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GENERAL GOVERNMENT DEBT SUSTAINABILITY IN SLOVENIA

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Abstract:

This paper presents the impact of demographic changes on pension and health care expenditures, which influence government debt sustainability over the short-, medium- and long-terms. It has been attested that an increasing proportion of the elderly population in Slovenia will boost pension expenditures as well as health care expenditures by the year 2050. It would result in debt unsustainability over the projected period in the no-policy-change scenario. Changes in the pension and health insurance system together with higher economic growth and a higher employment participation rate could mitigate unfavourable demographic trends.

Key words: government debt, debt sustainability, demographic changes, ageing, pension and health care expenditures, sustainability gaps

Povzetek:

Članek predstavlja vpliv demografskih sprememb na pokojninske in zdravstvene izdatke, kar kratko-, srednje- in dolgoročno vpliva na vzdržnost dolga. Rezultati potrjujejo, da bo povečan delež starega prebivalstva v Sloveniji precej vplival na povišanje pokojninskih in zdravstvenih izdatkov. Ob predpostavki, da se fiskalna politika ne bo spreminjala, bo slednje povzročilo nevzdržnost javnega dolga do leta 2050. Neugodne demografske trende bi lahko ublažile spremembe pokojninskega in zdravstvenega sistema, višja gospodarska rast in večja zaposlenost.

Ključne besede: javni dolg, vzdržnost dolga, demografske spremembe, staranje, pokojninski in zdravstveni izdatki, vrzeli vzdržnosti

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The views expressed in the paper are those of the author and do not necessarily represent those of the Bank of Slovenia.

1. INTRODUCTION

There is growing concern regarding public debt in most European Union (EU) member states, and long-term debt sustainability is becoming a primary economic policy issue. Currently, Slovenian government debt is still low by international standards, and far below the Maastricht Treaty reference value. However, unfavourable demographic trends in particular might seriously endanger debt sustainability in the future.

Available population projections unambiguously reveal an increasing proportion of the elderly population. The Slovenian population is about to become the seventh oldest in the world by the year 2050, second only to Italy in the EU. The elderly population will boost pension expenditures as well as health care expenditures since they require more health care services. Furthermore, long-term sustainability is also threatened by low fertility rates, leading to an ever-smaller working-age population to support the increasing number of pensioners.

The main purpose of this paper is to examine debt sustainability in the short-, medium- and long-terms, and to identify potential sources of debt unsustainability in Slovenia's case. The paper focuses particularly on how the ageing population affects debt sustainability. Given the endogenous interest payments and debt dynamics, long-term constraints imposed on the fiscal primary balance are derived.

The applied method consists of calculating debt sustainability coefficients (gaps) in various plausible macroeconomic and policy scenarios of future economic environment. It is contained in two steps. First, a bottom-up approach involving a detailed analysis of past and future expenditures, revenues and factors affecting the fiscal balance, such as demographic changes, to derive plausible paths for the future primary balance and government debt levels. These ingredients are used in the second step to calculate short-, medium- and long-term debt sustainability coefficients, introduced by Blanchard et al. (1990) and used by the European Commission. All the coefficients are calculated under three different pension indexation rules and eight alternative macroeconomic scenarios.

The results demonstrate that general government gross debt would experience a worrisome increase taking into account only pensions and health care expenditures, which are going to deteriorate due to the ageing of the population. This leads to the conclusion that the present fiscal policy is unsustainable in the long run.

Further on, the results acquired by the sensitivity calculations with alternative scenarios first attest that demographic changes have a strong impact on future pension and health care expenditures. Second, it is observed that fiscal policy is very important for long-term debt sustainability. Third, it is shown that the response of government debt in Slovenia is stronger with respect to growth rate and participation rate changes than to interest rate changes in the long run. This means that strong economic growth would lead to rapid improvement in public finances. Fourth, it is demonstrated how estimates of long-term debt sustainability are acutely sensitive to the projections of health care expenditures.

Short-term debt sustainability coefficients indicate that the present fiscal policy could lead to deterioration in sustainability indicators. However, the need for fiscal adjustments, a tax increase or expenditures decrease, is not substantial in the short run. Medium-term coefficients show that fiscal adjustments would be needed in almost all examined cases and the needed adjustments are stronger than in the short-term. Finally, long-term debt coefficients indicate that either primary surpluses or significantly higher economic growth

and proper fiscal policy are necessary in Slovenia if fiscal policy is to maintain a sustainable government debt level.

The paper is organized as follows: Section 2 reviews the concept of government debt and debt sustainability, and applies it to the Slovenian case. Section 3 introduces the debt sustainability coefficients. Section 4 presents macroeconomic assumptions and demographic forecasts for Slovenia, and also analyzes the evolution of future pension expenditures assuming three different pension growth scenarios. Finally, it comprises the projections of future health care expenditures, differentiating between elderly health care expenditures. The results are presented and commented on in Section 5. Section 6 summarizes the main findings and provides guidance for further research.

2. GOVERNMENT DEBT IN SLOVENIA: WHERE DO WE STAND?

This section first looks at some definitions of government debt and debt sustainability, and second, presents an analysis of the current debt dynamics in Slovenia. Regarding the Maastricht criterion on debt, Slovenia does not pose any problems of non-compliance. However, this does not assure long-term debt sustainability.

2.1. Concepts and definitions

Public finances are sustainable if and when the government meets its obligations when they arise in the future, contributing to a stable macroeconomic environment that will promote economic growth in the long run. However, debt sustainability is not simply a matter of avoiding debt accumulation. It also requires keeping the tax burden at a reasonable level, and not restraining essential public expenditures such as investment and R&D[1]. Blanchard, who defines a sustainable fiscal policy as one in which the ratio of debt to GNP eventually converges back to its initial level, provides an alternative definition[2]. In order to assure debt sustainability in the long run, HM Treasury, for example, sets two fiscal rules: the golden rule and the sustainable investment rule[3].

The European Commission in turn acts to discourage unsustainable fiscal positions in the Euro Area via its Stability and Growth Pact, which sets forth that government deficits should not exceed 3% of GDP, and public debt as a proportion of GDP should be held below 60%[4]. While a lot of attention has been given to the government deficit figures until now, the European Commission[5] has largely agreed that there should be more focus on debt sustainability. This implies that more attention should be paid to the medium- to long-term budgetary impact of current policies[6]. However, the European Commission states that even in assuming a Member State achieves a medium-term budgetary target, there still exists a risk of an unsustainable public policy. Therefore, long-term fiscal projections are very important for governments in forming their current policies. Some experts criticize that the

[1] Regling K. and Costello D.: The economic and budgetary implications of ageing populations: an EU perspective, European Commission, March 2003.

[2] For more definitions on debt sustainability, see the working paper by Balassone F., D. Franco: Assessing Fiscal Sustainability: a review of methods with a view to EMU, 2000.

[3] HM Treasury: Long-term public finance report: fiscal sustainability with an ageing population, December 2002 and 2003.

[4] See the Maastricht Treaty, Art. 109j and 104.

[5] See European Commission: The impact of ageing populations on public finances, p. 35, 2003.

[6] Flores, Giudice and Turrini, European Commission, March 2005.

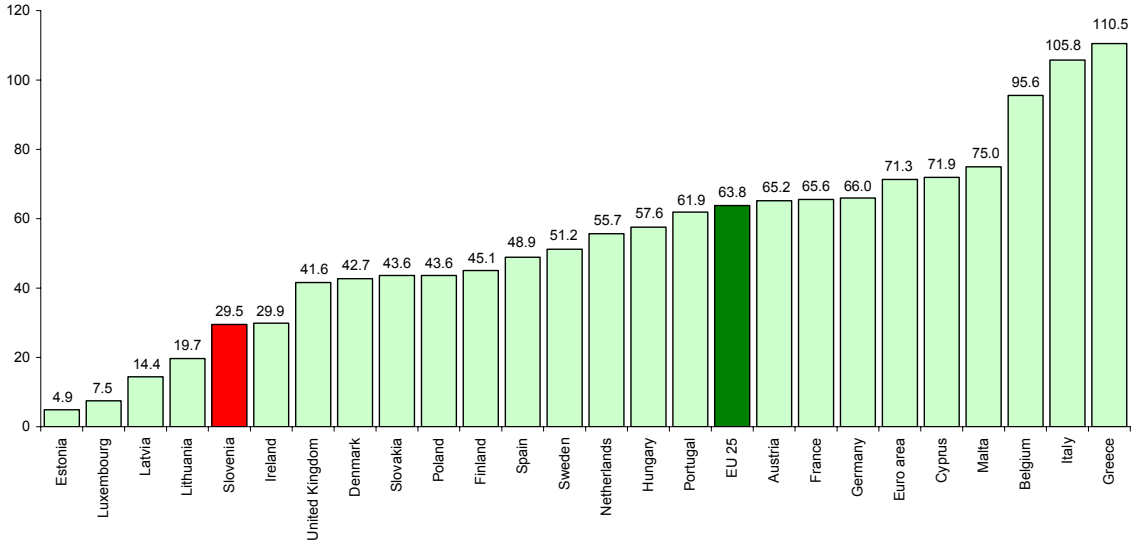
analytical and operational definition of sustainability as appointed in the Maastricht Treaty is not straightforward[7]. Moreover, the economic rationale of the fiscal reference values is under question[8].

2.2. Current trends

At present, Slovenia does not exceed any of the two reference values, and major changes are not expected over the short-term (one year) period. In 2004, the deficit ratio reached 1.9% of GDP. The government's objective, laid down in the Convergence Programme 2004-update, is for the general government deficit to reach 2.1% of GDP in 2005[9]. Under that scenario, the government deficit should fall to 1.8% in 2006 and to 1.1% in 2007. This is expected to be achieved not by changing the overall fiscal burden, but through a gradual decline in the expenditure-to-GDP ratio in 2005 and 2006. Moreover, the new government is committed to achieving a close-to-balance position in the medium-term and to improve the quality of fiscal policy by redirecting expenditures towards those programs that have a positive impact on economic growth.

Regarding public debt, Slovenia today presents a much more optimistic picture than its deficit ratio would suggest, with a level far below the reference value of 60% of GDP. Since 2000, when the government debt ratio stood at 27.4%, it has increased by 2.1% over the subsequent years to the present time. In principle, this reflects a sound and relatively sustainable medium-term fiscal position of the past budget balances. Other determinants, however, such as privatization transactions, restructuring of the banking system and valuation adjustments should also be considered. Comparisons with the other EU-25 countries are provided in *Figure 1*, which shows that Slovenia has the fifth lowest government debt in the EU-25 and remains far below the average level.

Figure 1: Government debt in % of GDP for EU-25 in 2004



Source: Eurostat, http://epp.eurostat.cec.eu.int

[7] See Daniele Franco, Maria Rosaria Marino and Stefania Zoteri, Banco d'Italia, 2004 and also Buti and Sapir 1998, Buti, Eijffinger and Franco 2002.

[8] See Buiter et al (1993) and Eichengreen and Von Hagen (1996).

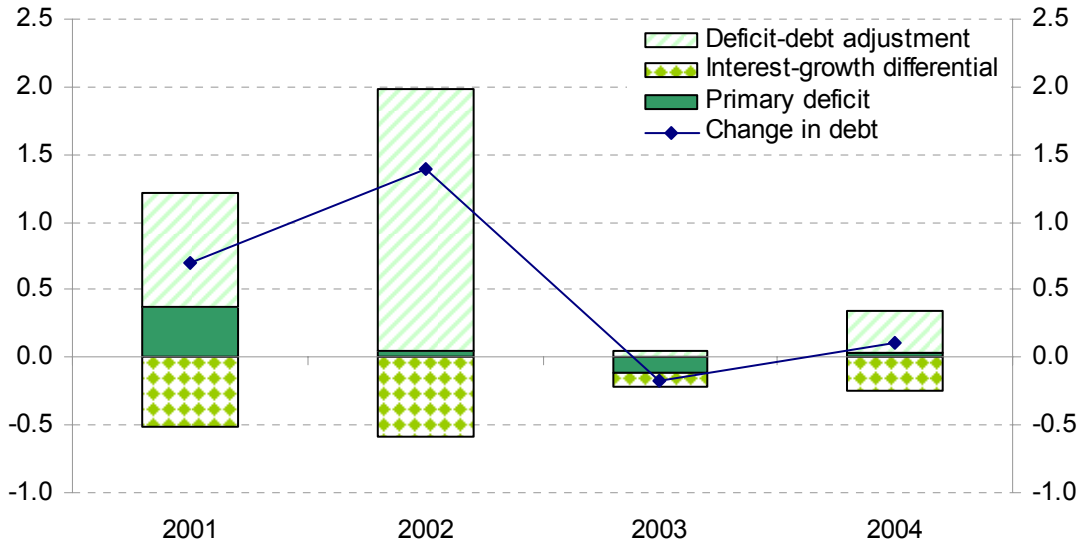
[9] In the Reporting of Government Deficit and Debt Levels, this ratio was lowered to 1.9% of GDP.

In order to better understand the debt dynamics, the breakdown of the Slovenian general government debt ratio is presented in *Figure 2* below. The change in debt has been broken down into three factors: primary deficit, interest-growth differential and deficit-debt adjustment. Factors that contributed to the higher debt level are shown with a positive sign and vice versa.

First, the primary balance shows general government net lending, excluding interest payments. A significantly decreasing pattern of the primary balance since 2001 can be seen above. This indicates that deficits increased the debt ratio in 2001, 2002 and 2004, while in 2003 a primary surplus contributed to debt reduction.

Second, the interest-growth differential shows a combined effect on the level of interest rates and economic growth on each year's debt level. It explains how much economic growth has contributed to lower debt more than interest payments increase it, or vice versa. Interest payments show government expenditures for interest on the accumulated past general government debt. It can be seen that the interest-growth differential has lowered government debt levels over the past four years. This means that economic growth has been higher compared to the implicit[10] interest rate. The highest interest-growth differential was registered in 2002, when it decreased the government debt by around 0.6 percentage points of GDP. Forecasts for GDP growth rates are not as optimistic compared to rates from the past two years. From here, one may conclude that economic growth in the future may not contribute as much to lowering the government debt levels as it has in the past few years.

Figure 2: Government debt dynamics in Slovenia, 2001-2004 (changes in % of GDP)



Source: Ministry of Finance and author's calculations.

Third, deficit-debt adjustment is defined as the difference between the government balance and the annual change in government debt. It captures the rest of the factors, such as debt takeovers, valuation adjustments, enterprise restructuring and privatizations, which cause government debt to change. In the past five years a majority of the deficit-debt adjustment in

[10] The implicit interest rate is generally defined as current year interest payments divided by the debt from the previous year.

[12] The data is taken from the Report on Debt Management in Slovenia for 2001, Ministry of Finance, RS.

Slovenia was composed of the valuation adjustments, i.e. the exchange rate adjustment, and debt takeovers, which are contributors to an increase in government debt. The major takeover happened in 2001 when the government took over debt from the Slovenian railways and iron industry, which amounted to SIT 89.9 billion or 1.9% of GDP[12]. In 2002 there was a particular accrual adjustment made in the Notification tables in order to reconcile the eleven months of VAT and excise duties[13].

In the calculations of the future gross debt, the deficit-debt adjustment is equal to zero, which is an important assumption. There are some contingent liabilities and government property which might influence the government debt and its sustainability in the long run. However, there is no accurate data available on contingent liabilities for Slovenia. At the end of 2004 there were 9.1% of GDP guarantees, but this is only part of the contingent liabilities. Moreover, it would be more relevant to calculate net debt, where the government's property is also taken into account. However, as this data is not available, the ESA95 definition of debt is used.

It is expected that Slovenia will continue to fulfil the two fiscal Maastricht criteria until the year 2007, when euro adoption occurs. Nevertheless, fulfilling the Maastricht criteria and joining the Euro Area does not mean that long-term debt sustainability has been achieved. For this purpose, the present working paper looks more precisely at the evolution of Slovenian long-term fiscal expenditures, which are likely to substantially increase due to the impact of demographic changes such as ageing of the population.

3. DEBT SUSTAINABILITY COEFFICIENTS OR SUSTAINABILITY GAPS

Assessing long-term debt sustainability is done using the bottom-up approach. This means that a profound analysis of past and future expenditures, revenues and other factors affecting fiscal balance, such as demographic changes, are included in the derivation of the primary balance and debt levels.

3. 1. Definition of debt sustainability gaps

Sustainability gaps are indicators used to assess long-term sustainability of public finance or debt sustainability[14]. They show the gap between the current budgetary policy and the policy needed to ensure sustainability. They can be expressed as tax gaps or primary balance gaps. Tax gaps show the difference between taxes needed to achieve long-term debt sustainability and current taxes. However, the results may be interpreted in favour of lowering expenditures instead of increasing tax rates. Likewise, the primary balance gap[15], or the required primary balance gap as it is referred to by the European Commission, explains what the primary balance should be, so as to achieve the fiscal goal of debt sustainability.

Long-term sustainability coefficients through fiscal projections also indicate the evolution of a debt-to-GDP ratio over time. It may either be the evolution of debt so that at the end of the

[13] The Central Government budget only included revenues from VAT and excise duties from February to December, and re-applied the principle of pure cash flow. (Reporting on Government Deficits and Debt Levels, Notification of April 2003).

[14] Cf. European Commission Report "Public Finances in EMU-2004" and Public Finance in EMU, European Commission, 2003, Blanchard, 1990, HM Treasury Fiscal reports.

[15] See also Deutsche Bundesbank, Monthly Report, p. 26-29, 2003.

observed period it reaches a certain level, or debt evolution by putting some restrictions on other fiscal indicators.

Blanchard et al. (1990) choose three indicators to determine debt sustainability over a varying time horizon. These are short-term, medium-term and long-term gaps. The short-term indicator corresponds to one year, the medium-term to five years and the long-term to a 40-year projected period. This paper performs calculations of all three indicators, using long-term gaps as upgraded by the European Commission.

The European Commission, in its recent EPC-publications[16] and their Assessments of the Convergence Programmes, calculates three long-term indicators. First, they calculate the S1 indicator, which measures the required primary balance that ensures a debt-to-GDP ratio of 60% in 2050. Second, the S2 indicator fulfils the inter-temporal budget constraint. Third, the Required Primary Balance (RPB) gap, which shows the minimum required average cyclically adjusted primary balance as a share of GDP over the first five years of the projected period, which guarantees respecting the inter-temporal budget constraint of the government[17].

3.2. Calculating sustainability coefficients (gaps)

This paper differentiates between three types of sustainability gaps[18]: short-term, medium-term and long-term. Under the long-term sustainability gap, two additional gaps are differentiated.

1. Short-term sustainability gap[19]

Short-term sustainability gap relates to the period of one year and is easy to assess.

$$t^*-t = g + h - t + (r-\theta)*b_0 = d + (r-\theta)*b_0,$$

where t^* denotes the required tax ratio, t the current tax ratio, g real spending, h transfers, t taxes, d the primary balance, r the real interest rate, θ the real GDP growth rate and b_0 the current debt level.

An advantage of the short-term tax gap, as opposed to the rest of the sustainability gaps, is that it does not require any forecasts and only relies on present factual data. Moreover, a breakdown of the primary deficit is not necessary.

2. Medium-term sustainability gap[20]

$$t^*-t = ((\text{average over the next 5 years of } g + h) + (r- \theta)*b_0) - t$$

Here, a breakdown of the primary balance into g (real spending), h (transfers) and t (taxes) is necessary. It relates to a five-year period.

[16] Cf. European Commission (2004), Public Finances in EMU-2004, European Economy, 3.

[17] Cf. European Commission: An Assessment for the January 2005 Update of the Convergence Programme of Slovenia (2004-2007), February 2005.

[18] Cf. Blanchard et al., 1990.

[19] Cf. Blanchard et al., 1990, p. 15, 16.

[20] Cf. Blanchard et al., 1990, p.17.

3. Long-term gaps

Long-term debt sustainability determined by the fiscal gaps is based on the assumption that the debt rule is met either at the end of the projected period or in perpetuity. From there, what needs to be changed today in order to reach a required debt level in the future can be concluded. It is possible to determine exactly how much today's taxes need to be increased (reduced) or expenditures lowered (increased) in order to cover future spending and rising (declining) debt levels.

The first long-term gap coefficient presented in this working paper is a tax gap related to the S1 coefficient calculated by the European Commission. The difference is in the target debt values. The S1 indicator is used to calculate the gap between current policies and those which would ensure a so-called "prudent" debt ratio in the long run. However, it should be noted that the 60% ratio is a reference value and not a target, and each country may choose its most appropriate level. For that reason this paper presents the S1 indicator at three different levels: 0%, 30% and 60% of GDP debt levels.

The second indicator, the S2 or IBC (inter-temporal budget constraint) gap, calculates the difference between the currently projected tax ratio and the ratio required to cover future public expenditures in perpetuity, plus current debt. This means that the current debt must be equal to the discounted present value of all future primary balances, and it indicates the need for a possible immediate and permanent change in either revenues or expenditures.

Budgetary projections only cover the period up to 2050 so that further assumptions beyond this date are needed in order to provide the IBC sustainability gap. Calculations in this paper assume that the primary balance remains constant as a percentage of GDP at a 2050 level, implying no further demographic impact on the budget. The tax burden and non-age-related expenditures remain constant as a share of GDP after 2050 as well.

Sustainability gaps of zero would mean that the current fiscal policy is sustainable. On the contrary, a positive value indicates that a sustainable tax rate is higher than the current tax rate and therefore an adjustment in the fiscal policy is needed, either on the revenue or expenditure side.

4. ASSUMPTIONS FOR DEBT SUSTAINABILITY

This section discusses the influence of demographic changes on the two major budgetary expenditures, i.e. pension and health care expenditures. It presents assumptions on the future macroeconomic environment and demographic projections. It also analyses the impact of an ageing population on future pensions, as well as assessing the evolution of future health care expenditures.

4.1. Assumptions on the future macroeconomic environment

It is assumed for modelling purposes that future tax revenues grow in accordance with nominal GDP. In addition, non-age-related expenditures and other age-related expenditures

remain constant as a share of GDP over the projected period[21] as well, although it is unlikely that these items will remain unchanged for several decades[22].

Future GDP growth depends on labour productivity and employment growth. There exists the danger of a negative impact from the ageing population on growth potential via labour supply, unless this effect is offset by higher participation and productivity rates[23]. If the non-working population (65+) rises faster than the working population (20-59) due to the ageing of the population, production will be left to a smaller labour force and real GDP growth will fall in the long run through negative employment rates. Moreover, productivity tends to decline with an ageing labour force, which lowers the growth rate for output[24]. Real GDP growth is thus predicted to decrease from 3.9% in 2005 to 0.6% by the year 2050 for the Baseline scenario, which is shown in *Table 1*.

Table 1: Main macroeconomic assumptions

Baseline scenario	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Productivity	3.0	3.0	3.0	2.8	2.6	2.4	2.2	2.0	2.0	2.0
Employment	0.2	-0.2	-0.9	-0.8	-0.8	-0.8	-1.0	-1.3	-1.3	-1.4
Real GDP growth*	3.9	2.8	2.0	2.0	1.7	1.5	1.2	0.7	0.7	0.6
Inflation	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Real interest rate	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Source: *Egbert L.W. Jongen: "An Analysis of Past and Future GDP Growth in Slovenia", 2004, and author's calculations

Real GDP growth and real interest rate projections are difficult to predict over such a long period of time (to 2050). For that reason, alternative scenarios will give a picture of how real GDP growth and real interest rates affect debt sustainability.

Inflation, measured as CPI, is kept constant at 2.5% over the projected period. Moreover, the real interest rate is held constant at 3%. The fact that with increasing debt levels economies usually face increasing risk premiums is ignored. Annual employment growth rates, presented in *Table 1*, are derived from the calculations explained in Annex 1.

4.2. Demographic projections for Slovenia

Demographic changes, resulting in increased pension and health care expenditures, are the most probable factor and are expected to have a negative impact on debt sustainability in the long run. For that reason, this sub-section analyzes the demographic situation in Slovenia.

[21] Similar assumptions were made by Costello and Regling: The economic and budgetary implications of ageing populations: an EU perspective, and by HM treasury in their Reports on fiscal sustainability 2002, 2003, 2004.

[22] Hauner (2005) in his research of fiscal expenditures under alternative assumptions determines that either keeping real non-age-related expenditures constant or keeping them constant per capita can be viewed as significantly negative.

[23] See Kraigher T., 2003.

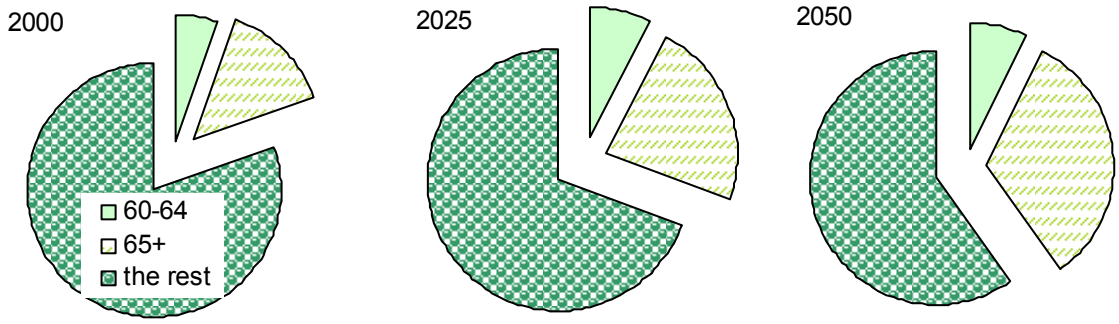
[24] Kinnunen H. and Kuoppamaki P., 1998.

According to population projections based on the United Nation's World Population Prospects[25] medium-term scenario, the overall population in Slovenia is expected to fall by 17.2% from 2000 to 2050, due to low fertility rates and a low immigration rate. Slovenia should be even more concerned than similar countries as its population is about to become the seventh oldest in the world and the second oldest in the European Union by the year 2050.

However, Eurostat's new Population Projections (2005) show a decline in the total population of only 4.4% by the year 2050. This substantial difference in population projections tells us that demographic developments are difficult to predict in the long run. Nevertheless, the population age structure from Eurostat's projections, compared to the United Nation's Prospects, differs only marginally. This paper only considers the United Nation's Population Projections since the difference between the two projections does not affect the conclusions on debt sustainability.

Slovenia currently has the sixth lowest fertility rate in the world (1.22). By the year 2050, it is projected to move into fifth place. As a result, the Slovenian population between the ages of 15 and 59 will decrease from 65.6% of the overall population in 2005 to 47.2% in 2050. It is therefore evident that the share of older people in the total population will rise. *Figure 4*, on the left-hand scale, indicate that the sizes of the working-age population and children are projected to fall substantially, while on the other hand the over-60 population group is sharply rising[26]. Consequently, the median age in Slovenia is about to increase from 40.2 years in 2005 to 51.9 in 2050, compared to 27.7 years in 1950.

Figure 3: Population structure by age group from 2000 to 2050



Source: United Nations World Population Prospects, the 2004 Revision.

The effect of demographic changes and the worrisome evolution of an ageing population in Slovenia can be better seen by the performance of the elderly dependency ratio in *Figure 4*, on the right-hand scale, where the elderly dependency ratio is defined as the ratio between the number of people aged 60+ and the number of people aged 20 to 59. It is obvious that

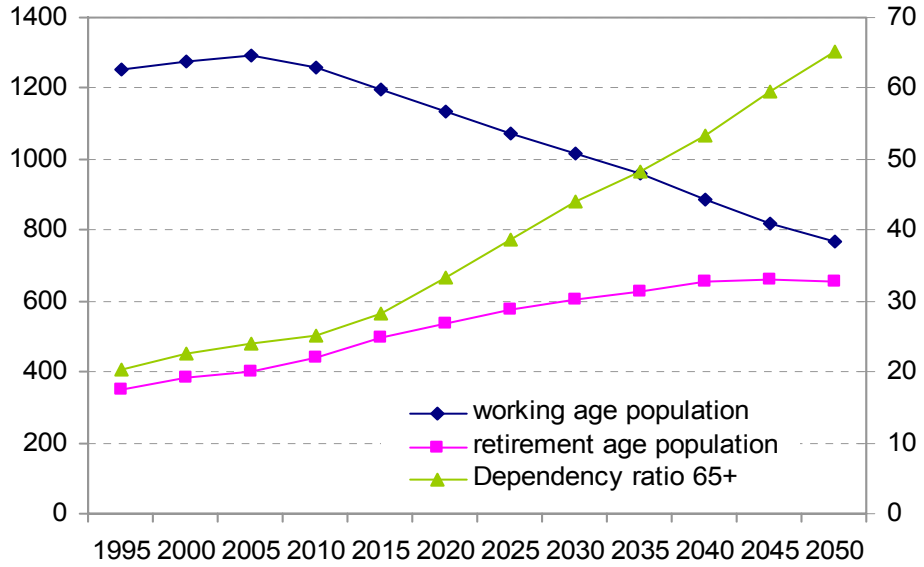
[25] See also Andreja Strojan-Kastelec (2005), Annex II.

[26] This working paper, under one of the alternative scenarios, assumes that after 2010 the working age population will increase gradually by employing people from the 60-64 age group. By the year 2030, 50% of the population from that group will join the working age group.

[28] Before calculating these two indicators, we have to make projections of the number of people employed and the number of people retired over the next 45 years. They are explained in Annex 1.

the share of the older population will increase significantly by the year 2050. The dependency ratio will in both cases more than double by the end of the observed period.

Figure 4: Slovenian population of working and retirement ages, 1995 to 2050 (in thousands)



* Working age is 20-59. Retirement age is 60+.
Source: United Nations World Population Prospects, the 2004 Revision

To sum up, demographic changes in the Slovenian population will have a double negative effect on long-term fiscal and macroeconomic development. First, ageing of the population will create higher expenditures for pensions and health insurance. Second, it will contribute to slower GDP growth, unless there are higher participation or productivity rates.

4.3. Pension expenditures

It is necessary to make an assessment of probable future pension expenditure developments, which will, due to demographic changes and ageing of the population, deteriorate future debt sustainability. Although it is not possible to exactly predict the evolution of the future population, it is nevertheless certain that the number of pensioners will rise relative to the working age population. Pension revenues are predicted to grow in line with employment and nominal wage growth.

There are two indicators which help to explain the impact of the ageing population on pensions and finally on debt sustainability. The first is the support ratio and the second is the replacement ratio[28].

First, the support ratio measures the share of the employed population over all pensioners. The ageing of the population will cut this support ratio to nearly half over the period from 2005 to 2050. The current pension system, put in place in 2000, determines a gradual increase in the retirement age. The support ratio significantly decreases due to the strong ageing of the population over the projected period. It falls from 1.5 in 2005 to 0.8 in 2050. The support ratio, which includes only elderly pensioners instead of all pensioners, drops from 2.6 to 1.0 from 2005 to 2050.

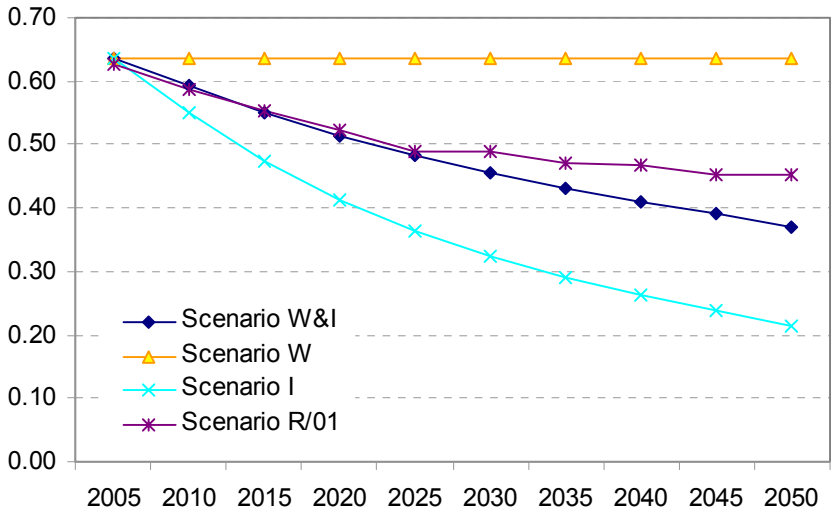
Second, the replacement ratio measures the difference in pension and wage growth. In order to better understand the importance of pension policy decisions and their effect on long-term fiscal sustainability, this paper presents three scenarios related to pension growth.

Under the first, Baseline, scenario (Scenario **W&I**) the replacement ratio captures pension growth, which is determined by inflation and wage growth. This means that pensions are predicted to grow slower than wages, since only 50% of the wage growth is taken into consideration for the pension increase. It very roughly resembles the pension indexation formula[29] (Scenario R/01) introduced in 2001[30], and was in use by mid-2005. By this pension legislation, pensions are about to grow at a slower pace than wages. Therefore, the replacement ratio for the R/01 Scenario would be falling gradually to the end of the projected period.

However, the pension indexation formula has been changed in mid-2005, so that pensions are indexed to total wage growth. This assumption is therefore included in the second scenario. Scenario **W** predicts that replacement ratios will remain constant over the projected period. Scenario **I**, which is the most optimistic (but not realistic), predicts that pensions would only grow in line with the projected inflation rate. The replacement ratio in this scenario would significantly decline over the period to 2050.

Figure 5 shows replacement rates by the three explained scenarios. The lowest replacement rate arises from Scenario **I**, while the highest by Scenario **W**.

Figure 5: Replacement rates by the three scenarios



Source: ZPIZ Pension Fund and author's calculations

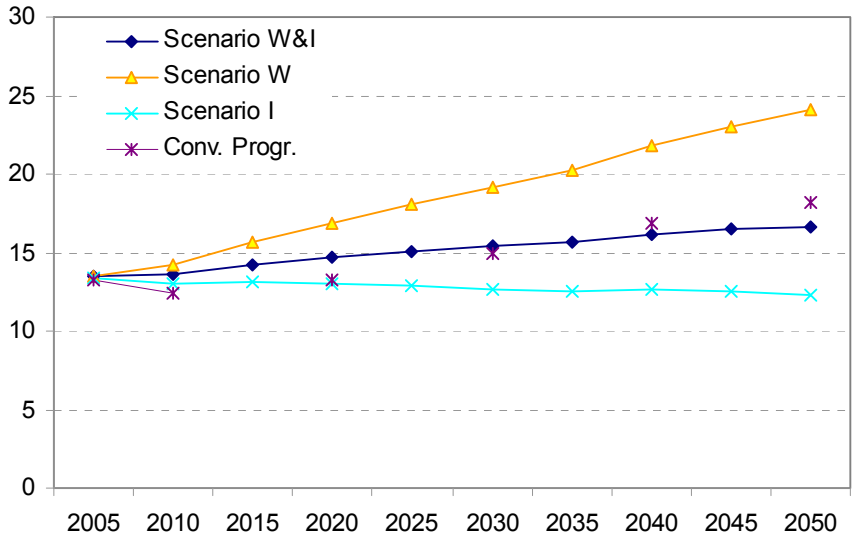
The highest growth in pension expenditures is expected under Scenario **W,** while Scenario **I** projects a decrease in pension expenditures over the projected period up to 2050. The

[29] Under the pension legislation, implemented in 2000, there was: (1) a gradual increase of the retirement age, (2) a complex system for pension indexation which had, on average, reduced the rate of pension indexation slightly below the rate of wage growth in 2001, (3) a gradual reduction of replacement rates to lower levels, (4) the introduction of retirement penalties that were about to affect certain groups of people who qualified for retirement at an early age.

[30] See also Andreja Strojan-Kastelec (2005), p. 9-15.

Baseline Scenario **W&I** resembles the calculations from the Convergence Programme 2004-Update made by the Slovenian Ministry of Finance. Under this scenario, pension expenditures would increase from 13.4% of GDP in 2005 to 16.6% of GDP by the year 2050.

Figure 6: Pension expenditures by the three scenarios in % GDP (UN's projections)



Source: United Nations Population Projections, ZPIZ Pension Fund and author's calculations

4.4. Health care expenditures

Quantifications of the impact of demographic changes on health expenditures are highly uncertain. While there is a broad consensus in the literature that population ageing will increase health care expenditures and thus put further pressures on fiscal sustainability, all estimates are acutely sensitive to the assumptions on which they are based. Consequently, considerable care is needed when interpreting health care expenditure projections and sensitivity checks should be thoroughly examined.

Uncertainty about health care expenditure projections stems from several factors. First, many projections use mechanical assumptions that hold for the past, but might change in the future. For example, a commonly used assumption is a constant ratio between the health care expenditures[31] of the elderly population (usually 65+) and of the rest (0-64). However, certain evidence presented in Jacobzone (2002) shows that age-expenditure profiles change over time. Second, the fact that people will be living longer is likely to be coupled with a better health status of the elderly population[32]. This might in turn mitigate the effects of demographic changes on health care expenditures[33]. On the other hand, others claim that morbidity postponements are one of the factors that will substantially increase health expenditures in the future[34]. Third, health care expenditures are also strongly driven by non-demographic determinants, such as new technologies in medicine and research, and development in the health sector. This provokes rising costs in pharmaceuticals as well as

[31] In OECD countries, health care expenditures for elderly people are three to five times higher than for the rest of the population (Jacobzone, 2002).

[32] For example, see Long-term public finance report: an analysis of fiscal sustainability, HM Treasury, November 2002, p. 16.

[33] See for ex. Schulz Erika (2005), p.11-18.

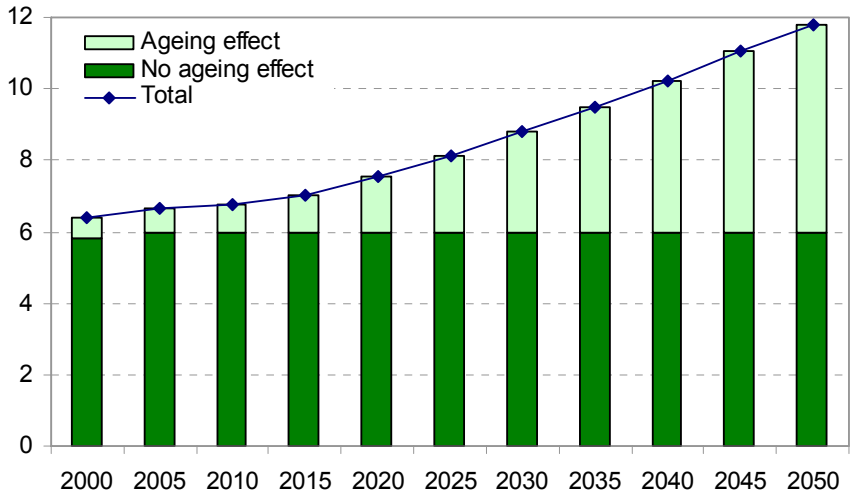
[34] See for ex. Batljan Lagergren (2000).

higher inflation in health services. Omitting the technological effects on health care expenditures could result in underestimated projections of future expenditures.

Projections of future health care expenditures used in this paper are based on Slovenian Ministry of Health calculations presented in the White Book[35]. The Slovenian Ministry of Health estimated additionally incurred health care expenditures attributable explicitly to the ageing of the population from 1993 to 2002 and made projections up to 2015. On the basis of these calculations, it can be estimated that, on average, a one percentage point increase in the share of population aged over 65 years results in a SIT 9.6 billion increase of health care expenditures, measured in constant 2002 prices, and this assumption is applied in the paper. Another assumption applied is that the share of health care expenditures in GDP would remain constant at 6% if there were no change in the age structure of the population. This paper predicts that after 2004, revenues will be increasing in accordance with the nominal GDP.

Figure 7 shows a projected evolution of health care expenditures in percent of GDP from 2000 to 2050. Overall health care expenditures are about to increase significantly as a consequence of the increased health care expenditures of the elderly population.

Figure 7: Health care expenditures with and without ageing costs (in % of GDP)



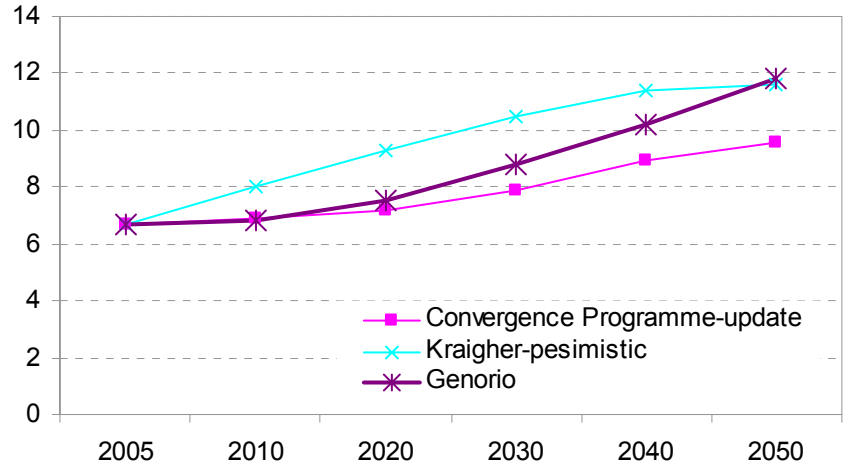
Source: White Book on Health Reform, 2003 and author's calculations

Similar results are presented by other studies (see *Figure 8*). Kraigher (2003) provides two health care expenditure scenarios, depending on two different assumptions of the future demographic developments. The more pessimistic scenario comprises demographic developments almost identical to the one used in this paper. Kraigher in his paper assumes that the age group of 0-54 spends 3.2% of GDP on health care expenditures, while a person from the 55+ age group spends 18% of GDP. Health care expenditures would exceed 9% of GDP under the optimistic demographic developments and would come close to 12% under pessimistic ones by the year 2050. On the other hand, the update of the Convergence programme projects health care expenditures to reach 9.6% of GDP in 2050[36].

[35] Ministry of Health of the Republic of Slovenia: White Book on Health Reform, July 2003.

[36] The original Convergence Programme, published in May 2004, put the number at 8.9% of GDP.

Figure 8: Comparison of health care expenditures in % of GDP



Source: Convergence Programme 2004-update, Kraigher (2003), White Book on Health Reform, 2003 and author's calculations.

Differences between various health care expenditure projections are mostly due to different underlying demographic and macroeconomic assumptions[37]. However, it should be noted that the primary purpose of this paper is not to provide exact numbers for future health care expenditures, but rather to assess the effect of different health care projections on debt sustainability[38]. This can then be used to evaluate different fiscal policies regarding their effect on debt sustainability.

5. RESULTS

This section presents developments in debt levels and in debt sustainability indicators under different scenarios, taking into account demographic changes and their impact on pension and health care expenditures. First, the outcome of the Baseline scenario under three different pension adjustment scenarios is presented. Second, seven alternative scenarios are introduced. Finally, debt sustainability gaps are calculated for all scenarios. The main conclusion is that a continuation of the current fiscal policy set against unfavourable demographic changes is very likely to result in unsustainable debt levels.

5.1. Baseline scenario

The Baseline scenario takes into account macroeconomic assumptions shown in *table 1* and pension growth in line with wages (50%) and inflation (50%) (Scenario **W&I**). This scenario also takes into account a gradually increasing participation rate for the population aged 20-59, while for the population group 60-64 it is set to 0.

[37] For example, the assumption on the evolution of the employment rate used in this paper differs considerably from the one used in the Convergence Programme. The sensitivity of the employment rate on the final government debt can be seen in the simulation of the first alternative scenario.

[38] See Section 5.2, Figure 15 for government debt evolution with health care expenditures from the Convergence Programme 2004-update.

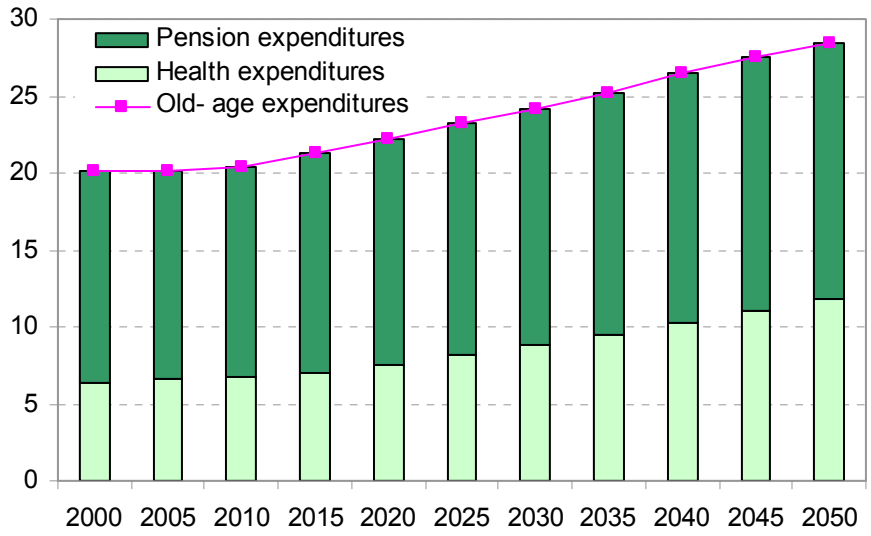
Table 2: Participation rates[39] under the Baseline scenario

Participation rates	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(20-59)	0.69	0.69	0.69	0.70	0.71	0.72	0.73	0.74	0.75	0.75

Table 2 shows that 69% of the population between the ages of 20 and 59 is employed in 2005. By the year 2050 this number is predicted to increase to 75%. However, the participation rate could also rise because of immigration flows of the working-age population or because of the gradual increase of the retirement age. Immigration would mitigate the impact of falling birth rates and ageing of the population, providing more labour supply[40].

Incorporating the upper predictions into calculations of future pension and health care expenditures, one can determine the evolution of the total elderly related expenditures over the next 45 years. The evolution can be seen in *Figure 9*. Health care expenditures would almost double over the projected period of 45 years. In addition, pension expenditures are about to rise from 13.4% of GDP in 2005 to 16.6% of GDP by 2050.

Figure 9: The evolution of total Pension and Health care expenditures as a % of GDP, Baseline with Scenario **W&I**



Source: ZPIZ, ZZZS, author's calculations

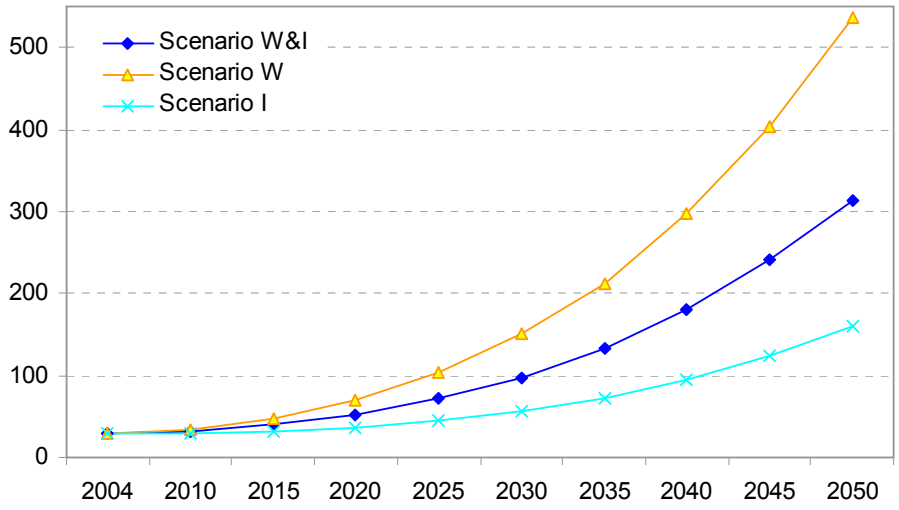
How important is a policy decision on pension growth for debt sustainability in the long run? The answer is shown in *Figure 10* below, where debt evolution for the three different scenarios of the pension growth explained in Section 4.3 is presented.

Scenario **W** is the one that indicates the least favourable outcome. There is a significant difference between Scenarios W, W&I and I, which points to the importance of fiscal policy decisions on the evolution of the gross debt, and therefore on long-term debt sustainability.

[39] Employment rate is the ratio of employed people in the active population, i.e. the population under 60 years of age and it amounts to 0.69%. For more see the section on Pensions, Section 4.3.

[40] See Green Paper "Confronting demographic changes: a new solidarity between the generations", Communication from the Commission, 16 March 2005.

Figure 10: Government gross debt by Baseline and three pension scenarios



Source: Author's calculations, Ministry of Finance, ZPIZ, ZZZS

To show the sensitivity of various factors on the evolution of the government debt in the long run, this working paper in the next section provides seven more scenarios in addition to the three scenarios explained above.

5.2. Sensitivity analysis

The sensitivity analysis was carried out by assuming seven additional scenarios. First, the participation rate for the population aged 60-64 was increased. Second, to allow for slow and fast growth scenarios, real GDP growth rates were decreased and increased by 1 percentage point. Third, interest rates were lowered and raised by 1 percentage point from the Baseline scenario. Fourth, the demographic structure remained at the 2005 level. Finally, health care expenditures, projected by the Ministry of Finance and published in the Convergence Programme 2004-update, were simulated.

Table 3: Scenarios

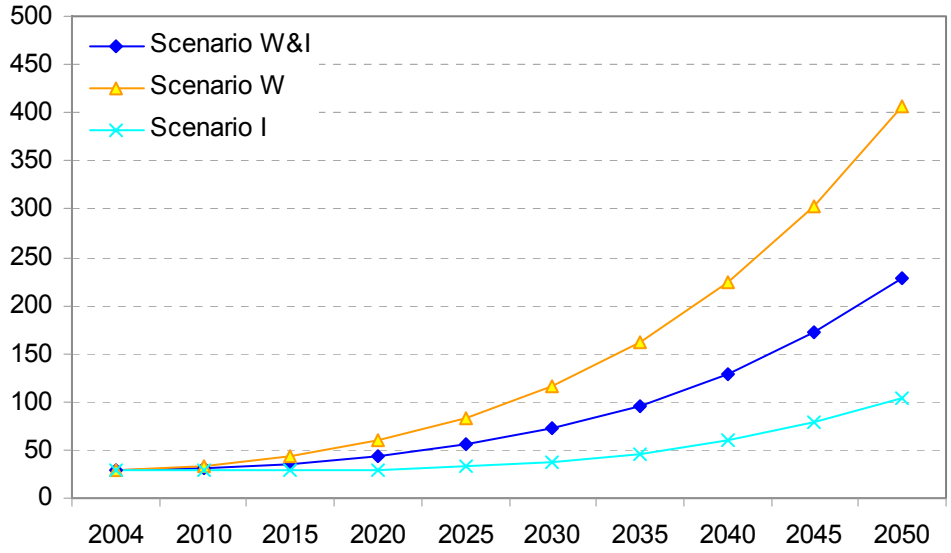
	Scenarios	
1)	Baseline	Baseline
2)	Part. rate ↑	Increased participation rate for a group 60-64
3)	1 pp ↑ Q	1 p.p. increase in productivity growth rate
4)	1 pp ↓ Q	1 p.p. decrease in productivity growth rate
5)	1 pp ↑ i	1 p.p. increase in the real interest rate
6)	1 pp ↓ i	1 p.p. decrease in the real interest rate
7)	Pop. 2005 level	Population structure remains at 2005 level
8)	C.P. health exp.	Projections of the health care expenditures taken from the Convergence Programme 2004-update

First, the participation rate for the population group aged 60-64 is increased from 0 to gradually increasing levels in order to partly accommodate the labour market on demographic changes. This means that the retirement age will gradually increase and the population aged 60-64 would gradually prolong their working period up to age 65, thus

increasing the labour supply. The participation rate for this age group will range from 0.1% in 2010 to 0.5% in 2050. It would never exceed 0.5%, since it is expected that there will be more disabled and ill people from this age group compared to the group aged 20-59.

Figure 11 shows that increasing the participation rate in the age group 60-64 would significantly improve debt outcomes. Under Scenario **W&I**, government debt would approach 60% only by 2026, and by 2050 it would be 86 percentage points of GDP lower than in the Baseline scenario. This improvement was expected, since a higher participation rate means a stronger labour supply and consequently higher GDP growth rates, which lowers debt levels. However, debt sustainability is still not assured over the projected period. Despite the gradual incorporation of the population aged 60-64 into the working age population, risks of unsustainable debt developments do not disappear.

Figure 11: Government gross debt by (Part. rate ↑) and three pension scenarios



Source: Author's calculations, Ministry of Finance, ZPIZ, ZZZS

The subsequent scenarios concern an increase or decrease in real GDP growth and real interest rate.

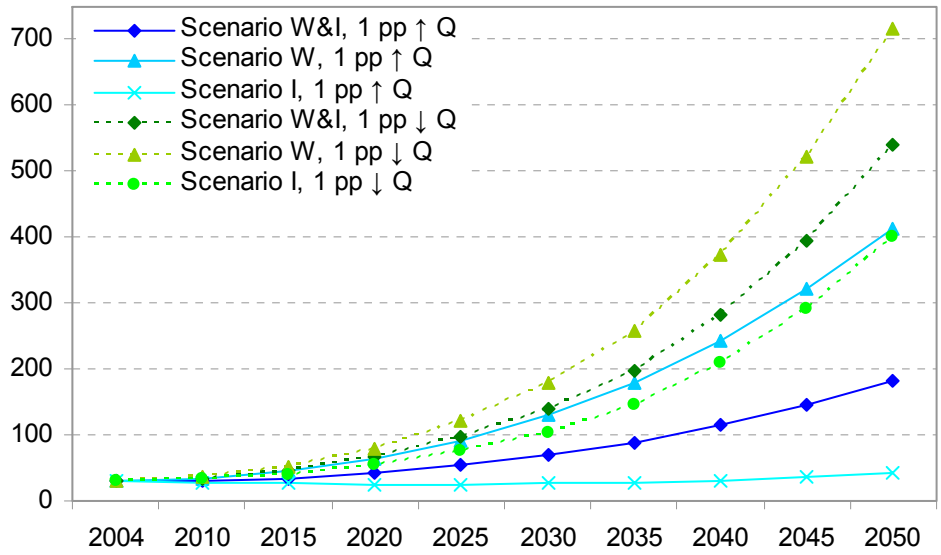
Figure 12 below shows evolution of the government gross debt under all three pension scenarios and an alternative scenario with deviations from the growth rate assumption by 1 percentage point.

Assuming pension growth in line with wages and a 1 percentage point lower growth rate from the Baseline leads to the least favourable result. On the other hand, assuming pension growth in line with inflation and a 1 percentage point higher growth rate from the Baseline leads to the most favourable result. In addition, there is also a big difference between the same pension scenario and a different growth rate scenario.

A significant deviation of the alternative scenarios compared to the Baseline scenario[41] tells us that growth rate plays a crucial role. In the case of future growth rate drops, debt sustainability will significantly deteriorate. On the other hand, future growth rate increases would help to keep government debt on a more sustainable path.

[41] See Annex II.

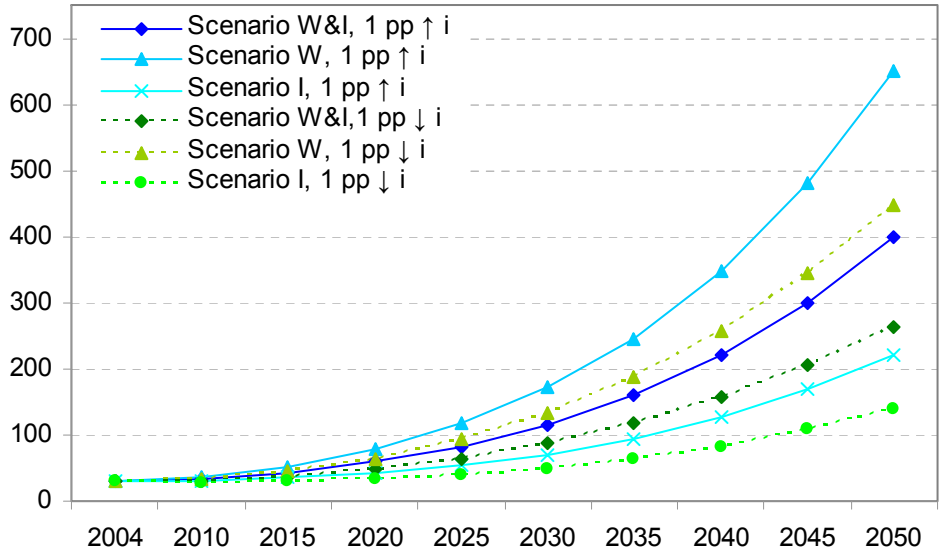
Figure 12: Government gross debt and growth rate sensitivity with three pension scenarios



Source: Author's calculations, Ministry of Finance, ZPIZ, ZZZS

Figure 13 shows the evolution of the government gross debt under all three pension scenarios and an alternative scenario with deviations from the interest rate assumption by 1 percentage point.

Figure 13: Government gross debt and interest rate sensitivity with three pension scenarios



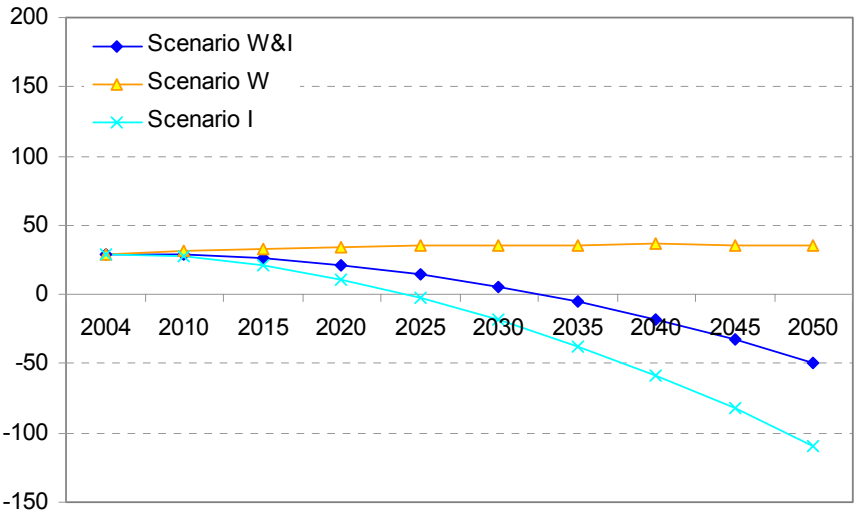
Source: Author's calculations, Ministry of Finance, ZPIZ, ZZZS

A 1 percentage point higher interest rate would increase debt in 2050 by more than 100 percentage points, if pensions grow in line with wages.

A 1 percentage point lower interest rate would have a smaller impact on the final result of government debt than an increase. In the case of pension growth in line with wages, this decrease would improve the debt level in 2050 by 88 percentage points. Comparing interest rate scenarios with growth rates and the Baseline scenario, we can conclude that growth rate deviations have a stronger impact on the evolution of government debt than interest rate deviations. Nevertheless, the difference in the pension adjustment mechanism is more important.

Figure 14 shows the evolution of government debt for the three pension scenarios and under the assumption that the demographic structure and the size of the population remain at the 2005 level. This scenario has been introduced in order to confirm a presumed strong link between ageing of the population and long-term debt sustainability. Government debt in % of GDP remains constant or decreases if we predict the population from 2005 to remain constant over the whole observed period.

Figure 14: Government gross debt and Scenario (Pop. 2005 level)



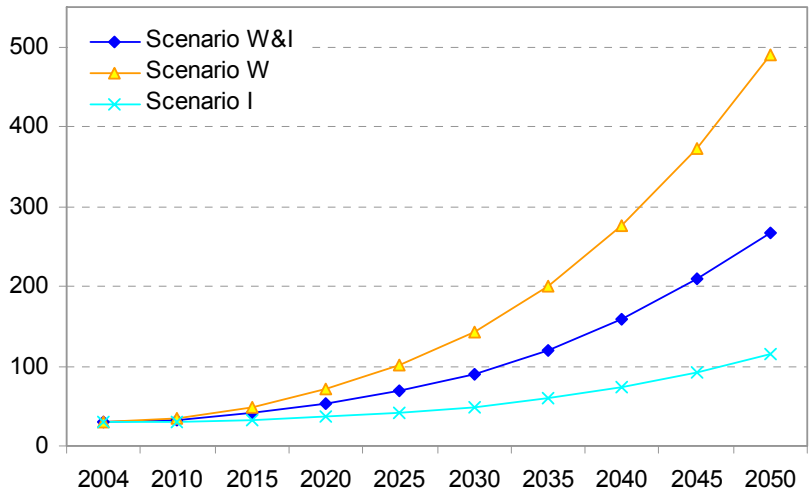
Source: Author's calculations, Ministry of Finance, ZPIZ, ZZZS

A decrease of government debt below 0% of GDP after 2030 is a consequence of the increasing nominal GDP, which results from the predicted gradual increase in the participation rate and consequently higher labour supply and employment rates. An alternative scenario shown in *Figure 14* indicates that demographic change will have an important impact on future debt sustainability.

Finally, health care expenditures, projected by the Ministry of Finance and published in the Convergence Programme 2004-update, were simulated. According to this scenario, health care expenditures reach 9.6% of GDP in 2050. *Figure 15* below exposes the difference in government debt evolution, which results from different health care projections[43]. In comparison to the Baseline scenario, the difference of 2.2% of GDP in health expenditures results in a difference of 46.4% of GDP in government debt under all three pension scenarios at the end of the observed period.

[43] See Section 4.4.

Figure 15: Government gross debt and Scenario (C.P. health exp.) with three pension scenarios



Source: Author's calculations, Ministry of Finance, ZPIZ, ZZZS

Four main conclusions can be derived from the sensitivity analysis provided above. First, the sensitivity calculations show that the response of the government debt dynamics in Slovenia is stronger with respect to the growth rate and participation rate changes than with respect to interest rate changes in the long run. This means that stronger economic growth would lead to a significant improvement in public finances. Second, it can be observed from all the presented figures and differences between the three pension scenarios, that fiscal policy is very important for long-term debt sustainability. Third, it has been attested by the sixth alternative scenario that demographic changes significantly deteriorate debt sustainability in the long run. Fourth, the last alternative scenario demonstrates that estimates of long-term debt sustainability are acutely sensitive to the projections of health care expenditures and assumptions on which they are based.

5.3. Debt sustainability coefficients (gaps) in various scenarios

As explained in Section 4.2, this paper calculates three types of debt sustainability coefficients, or gaps: short-term, medium-term and long-term. S1 and S2 are long-term coefficients, and under S1 there are additional three scenarios. All together, including all alternative scenarios, this paper calculates 144 debt sustainability gaps.

Short-[44] and medium-term debt sustainability gaps are presented in *Table 4* below. The short-term sustainability gap (t*-t) indicates by how much the tax ratio (t*) needs to be increased (or expenditures decreased) in one year, in order to cover the primary deficit (d) and the amount of (r-θ)*b0, which stands for the product of interest-growth differential and current debt. This means that the tax rate must keep the ratio of debt-to-GDP constant in the short-term. If the interest rate is higher than the growth rate, then this would deteriorate debt levels. A positive sustainability gap means that tax rates need to rise so as not to accumulate additional debt. For the calculation of sustainability gaps, the projected deficit for 2005 and 2006 is 1.9% of GDP.

First, the short-term sustainability gaps for 2005 and 2006, presented in *Table 4,* are mostly positive but small for pension Scenarios **W&I** and **W**. Positive numbers indicate that there is

[44] See equations for short-term sustainability gaps in Section 4.2.

already a need for fiscal adjustments in 2005 and 2006 under the majority of scenarios. Negative numbers, which result mainly from the third pension Scenario **I**, imply that current fiscal policy was sustainable in the short-term if pensions would rise in line with inflation.

Second, medium-term sustainability gaps give a very similar picture to the short-term. From *Table 4* it is seen that the majority of the numbers are positive for the first two pension scenarios (first two columns), which means that under these scenarios, fiscal policy would need to be adjusted immediately or over the next five years.

Table 4: Short- and medium-term sustainability coefficients (gaps), 2005 and 2006 (in %)

2005	Short term gap (2005)			Medium term gap		
Scenarios	W&I	W	I	W&I	W	I
Baseline	0,05	0,15	-0,06	0,17	0,52	-0,16
Part.rate ↑	0,05	0,15	-0,06	0,04	0,37	-0,27
1 pp ↑ Q	0,05	0,15	-0,06	-0,02	0,40	-0,40
1 pp ↓ Q	0,05	0,15	-0,06	0,39	0,65	0,14
1 pp ↑ i	0,05	0,15	-0,06	0,19	0,52	-0,13
1 pp ↓ i	0,05	0,15	-0,06	0,19	0,52	-0,13
Pop. 2005 level	0,05	0,15	-0,06	-0,20	0,11	-0,50
C.P. health exp.	0,06	0,17	-0,04	0,24	0,59	-0,08
2006	Short term gap (2006)			Medium term gap		
Scenarios	W&I	W	I	W&I	W	I
Baseline	0,17	0,41	-0,06	0,68	1,14	0,26
Part.rate ↑	0,10	0,33	-0,12	0,49	0,92	0,09
1 pp ↑ Q	0,07	0,35	-0,19	0,41	0,96	-0,10
1 pp ↓ Q	0,28	0,47	0,10	1,01	1,34	0,69
1 pp ↑ i	0,47	0,71	0,25	0,71	1,15	0,29
1 pp ↓ i	-0,12	0,12	-0,34	0,71	1,15	0,29
Pop. 2005 level	-0,04	0,18	-0,24	0,14	0,55	-0,24
C.P. health exp.	0,22	0,46	-0,01	0,78	1,24	0,36

In the medium-term, the highest increase in current taxes would be needed, under the assumption of the pension's increase in line with wages and one percentage point decrease in the growth rate. If pensions grow in line with inflation (third column), then fiscal adjustments would rarely be needed. On the other hand, starting from 2006, it would be needed under six scenarios.

Third, long-term sustainability gaps, S1 and S2, are presented in *Table 5* below. The first one is calculated under the assumption that a certain debt level is achieved at the end of the projected period, and the second one under the assumption that the inter-temporal budget constraint is assured.

Values of the S1 and S2 debt sustainability gaps, as well as of short- and medium-term gaps, depend on the level of the non-age and age related expenditures, on the current stock of gross debt, on the interest-growth differential, and on the current tax ratio.

Table 5 presents S1 gaps, calculated with three different end points for government debt. The first end point is a 0% of GDP debt level, the second is 30% of GDP and the last one is

the Maastricht reference value for government debt of 60% of GDP. If the difference of t*-t is positive, it means that Slovenia is not able to ensure respecting the 60% (or 30% or 0%) value over the very long-term period, considering current fiscal policy. Therefore permanent adjustment of the primary balance is needed.

The most favourable outcome of the S1 debt sustainability gap results from the scenario where population is assumed to remain at the 2005 level. Fiscal adjustment is almost not needed except under two cases, where the needed adjustment is not very high. This result confirms our presumption that debt sustainability is strongly connected to demographic changes or ageing of the population.

Table 5: Long-term sustainability coefficients (gaps) for a period from 2005 to 2050 (in %)

Long-run gaps	S1_1 (0%)			S1_2 (30%)			S1_3 (60%)			S2 (intertemporal constraint)		
Scenarios	W&I	W	I	W&I	W	I	W&I	W	I	W&I	W	I
Baseline	4,4	7,4	2,2	4,0	7,0	1,8	3,5	6,6	1,8	5,4	9,5	2,7
Part.rate ↑	3,3	5,8	1,5	2,9	5,4	1,1	2,4	5,0	0,6	4,1	7,5	1,9
1 pp ↑ Q	3,2	7,3	0,7	2,7	6,7	0,2	2,1	6,2	-0,3	3,7	9,2	0,7
1 pp ↓ Q	5,8	7,7	4,3	5,5	7,4	4,0	5,2	7,1	3,7	7,5	10,0	5,6
1 pp ↑ i	4,3	7,1	2,4	4,0	6,7	2,1	3,7	6,4	1,8	5,0	8,4	2,7
1 pp ↓ i	4,7	7,9	2,4	4,1	7,4	1,9	3,6	6,8	1,4	6,2	10,8	3,2
Pop. 2005 level	-0,9	0,7	-2,1	-1,5	0,1	-2,6	-2,1	-0,5	-3,2	-1,6	0,4	-2,8
C.P. health exp.	3,7	6,8	1,6	3,3	6,4	1,2	2,9	6,0	0,8	4,3	8,5	1,7

Table 5 shows S2 gaps under 24 different scenarios. The two most favourable outcomes, after the constant population scenario, are the scenario with an additional percentage point in productivity and the scenario with a gradually increasing participation rate, i.e. an increasing retirement age and therefore labour supply. Comparing these S2 gaps with the Baseline scenario gaps, we can see that they are lower, which tells us that higher productivity and an increasing participation rate improves debt sustainability in the long-term.

To sum up, several debt sustainability coefficients indicate that in the future, either primary surpluses or significantly higher economic growth and proper fiscal policy will need to happen in Slovenia if fiscal policy is in favour of keeping government debt levels on a sustainable path.

6. CONCLUSIONS

Demographic changes involving a rising elderly population relative to the working age population deteriorates long-term debt sustainability for two reasons. First, it creates higher pension and health care expenditures. Second, it contributes to a slower GDP growth because of the fall in the labour supply, unless there are higher participation or productivity rates.

Under the Baseline scenario, pension and health care expenditure projections up to 2050 show a significant increase due to the ageing of the population. Pensions are modelled under three different policy scenarios, which give us three different patterns of the future

pension evolution. First, the highest growth in pension expenditures is expected under the scenario where pensions are predicted to grow in line with wages. In 2050 they are projected to reach 24.1% of GDP. In addition, under the Baseline scenario, where pensions grow in line with wages and inflation, pension expenditures will increase from 13.4% of GDP in 2005 to nearly 16.6% of GDP in 2050. Finally, in the third scenario, where pensions are assumed to grow with the inflation rate, pension expenditures decrease by 1 percentage point over the projected period up to 2050. Health care projections indicate a strong rise in health care expenditures owing to the ageing of the population as well. This paper estimates that health care expenditures may increase by more than five percentage points by the year 2050 and will approach 12% of GDP. The corresponding debt sustainability coefficients show that there is a strong impact of the ageing population on future debt levels and that future fiscal sustainability is exposed to serious risks if the current system does not change.

Alternative scenarios lead to four main conclusions. First, the sensitivity analysis shows that the response of the government debt dynamics in Slovenia is stronger with respect to the growth rate and participation rate changes than with respect to interest rate changes in the long run. This means that stronger economic growth would lead to significant improvement in public finances.

Second, significant differences between the three pension scenarios point at the importance of the fiscal policy for long-term debt sustainability. According to the Baseline scenario, where pensions are predicted to grow in line with wages and in line with inflation, government debt would amount to 314% in 2050. Under a condition that pensions grow in line with wages, government debt reaches 535% of GDP in 2050, while if they are about to grow in line with inflation it amounts to 161% of GDP.

Third, if we assume that the population over the projected period remains at the 2005 level, Slovenia would not suffer any debt unsustainability problems. Under the scenario where pensions are about to increase with wages, debt would follow a constant pattern, while if they were indexed with wages and inflation, government debt would even decrease and go below 0 in the long run.

Fourth, estimates of long-term debt sustainability are acutely sensitive to the projections of health care expenditures and assumptions on which they are based. A comparison with the health care evolution, from the Convergence Programme 2004-update, shows a difference of 2.2 percentage points of GDP in health expenditures, which results in a difference of 46.4% of GDP in government debt under all three pension scenarios at the end of the observed period.

In all, there is a need to put more emphasis on debt and debt sustainability. To ensure debt sustainability in the long run, the demographic changes and macroeconomic conditions are to be assessed and taken into consideration when making strategic long-term decisions. Currently unsustainable policies might harm future generations via future fiscal and macroeconomic imbalances.

Some issues warrant further research. First, more sophisticated health care expenditures could be arrived at by econometric estimation. Second, the efficacy of fiscal policies up to now could be assessed by calculating debt sustainability coefficients for the past. Third, other factors that affect long-run debt sustainability, such as education and unemployment benefits, could be included in the estimation of debt sustainability coefficients.

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ANNEX 1: Calculating the number of people employed

The number of employed people is calculated as:

$Empl = R_{(20-59)}*S_{(20-59)} + R_{(60-64)}*S_{(60-64)}$,

where $R_{(20-59)}$ denotes the participation rate for the population of working ages 20-59. It is calculated as a ratio of employed people in the active population, i.e. the population from 20 to 59 years of age and it currently amounts to 0.69. The participation rate for this segment of the population is predicted to gradually increase to 0.75 over the projected period. $R_{(60-64)}$ denotes the participation rate for the population group aged 60 to 64. In the Baseline scenario it is set to 0, since the present average retirement age is 58 years and 7 months[45]. One of the alternative scenarios predicts an participation rate of 0.10 in 2010 and 0.30 in 2020. After 2030 and up to 2050 it remains at 0.5. With this it is defined that the retirement age will slowly increase, and after 2030 half of the population from the group aged 60-64 will be employed. This also indicates a reduction in unemployment rates. $S_{(20-59)}$ denotes the number of people in the age group of 20 to 59, and $S_{(60-64)}$ the number of people aged 60 to 64.

Regarding the number of pensioners, calculations for forecasts[46] differentiate four types of pensions: old age pensions (POA), disability pensions, widow and family pensions, and the rest.

The number of old-age pensioners is calculated as:

$$POA = \text{predicted pensions} * \text{coef. for pension} = (S_{(65+)} + (1 - R_{(60-64)} * S_{(60-64)})) * \left(\frac{oldpensions}{(S_{(65+)} + S_{(60-64)})}\right),$$

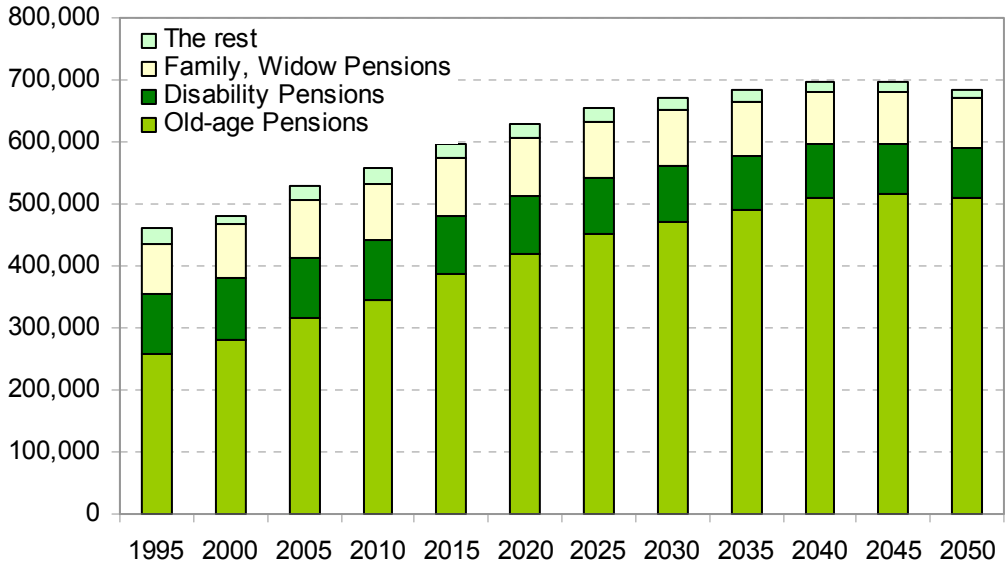
where predicted pensions represents the number of persons aged 65 and over, plus the product of the population from age group 60 to 64 and $1-R_{(60-64)}$. In addition, a coefficient for pensions is calculated as a ratio of old age pensions in the population of over 60 years of age. For the year 2000 it is 0.73, and for 2005 it is 0.79. For the years to come, it is assumed that a coefficient for pensions is constant at 0.78.

Disability pensions are predicted to grow with the growth rate of the overall population, since the rise of this pension group does not depend on the age factor. In addition, widow and family pensions are predicted to grow with the growth rate of the population aged 20+, because these pensions are mainly present among the population older than 20 years. Persons under 20 are dependent on adults, who are eligible for the named pensions.

[45] Present average retirement age for men is 60 and 7 months and for women 56 and 7 months. Since 1994 it has increased by three years for men and by 3.5 for women. Retirement age is about to increase in the future.

[46] Data for past years have been taken from the ZPIZ, Slovenian Pension Fund.

Figure 1: Breakdown of pensions and projections up to 2050



Source: ZPIZ, Pension Fund and author's calculations

From *Figure 1* it is clearly seen that the greatest increase from 1995 to 2050 belongs to the group of Old-age Pensions, which nearly doubles over the observed period. Disability Pensions were up by 1,000 from 1995 to 2005. However, they are about to decrease from 2005 to 2050 because of the fall in the overall population. In addition, Family and Widow Pensions follow a similar pattern. The rest of the pensions are also about to fall due to the fall in the population aged 20-64. The overall number of pensioners has risen by 70,000 in the last 10 years and they are projected to increase by an additional 155,000 over the next 45 years.

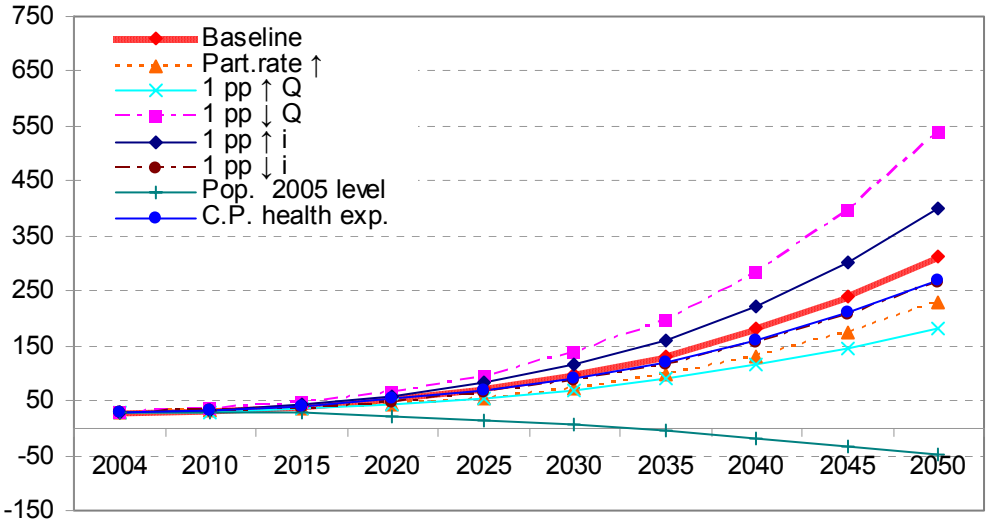
ANNEX 2: Results of the alternative scenarios under three pension scenarios

1. Scenario **W&I:**

Table 1: Government gross debt in % of GDP under the assumption that pensions grow in line with wages and inflation

	2004	2010	2015	2020	2025	2030	2035	2040	2045	2050
Baseline	29.5	32.2	39.7	52.5	71.5	97.5	132.2	180.5	240.6	314.0
Part. rate ↑	29.5	31.2	35.7	43.7	55.8	72.4	96.0	129.1	172.9	228.5
1 pp ↑ Q	29.5	30.3	34.7	42.6	54.3	69.6	89.2	115.4	146.3	181.6
1 pp ↓ Q	29.5	34.5	46.2	65.8	95.9	138.5	198.0	283.4	395.5	540.1
1 pp ↑ i	29.5	33.9	43.6	59.4	82.9	115.3	159.2	221.1	300.3	399.8
1 pp ↓ i	29.5	30.9	37.0	47.9	64.5	87.0	116.6	157.0	206.2	264.4
Pop. 2005 level	29.5	29.4	26.8	21.6	14.5	5.4	-5.4	-18.1	-32.5	-49.1
C.P. health exp.	29.5	32.8	40.6	52.3	68.9	90.7	119.6	159.7	208.9	267.6

Figure 1: Government gross debt evolution under eight different scenarios and assumption that pensions grow in line with wages and inflation

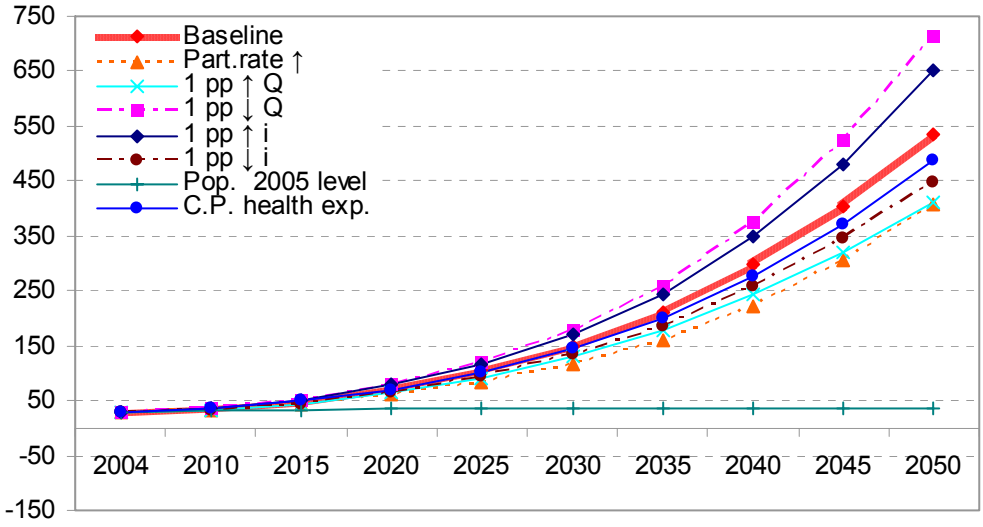


2. Scenario **W:**

Table 2: Government gross debt in % of GDP under the assumption that pensions grow in line with wages

	2004	2010	2015	2020	2025	2030	2035	2040	2045	2050
Baseline	29.5	34.6	47.9	70.4	104.2	150.3	212.2	297.4	404.3	535.5
Part. rate ↑	29.5	33.4	43.1	59.5	83.6	116.2	161.2	223.1	303.9	406.1
1 pp ↑ Q	29.5	33.2	44.4	63.7	92.0	129.5	178.0	242.8	320.8	412.6
1 pp ↓ Q	29.5	36.4	52.2	79.1	120.1	178.0	258.5	373.0	522.7	715.1
1 pp ↑ i	29.5	36.3	51.8	77.8	116.8	170.9	244.8	348.6	482.1	650.9
1 pp ↓ i	29.5	33.2	44.7	64.6	94.3	134.3	186.8	257.7	344.3	447.5
Pop. 2005 level	29.5	31.6	33.2	34.3	35.1	35.7	36.0	36.2	35.9	35.8
C.P. health exp.	29.5	35.2	48.7	70.3	101.5	143.5	199.5	276.7	372.5	489.0

Figure 2: Government gross debt evolution under eight different scenarios and assumption that pensions grow in line with wages



3. Scenario **I:**

Table 3: Government gross debt in % of GDP under the assumption that pensions grow in line with inflation

	2004	2010	2015	2020	2025	2030	2035	2040	2045	2050
Baseline	29.5	30.0	32.4	37.1	44.7	55.8	71.5	94.6	124.2	160.9
Part. rate ↑	29.5	29.0	29.1	30.1	32.8	37.6	45.9	59.4	78.7	104.3
1 pp ↑ Q	29.5	27.7	26.3	25.3	25.2	25.8	27.5	31.2	36.2	42.0
1 pp ↓ Q	29.5	32.8	40.6	53.9	74.6	104.5	147.1	209.3	292.0	399.8
1 pp ↑ i	29.5	31.6	36.2	43.6	54.9	70.9	93.3	125.9	168.3	222.2
1 pp ↓ i	29.5	28.7	30.0	33.6	40.1	49.7	63.3	83.1	108.1	138.3
Pop. 2005 level	29.5	27.4	21.0	10.7	-2.6	-18.7	-37.4	-58.7	-82.2	-109.1
C.P. health exp.	29.5	30.5	33.3	36.9	42.1	49.0	58.8	73.8	92.4	114.5

Figure 3: Government gross debt evolution under eight different scenarios and assumption that pensions grow in line with inflation