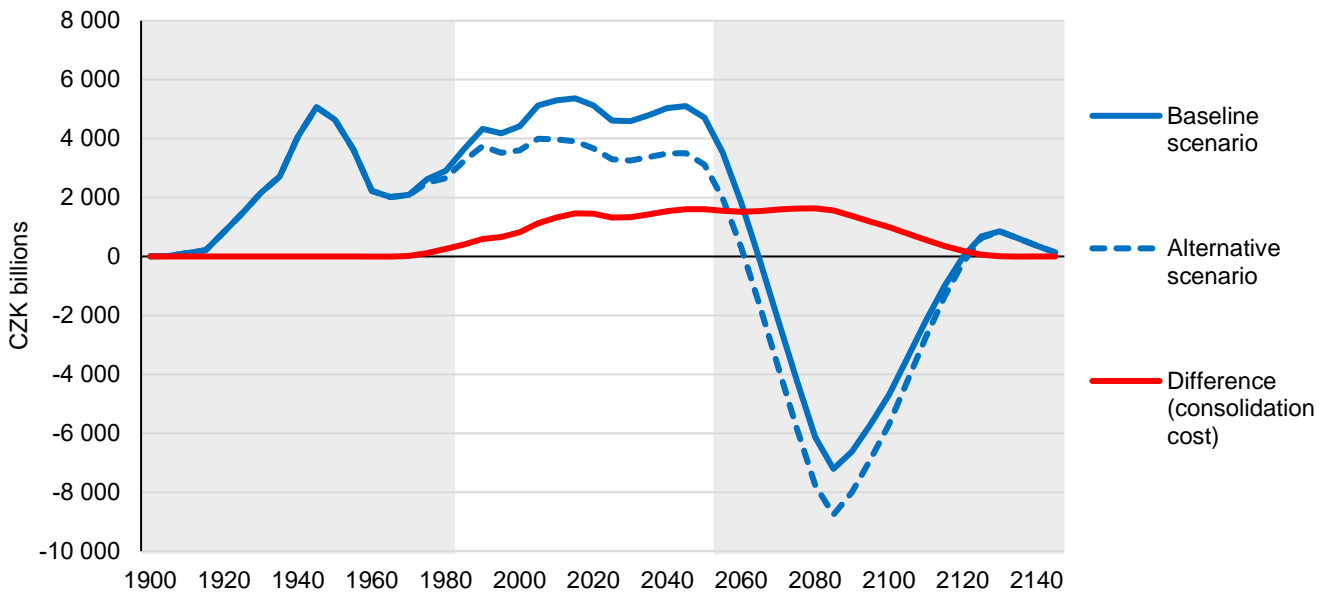
Source: CZSO (2024), CSSA (2024); CFC calculations.

5.4.2 Generational accounts and the pension system

In the previous section, generational accounts were compiled for the widest possible range of generation-specific household revenues and expenditures. To discuss the impacts of pension reform on various different generations, it is appropriate to examine specific pension system revenues and expenditures in the framework of these generational accounts.

The Czech pension system is largely based on inter-generational solidarity, with social security contributions paid by the economically active generation being used directly to pay existing pensions (pay-as-you-go). In the generational accounts model, we therefore include the pension insurance payments of the working population (i.e. pension system revenue), which we then compare with the expenditure on pensions paid to the economically inactive population. In the projection of pension expenditure of individual generations, we use the expenditure calculation method presented in section 3.1 of this Long-Term Sustainability Report,[100] taking into account expenditure on old-age, disability, widows', widowers' and orphans' pensions. For the projection of pension system revenue decomposed into generations, we begin with the method used to calculate such revenue for the pension system as a whole (see section 3.6 of this Long-Term Sustainability Report). We then divide these contributions to the pension system by generation on the basis of the volume of wages paid. We leave the ratio of the wage of a generation of a particular age to the average wage in the economy, as well as the participation rates and cyclically adjusted unemployment rates of each cohort, constant over time. In the baseline scenario, we assume the same pension system parameters as in our projections described in section 3.1. Here, we calculate how much each generation will pay into the pension system in total and how much it will receive in old-age, disability and other pensions in the period 2000–2150 (see Chart 5.4.4).[101] The net amount received from the pension system (pensions paid out minus social insurance contributions paid in) for each generation is thus determined by the pension per pensioner, but also reflects the generation's relative

[100] See also OCFC (2019): Projekce důchodového systému [Pension System Projection, available in Czech only] and OCFC (2022): Odhad náhradového poměru dávek důchodového pojištění [An Estimate of the Replacement Rate of Pensions, available in Czech only].
[101] Revenue and expenditure are expressed in real terms (2023 prices; indexed by the GDP deflator) and are discounted by a real interest rate of 1%.

population size, its life expectancy and retirement age. In the period 2000–2150, the current older generations no longer contribute to the system and merely draw pensions (the left-hand part of Chart 5.4.4). Conversely, the youngest generations, who have yet to be born and do not reach retirement age in our projection period, merely contribute to the system (except for disability and orphans' pensions; see the right-hand side of Chart 5.4.4).

Chart 5.4.4 Pension system payments and receipts of individual generations[99]
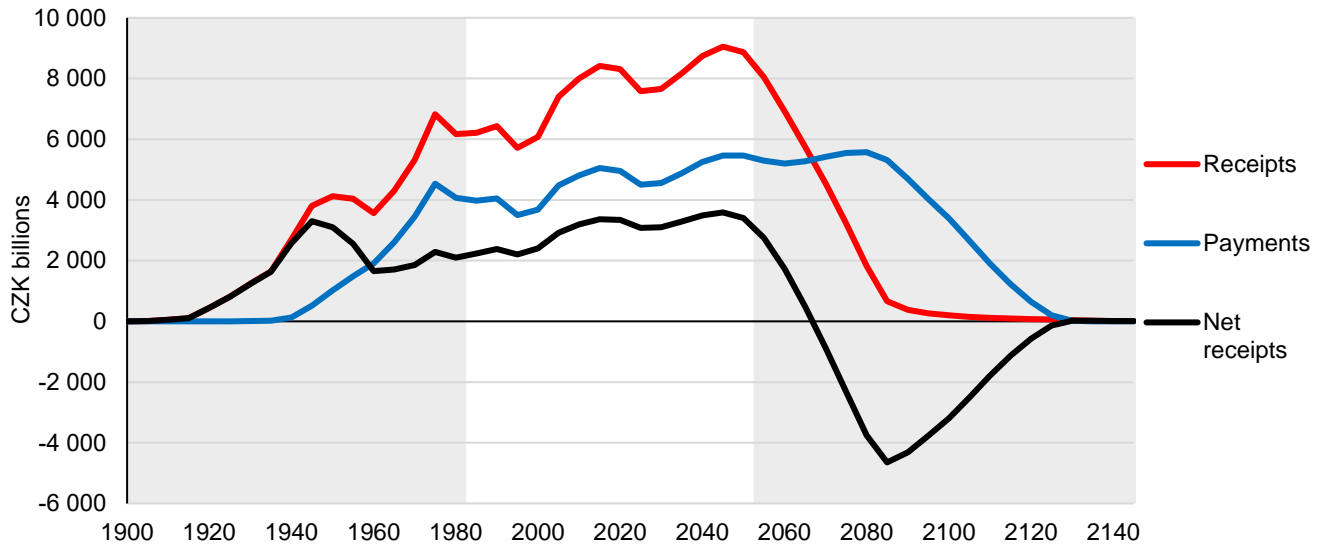
Source: CZSO (2024), CSSA (2024); CFC calculations.

The generations whose entire working and retirement cycles we cover start with the one born in 1980 and end with the one born in 2050. All these generations receive more from the pension system than they pay into it. Younger generations receive more, owing mainly to a combination of higher life expectancy and the capping of the retirement age at 65 years. However, the calculation presented in Chart 5.4.4 does not take account of the fact that the present configuration of the pension system is unsustainable in the long term and leads to an escalation of general government debt, as described in section 4. The considerations of any pension reform therefore raise the question of which generations will bear the brunt of that reform and whether it will burden some generations more than others. Delaying the pension reform will hit younger generations considerably harder than older ones.

We therefore prepared a set of simple possible alternatives, which we construct in such a way that the accumulated pension system balance is zero in 2074. There are several ways of achieving this. One can change the revenue side of the pension system (raise the social security contribution rate) or change the expenditure side (reduce the replacement rate and hence reduce pensions), or do a combination of the two. Another option is to move the retirement age (see section 5.3), which has a similar effect as reducing pensions. Below, we consider two options separately: firstly, the situation where only the social security contribution rate rises and pensions stay the same relative to average wages as in the baseline scenario (see Chart 5.4.5); secondly, the situation where, on the contrary, the contribution rate stays unchanged and pensions fall relative to wages, i.e. the replacement rate decreases (see Chart 5.4.6).

In both variants we consider various alternative changes. In alternative 1, we assume that the pension system is balanced every year. For each year, we therefore calculate the contribution rate (replacement rate) that equalizes pension system revenue and expenditure. In this alternative, the central authorities put the reform of the system on hold until the pension system starts to deteriorate significantly due to population ageing (i.e. until around 2040). This alternative leads to social security contribution rates initially rising to 29% (roughly 1 pp) in response to the current pension account deficits. They then fall to 27.4% of income by 2030, even slightly lower than the current rate of 28%. However, they then rise to 38.4% in 2059 because of the increasing number of pensioners. This means that in 2059 the working generation would face a pension burden that is 10 pp higher than that of the current generation, which would already be receiving pensions.

Conversely, maintaining the current pension insurance rate would mean that pensions would have to be reduced from the current level of around 46.2% of the average wage to 30.7% in 2060. In this case, the burden of debt sustainability would be borne by the current economically active generation, who would see relatively lower pensions than current pensioners.

In the other alternatives, we raise the pension insurance rate or lower the replacement rate so that the pension system is cumulatively in equilibrium by 2074.[102] The impact on each generation depends on the point in time at which the pension rate increases or the replacement rate decreases. In alternative 2, we consider an increase in the rate starting in 2030, the year when most of the changes resulting from the pension reform are effectively in place (see section 5.3).[103] In alternative 3, we then assume an increase in the rate starting in 2039, the year after the debt brake threshold is reached. Needless to say, the greater the delay in raising the rate, the bigger the response required. While the insurance rate increases from the current 28% of income to 34.2% in alternative 2, it reaches 36.1% in alternative 3.

However, the question is whether such a dramatic increase in the insurance rate would not raise labour costs above the viable level, with implications for international competitiveness of the Czech economy and overall macroeconomic performance.

Chart 5.4.5 shows that an increase in the pension insurance rate would mainly burden younger generations. Its impact is greatest in alternatives 1 and 3, where recently born and future generations are much more affected than those born before the turn of the millennium. Earlier rate increases are slightly more equitable across generations than the other alternatives as they spread the cost of stabilising the pension system across more generations.

Chart 5.4.5 Rising insurance rate scenario (net balance)[99]
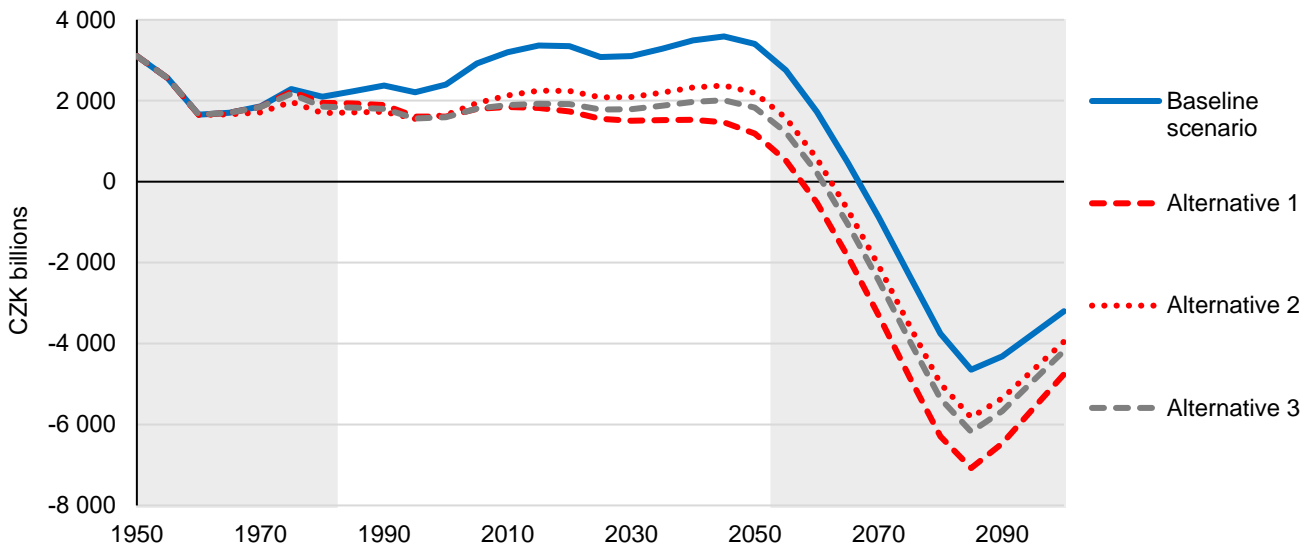
Source: CZSO (2024), CSSA (2024); CFC calculations.
Note: In each alternative, the pension insurance rate is increased in such a way that the pension system is balanced in 2074. In alternative 1, this is achieved by balancing the pension system every year, while in alternatives 2 and 3 we consider an increase in the rate starting in 2030 (when most of the pension reform measures take effect) and 2039 (i.e. one year after the debt brake threshold is reached), respectively.

If we assume that the pension insurance rate remains at the current level of 28% in the future and that the retirement age does not change either, it will be necessary to lower the replacement rate to achieve a balanced pension system. Chart 5.4.6 shows that both the older generation (starting with those born in the 1960s) and younger ones will be worse off in the event of a reduction in pensions, so the effects of consolidating the pension system will be distributed more evenly across generations by comparison with an increase in the pension contribution rate at the same point in time. Again, if the reduction takes place earlier, the burden will be split

more evenly across the generations. Conversely, if the reduction in pensions is delayed, the impact on the older cohorts will be smaller at the expense of the younger generations. It should be added that the current version of the pension reform (see section 5.3) is most similar to alternative 2 with a reduction in replacement rates, as both the start of the lower indexation and the increase in the retirement age above 65 occur around 2030.

Our projection of changes in the configuration of the pension system is simplified in many respects, but it is clear that postponing parametric changes in the

[102] These alternatives are therefore designed in such a way that the net present value of pension income over the period 2021–2074 is equal to the net present value of pension expenditure over the same period. Unlike in alternative 1, where the pension system is stable the entire period 2024–2150, in alternatives 2 and 3 the pension system is not necessarily stable after 2074.
[103] This is mainly due to the lower indexation of pensions to real wages and the increase in the retirement age above 65 (both of which will only have real impact after 2030). Changes to the reduction in the level of credited earnings in the calculation of new pensions will occur earlier (between 2026 and 2035), but their impact will also be gradual.

pension system will asymmetrically burden the younger generations born after the turn of the millennium. At the same time, it is evident that adjustments to the pension system settings that focus on the expenditure side produce a more even distribution of impacts across generations compared to adjustments on the revenue side and can be perceived as "fairer".

Chart 5.4.6 Falling replacement rate scenario (net balance)[99]
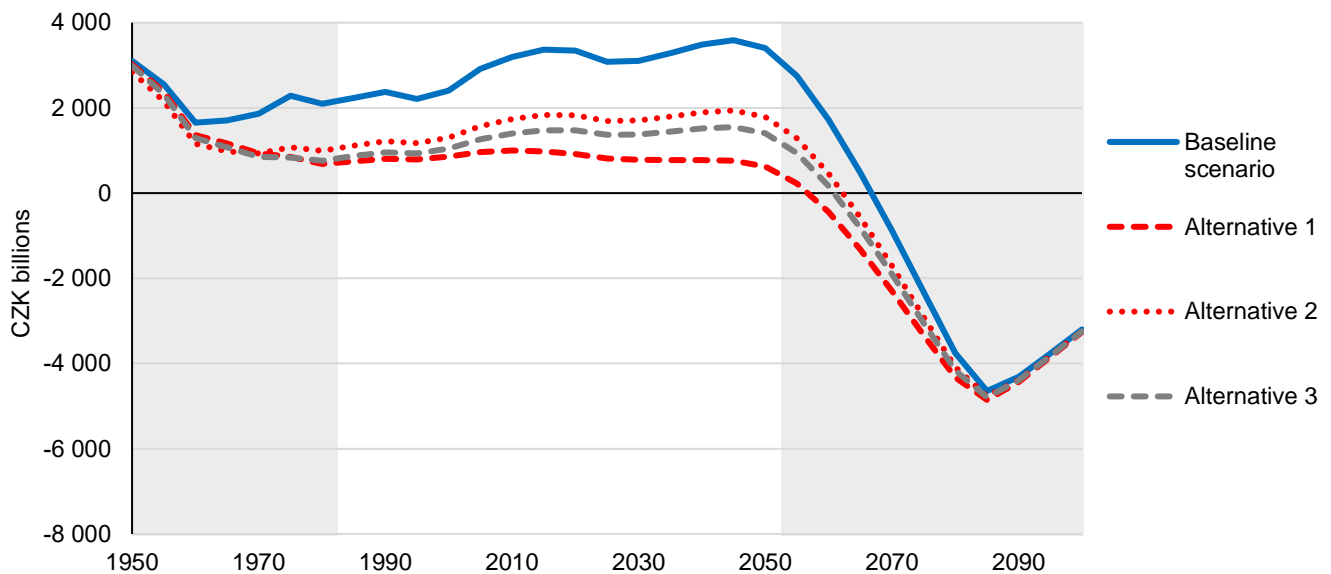
Source: CZSO (2024), CSSA (2024); CFC calculations.
Note: In each alternative, the replacement rate is reduced in such a way that the pension system is balanced in 2074. In alternative 1, this is achieved by balancing the pension system each year, while in alternatives 2 and 3, the reduction in the replacement rate starts in 2030 (when most of the pension reform measures take effect) and 2039 (i.e. one year after the debt brake is reached) respectively.

5.5 Comparison with the previous Long-Term Sustainability Report

Compared with the Long-Term Sustainability Report published in 2023, the current edition is relatively more optimistic in terms of the assessment of the sustainability of public finances. Debt at the end of the projection is reduced from 311% of GDP to 217% of GDP in the baseline scenario.

The debt projection was affected mainly by a significant change in the CZSO's demographic projection and its impact on the macroeconomic projection. The major change in the demographic projection is an increase in the projected net migration of 9,000 persons annually. On the other hand, the increase in population is dampened by the assumption of a lower fertility rate (1.5 children per woman in the longer term instead of the 1.74 originally projected). With net migration mostly going directly to the working population, while the reduced fertility rate reduces the working population only with a lag of at least 20 years, these changes add up to a higher GDP. Compared to the assumptions of last year's projection, total GDP in 2023 prices would thus be around 5.5% higher around 2044 than in last year's projection, while at the end of the projection horizon

(2074) the overall level of GDP would be slightly lower (by 0.4%) than last year.

The change in the projection was also influenced by a shift in the initial conditions, mainly relating to the fading of the inflation shock in 2023. Nominal GDP grew by 8.1% in 2023 and was around 4.3% higher than projected by the MF CR in January 2023.[104] At the same time, for a given projection of government revenue and expenditure, the higher-than-projected nominal GDP put downward pressures on their ratio to GDP. For a number of non-indexed government expenditures, high price growth led to a decline in the real value of these expenditures.

Higher projected future GDP, as well as the projected faster increase in the share of compensation of employees in GDP, is reflected in higher projected wage-related tax revenue (PIT and social security contributions). There has also been an increase in projected revenue from the CIT, reflecting, among other things, the impact of the consolidation package (an increase in the tax rate from 19% to 21%), which we included only as an alternative scenario in last year's Long-Term Sustainability Report, and which became part of the baseline scenario in this year's

[104] MF CR (January 2023): Macroeconomic forecast of the Czech Republic.

Long-Term Sustainability Report. At the same time, the consolidation package also increased projected tax revenue linked to wages (increase in tax progression and abolition of some tax exemptions, health insurance contributions charged to employees' income).

On the expenditure side of the general government sector, lower spending on education and other social cash benefits (mainly parental allowance and tax advantage for children) have been driving the slower increase in debt compared to the 2023 Long-Term Sustainability Report. The reduction in the projection for this expenditure is due mainly to the assumption of a lower fertility rate.

Pension expenditure is also lower than projected last year for most of the horizon of our projection. This reflects, among other things, the fact that part of the pension reform has already been approved, especially the pension indexation mechanism. This part of the pension reform has thus shifted from last year's alternative scenario to the baseline scenario, leading to a reduction in projected pension expenditure of up to 0.5% of GDP. The parts of the pension reform that are still in the legislative process (mainly the increase in the retirement age and the reduction in the level of credited earnings for calculating new

pensions) are then considered in the alternative scenario. In the longer term, pension expenditure, like health expenditure, is mainly affected by demographic developments. The higher projected number of pensioners over the longer projection horizon reflects a lower projected mortality rate and increased life expectancy. Conversely, in the shorter term, higher projected net migration has a positive effect, improving the dependency ratio (the ratio of the working-age population to the population over 65). However, this index deteriorates towards the end of the projection period due to lower fertility.

The projection of primary deficits suggests that the debt brake will be reached in 2038, ten years later than projected in the previous edition of the Long-Term Sustainability Report. Given the evolution of the projected primary structural deficits, interest costs and debt, the so-called sustainability gap for public finances has been reduced from 6.22% last year to 3.78% of GDP this year. The sustainability gap shows how much better the primary structural balance would have to be each year from 2024 to 2074 in order for debt to remain below the debt brake in 2074.

Conclusion

The current Long-Term Sustainability Report shows a significantly more optimistic overall situation in terms of the long-term and medium-term sustainability of Czech public finances compared to last year's Long-Term Sustainability Report. The projected public debt at the end of the projection has decreased from 311% of GDP to 217% of GDP in the baseline scenario. The moment of hitting the so-called debt brake has been delayed by 10 years (from 2028 to 2038). The change in our projection also reflects an adjustment to the demographic projection, which the CZSO made in 2023, and combines a relatively large reduction in the projected fertility rate with a higher net migration rate. This leads to a higher number of workers and a higher GDP over a 25-year horizon, while at the same time there is lower expenditure related to, for example, education or some social benefits. Pensions, which have risen sharply in recent years due to automatic indexation, will partly stabilise in the coming years. Without additional changes, the pension balance will deteriorate after 2040. Changes in initial conditions, in particular a higher share of wages and salaries in gross value added, will lead to higher projected government revenue.

Our projections also positively reflect last year's efforts to consolidate public finances, which were oriented mainly towards the revenue side of public finances and a shorter time horizon. In the longer term (after 2030), the already approved changes in the area of pensions (mainly adjusting pension indexation to real wages and tightening of early retirement pensions) have a positive impact. This part of the pension reform has thus moved from last year's alternative scenario to this year's baseline scenario.

Further efforts to adjust the pension system are underway during 2024, which have the potential to at least partially reduce future long-term public finance imbalances. This Long-Term Sustainability Report presents these changes under alternative scenarios where different options for increasing the retirement age after 2030 start to translate into lower pension expenditure. There is also a significant impact from the slowdown in the growth of newly awarded pensions due to the reduction in the level of earnings taken into account and the reduction in the percentage credited for each year of coverage. Taken together, these measures bring about a further significant reduction in the medium- and long-term imbalances, with debt falling by up to a further 109% of GDP over the projection horizon. The CFC therefore welcomes the fact that, after a long period of time, tax and expenditure policy adjustments are being proposed and adopted that have a positive impact on the long-term sustainability of public finances, and not the other way around.

Appendices

D.1 Summary of general government revenue and expenditure in selected years (% of GDP) – medium variant of demographic projection

	2024	2034	2044	2054	2064	2074
REVENUE						
Personal income taxes	3.9	4.0	4.1	4.1	4.2	4.2
Corporate income taxes	3.9	3.6	3.4	3.2	3.1	3.0
Other current taxes	0.2	0.2	0.2	0.2	0.2	0.2
Social security contributions	16.7	16.8	17.1	17.3	17.3	17.3
pension insurance	*8.7*	*8.9*	*9.1*	*9.2*	*9.3*	*9.4*
public health insurance (excluding state insurees)	*4.6*	*4.7*	*4.8*	*4.9*	*4.9*	*5.0*
payments for state insurees	*2.0*	*1.8*	*1.7*	*1.7*	*1.6*	*1.5*
other	*1.4*	*1.4*	*1.5*	*1.5*	*1.5*	*1.5*
Taxes on production and imports	11.4	11.4	11.4	11.4	11.4	11.4
Property income	0.6	0.6	0.6	0.6	0.6	0.6
Other revenue	4.8	4.8	4.8	4.8	4.8	4.8
TOTAL REVENUE	41.5	41.4	41.5	41.6	41.6	41.5
EXPENDITURE						
Pensions	9.3	8.9	10.8	12.3	12.5	12.4
Health care (public health insurance system only)	5.6	6.0	6.4	6.6	6.8	6.9
Other social benefits in cash	2.9	3.0	3.2	3.4	3.6	3.7
Payments for state insurees	2.0	1.8	1.7	1.7	1.6	1.5
Long-term care outside the public health insurance system	0.6	0.7	0.8	0.9	1.0	1.1
Education	4.9	4.7	4.6	4.9	4.9	4.7
Other expenditure – baseline scenario	17.6	17.6	17.6	17.6	17.6	17.6
Changes related to convergence	0.0	0.1	0.1	0.1	0.1	0.1
public investment	*0.0*	*-0.1*	*-0.2*	*-0.3*	*-0.3*	*-0.3*
defence expenditure	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
growth in general government costs (wages)	*0.0*	*0.1*	*0.2*	*0.3*	*0.3*	*0.3*
growth in payments to EU	*0.0*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
Total expenditure excluding interest	43.0	42.7	45.2	47.5	48.1	48.0
Primary balance	-1.5	-1.3	-3.7	-5.9	-6.5	-6.4
Interest (no interest rate feedback)	1.4	1.4	1.8	3.0	4.4	5.7
TOTAL EXPENDITURE (no interest rate feedback)	44.4	44.1	47.0	50.5	52.5	53.6
TOTAL BALANCE (no interest rate feedback)	-2.9	-2.7	-5.5	-8.8	-10.9	-12.1
DEBT (no interest rate feedback)	45.5	51.1	70.9	115.6	169.5	217.4

Source: CFC calculations.
Note: The totals in the table may be subject to inaccuracies due to rounding.