Economic Policy Committee - Ageing Working Group

2024 Ageing Report

Bulgaria - Country Fiche

National Social Security Institute of Bulgaria

Penka Taneva, penka.taneva@nssi.bg

Irena Davidkova, irena.davidkova@nssi.bg

Ministry of Finance

Kaloyan Kolev, k.kolev@minfin.bg

Final version

December 2023

Table of contents

List of tables

List of figures

Introduction

The present country fiche for Bulgaria is part of the 2024 Ageing Report, which provides long-term projections of the economic and budgetary impact of population ageing at unchanged policy. The 2024 edition is the eighth update and covers the period up to 2070.

This fiche was prepared by National Social Security Institute in agreement with the *Ageing Working Group* of the *Economic Policy Committee* and based on a common set of assumptions and methodologies. The pension expenditure projections presented in this fiche have been peer reviewed by the other Member States and the European Commission within the *Ageing Working Group*. The projections were finalised in the autumn of 2023 and represent the situation of the pension system on 01/12/2023.

Section 1 provides a general overview of the pension system in Bulgaria. Section 2 describes the demographic and labour market assumptions underlying the pension expenditure projections presented in Section 3, which also discusses the sensitivity scenarios around the baseline. Finally, Section 4 gives an overview of the methodology used to produce the pension projections.

1. Overview of the pension system[1]

1.1. Description of the pension system

The Bulgarian pension system has undergone substantial structural reforms since the late 1990s. The traditional pay-as-you-go system has been transformed into a three-pillar system through the introduction of compulsory and voluntary supplementary pension insurance.

The first step towards pension reform in Bulgaria has been the adoption of the Social Security Fund Act in 1996, which separated the State social insurance budget from the State budget. This has made the social security system self-financed; benefits are mainly covered by the contributions paid by employers and employees, and any deficit is covered by the State. Other aspects of the pension reform include the establishment of specialized funds, and the introduction of the tripartite management of the State social insurance system.

The current Bulgarian pension system came into force with the Mandatory Social Insurance Code on 1 January 2000 (renamed the Social Insurance Code [SIC] in 2003). The main objectives of the reform were to stabilize the existing state social insurance system (first pillar), and to get the opportunity of insured people for higher incomes after retirement through participation in second and third pillars of the pension system.

1.1.1. The public system of mandatory pension insurance of the pay-as-you-go type (I pillar)

The first pillar is a pay-as-you-go public pension insurance system. Promoting the principle of mandatory participation and universality, the first pillar covers all economically active persons. It is financed through contributions from employers and employees, as well as through transfers from the State budget for covering all non-contributory pension benefits and some non-contributory periods, which are regarded as insurance periods. In the period 2009-2015 the State was participating as a "third insurer" and was paying contributions equal to 12 percent of the total insurance income of all insured persons. As of 2016 the State contribution was abolished. In addition, the State has the obligation to cover any remaining financial gaps and deficits of the public pension system.

The first pillar is administrated by the National Social Security Institute (NSSI), which is responsible for the entitlement and payment of pensions and other social insurance benefits in the event of one's temporary incapacity to work, maternity and unemployment. The pension policy is formulated and implemented by the Ministry of Labour and Social Policy.

The current **old-age pension** is calculated according to the following formula:

$$\textit{Old-Age Pension = NAMCII * IC * LI * AR + BGN 60,}$$

where:

NAMCII – National average monthly insurable income (12 months before retirement);

IC – Individual coefficient calculated as a ratio between the individuals' average insurable income over their whole length of contributions after 31 December 1999 and the national average insurable income over the same period; For all persons born after 1959, the coefficient is reduced due to the transfer of pension contribution to the second pillar – Universal Pension Funds;

LI – Length of insurance/service;

AR – From 1 January 2022, the accrual rate is 1.35% for newly granted pensions. From 1 October 2022, pensions awarded until 31 December 2021 were recalculated on the basis of the average monthly insurance income of the country from which the pension was first granted and the percentage per year of service (accrual rate) set out in the legislation in force at the date of award of the pension. Where the recalculated amount turned out to be different from the amount on 30 September 2022, the pension shall be set at the higher amount. For pensions already granted until the end of 2021, after the recalculation in October 2022, the accrual rate varies between 1 and 1.2 % depending on the year in which they are awarded for the first time.

BGN 60 – a COVID-19 pension supplements becoming a permanent part of the pension amount for both existing and newly granted pensions. According to the pension legislation amendments came into force from 1 July 2022, pensions were increased by 10% and 60 BGN was included to the amount of pension. As a permanent part of the pension, this amount will increase with the applied percentage for updating pensions in July. For newly granted pensions it is envisaged that the initially included amount will be BGN 60, regardless of the year of granting. Then it will increase with the rate of updating pensions, but its amount will lag behind the amounts of supplements that are included in pensions granted earlier.

The minimum old-age pension amount is set every year by the State Social Security Budget Law. From 1 July 2023, it is BGN 523,04.

Elderly people with income lower than 30 percent of the sum of the poverty line set for the country in the last 12 months are entitled to the social pension for old age. The amount of social pension for old age was increased from BGN 247 to BGN 276,64 as of 1 July 2023.

From 1 October 2022, the maximum pension amount was increased from BGN 2 000 to BGN 3 400.

Disability pensions are payable to insured persons who have lost 50 or more percent of their ability to work and have completed a minimum five-year insurance period if their age is 30 years or more. For insured persons under 30 years of age, the required insurance period is shortened in the following manner:

- For persons under 20 years of age, persons born blind or persons who became blind before starting to work, disability pensions are available regardless of the duration of their insurance period.

- For persons between 20 and 24 years of age, one year of insurance is required.

- For persons between 25 and 29 years of age, three years of insurance are required.

Persons with at least 50 percent loss in their ability to work due to work accident or occupational disease qualify for disability pension regardless of the duration of their insurance period.

Survivors' pensions are payable to children up to age 18 (age 26 if the person is a student, no limit if it is disabled), to surviving spouse within 5 years prior to statutory retirement age (earlier if disabled) and to parents older than statutory retirement age who do not receive a pension in their own right. Parents of insured persons who died during military service are eligible regardless of age.

Pensions granted until December 31 of the previous year are **updated annually** from July 1 by decision of the supervisory board of the National Insurance Institute with a percentage equal to the sum of 50 percent of the increase in the insurance income and 50 percent of the consumer price index during the previous calendar year. In July 2023 all pensions granted until the end of 2022 increased by 12.0%.

1.1.2. Supplementary mandatory pension schemes (II pillar)

The supplementary pension insurance includes a compulsory and voluntary part and is set up as a defined contribution system with personal accounts managed by pension fund companies. Benefits are paid as a pension and are based on the accumulated capital in the individual account and life expectancy.

The supplementary mandatory pension provides:

- Additional old age pension for persons born after 31 December 1959 - all persons, born after 31 December 1959, who are insured (i.e. they either work under employment contracts or are self-insured) participate in the **Universal Pension Fund**. The contribution rate is 5% of gross wages (insurable income).

- Fixed-term early retirement pensions for workers under harmful or dangerous labour conditions - workers under harmful or dangerous labour conditions have been covered by the **Professional Pension Fund** since 2000. The contribution rate has been fixed at 12% for first labour category and 7% for second labour category and it is paid entirely by employer.

As of the second half of 2015 a possibility to opt out the second pillar was given to people born after 1959, who were previously mandatory participants in the second pillar. This decision is reversible until reaching the age, which is 1 year lower than the statutory retirement age for the period from 2022 to 2025 and will steadily increase to 5 years lower than the statutory retirement age after 2037. People who have decided to opt out the second pillar continue their pension insurance in first pillar only but paying additional contribution of 5% (which was paid to second pillar). Their individual savings managed by private pension funds are initially transferred to the State Fund for Guaranteeing the Stability of the State Pension System and upon retirement the funds are shifted to the State Pension Fund (first pillar).

1.1.3. Supplementary voluntary pension schemes (III pillar)

The third pillar is a supplementary voluntary pension insurance system. It is a pension savings scheme based on voluntary contributions deposited in private pension funds that are maintained by licensed pension insurance companies. Currently, two types of voluntary exist: Voluntary Pension Funds and Occupational Pension Funds. The latter are provided under occupational schemes and are based on collective agreements.

Contributions to the third pillar are paid by the members themselves or by their employers and they are tax-exempt up to a certain limit. Benefits can be paid in the form of life annuities, fixed-term annuities, lump sums or programmed withdrawals for survivors' benefits.

1.1.4. Main parameters of the Bulgarian pension system in base year 2022

The contribution rate for pension is 19.8% of the gross insurable income. For persons born after 1959, the contribution rate for first pillar is 14.8% and 5% are transferred to the second pillar. Employer pays 56% of the total contribution and the remaining 44% are on behalf of employee. Contribution rate for military and police officers is 60.8% (55.8% respectively) and is entirely on behalf of the State.

There are two qualifying conditions for acquiring old age pension – the attainment of the retirement age and the length of insurance. In 2022, the retirement age was 61 years and 10 months for women and 64 years and 5 months for men. The retirement age for women will continue to increase by 2 months each calendar year to 2029 and thereafter by 3 months until reaching 65 years in 2037; the retirement age for men will continue to increase by 1 month until reaching 65 years in 2029. After 2037 the retirement age for both genders will increase in line with the change in life expectancy. In 2022, the required length of service is 36 years and 2 months for women and 39 years and 2 months for men. The required length of insurance will continue to increase by 2 months every year until reaching 37 years for women and 40 years for men in 2027. In 2022 insured persons who do not meet the qualifying conditions are eligible for old-age pension at age 66 and 10 months (both men and women) and 15-years contributory period. This age will also continue to increase by 2 month every calendar year until reaching 67 years of age in 2023.

TABLE 1 – QUALIFYING CONDITIONS FOR RETIREMENT

			2022	2030	2040	2050	2060	2070
Qualifying condition for retiring **with** a full pension	Statutory retirement age - men		64y & 5m	65y	65y + LE	65y + LE	65y + LE	65y + LE
	Statutory retirement age - women		61y & 10m	63y & 3m	65y + LE	65y + LE	65y + LE	65y + LE
	Minimum requirements	Contributory period - men	39y & 2m	40y	40y	40y	40y	40y
		Retirement age - men	64y & 5m	65y	65y + LE	65y + LE	65y + LE	65y + LE
		Contributory period - women	36y & 2m	37y	37y	37y	37y	37y
		Retirement age - women	61y & 10m	63y & 3m	65y + LE	65y + LE	65y + LE	65y + LE
Qualifying condition for retirement **without** a full pension	Early retirement age - men		63y & 5m	64 y	64 y + LE	64 y + LE	64 y + LE	64 y + LE
	Early retirement age - women		60y & 10m	62 y & 3 m	64 y + LE	64 y + LE	64 y + LE	64 y + LE
	Penalty in case of earliest retirement age		0.048	0.048	0.048	0.048	0.048	0.048
	Bonus in case of late retirement		0.04	0.04	0.04	0.04	0.04	0.04
	Minimum contributory period - men		39y & 2m	40 y	40 y	40 y	40 y	40 y
	Minimum contributory period - women		36y & 2m	37 y	37 y	37 y	37 y	37 y
	Minimum residence period - men		:	:	:	:	:	:
	Minimum residence period - women		:	:	:	:	:	:

Source: NSSI.

In 2016, a possibility for granting a reduced early retirement pension was introduced for persons who are within 12 months of the statutory retirement age, with the lifetime reduction of the pension by 0.4% for each month of anticipation.

Retirement below statutory retirement age, but without reducing the pension amount, is possible for people working under hazardous and very unhealthy working conditions (such as miners) or special groups such as teachers, military and police officers. The retirement conditions for these categories of workers vary depending on the type of work, gender and length of service.

The pension can be postponed and there is no maximum postpone period. The accrual rate for postpone is 3.0% per year for the length of service until 31 December 2011. As of 2012 the accrual rate is set to 4%.

1.2. Recent reforms of the pension system included in the projections

The forecast reflects the changes in the pension sphere adopted by the Law on amending the Law on the State Social Security Budget for 2022 (published in State Gazette volume 51 dated 2022), which have a significant impact on the amounts of pensions both in 2022 and in the long term, including:

- From 1 January 2022, the accrual rate is 1.35% for newly granted pensions. For pensions already granted until the end of 2021, after the recalculation in October 2022, the accrual rate varies between 1 and 1.2 % depending on the year in which they are awarded for the first time.

- The continued monthly payment of an additional BGN 60 in the first half of 2022. In the period January-June 2022, pensioners for whom the income from a pension in January 2022 (with the "COVID supplement" of BGN 60 included) was less than that in December 2021 (with the "COVID supplement" included " of BGN 120), were compensated by being paid an amount representing the difference between their income in December 2021 and their income in January 2022.

- As of July 1, 2022, all work-related pensions granted until December 31, 2021 were updated with 10 percent instead of 6.1 percent (the percentage determined under the rule of Article 100 of the SSC). Additional amounts of BGN 60 paid as of June 30 (the so-called 'COVID supplements') and individual compensatory amounts representing the difference between their pension income in December 2021 and their pension income from January 2022 were included in the basic amount of the work-related pension received after applying the 10 per percent.

- The minimum old-age pension amount increased from BGN 370.00 to BGN 467.00 as of July 1, 2022 (by 26.2 percent).

- The amount of the social pension for old age increased from BGN 170.00 to BGN 247.00 from July 1, 2022 (by 45.3 percent).

- The maximum amount of one or more pensions received, without considering supplements, increased from BGN 1,500.00 to BGN 2,000.00. (by 33.0 percent) from 01.07.2022, and from October 1, 2022 to BGN 3,400.00. (by 70.0 percent).

- From 1 October 2022, pensions awarded until 31 December 2021 were recalculated on the basis of the average monthly insurance income of the country from which the pension was first granted and the percentage per year of service (accrual rate) set out in the legislation in force at the date of award of the pension. For the period from the grant to the time of the recalculation, a new annual update rule was implemented from July 1 – instead of the sum of 50% of the increase in insurable income and 50% of the consumer price index in the previous year, 100% of the higher of the two percentages was applied. When the recalculated amount turned out to be different from the amount as of September 30, 2022, the pension was determined at the higher amount.

2. Overview of the demographic and labour force projections[2]

Part 2 contains a description of the main demographic changes implied by EUROPOP2023 and the changes in the labour force as projected by the Cohort Simulation Model. These provide the framework for the pension expenditure projections.

2.1. Demographic projections

The illustration of country-specific demographic developments is presented in Table 2. The table summarises the expected changes in population, life expectancy, surviving probabilities and net migration in Bulgaria for the period 2022 - 2070.

TABLE 2 – MAIN DEMOGRAPHIC VARIABLES

	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022-2070
Population (thousand)	6 890	6 547	6 139	5 844	5 563	5 297	6 930	2023	-1 593
Population growth rate	0.2%	-0.8%	-0.5%	-0.5%	-0.5%	-0.4%	0.6%	2023	-0.6%
Old-age dependency ratio (pop 65+ / pop 20-64)	36.6	40.2	47.7	58.6	65.5	60.3	65.9	2058	23.6
Old-age dependency ratio (pop 75+ / pop 20-74)	12.7	15.6	18.3	23.1	29.1	31.6	32.1	2067	18.8
Ageing of the aged (pop 80+ / pop 65+)	21.9	25.6	28.2	29.7	36.4	44.5	44.5	2070	22.5
Men - Life expectancy at birth	70.5	73.4	76.0	78.5	80.7	82.8	82.8	2070	12.3
Women - Life expectancy at birth	77.7	80.1	82.3	84.2	86.0	87.7	87.7	2070	10.0
Men - Life expectancy at 65	13.5	15.4	17.0	18.5	19.9	21.3	21.3	2070	7.8
Women - Life expectancy at 65	17.5	19.1	20.6	22.0	23.3	24.6	24.6	2070	7.1
Men - Survivor rate at 65+	70.0	75.7	80.4	84.2	87.3	89.8	89.8	2070	19.9
Women - Survivor rate at 65+	85.2	88.4	90.6	92.3	93.7	94.9	94.9	2070	9.6
Men - Survivor rate at 80+	28.6	38.7	47.2	55.1	62.4	68.7	68.7	2070	40.1
Women - Survivor rate at 80+	53.3	62.1	68.5	74.1	78.8	82.8	82.8	2070	29.5
Net migration (thousand)	160.1	-2.9	11.5	12.9	12.4	15.8	160.1	2022	-144.3
Net migration (% population previous year)	2.3%	0.0%	0.2%	0.2%	0.2%	0.3%	2.3%	2022	-2.0%

Source: Eurostat, European Commission.

Table 2 shows an overview of the demographic development in Bulgaria until 2070 according to the Eurostat projection. The population is expected to dwindle steadily throughout the projection period – a decline of 23% from 6.9 million in 2022 to 5.3 million in 2070.

Bulgaria is one of the fastest-ageing economies in the EU due to lower fertility rates and growing life expectancy. Although the total fertility rate is projected to rise from 1.56 in 2022 to 1.69 in 2070 it remains below the natural replacement level of 2.1. At the same time, the average life expectancy at birth, which was 70.5 for men and 77.7 for women in 2022, is expected to increase by 12.3 years for men and 10.0 years for women and to reach 82.8 and 87.7 in 2070, respectively. Both fertility rates and life expectancy are lower in the new projection compared to the 2021 Ageing report.

The age structure of Bulgarian population is projected to change considerably in the coming decades due to the dynamics of fertility, life expectancy and migration flows. The population at working age (20-64-year-old), would shrink relative to the overall population. Whereas in 2022, people at working age represented 59% of Bulgarian population, this share would fall to 51% in 2070. On the other hand, the share in the overall population of the age cohorts above 65

---

[2] For more details, see European Commission and EPC (2023), *'The 2024 Ageing Report: Underlying assumptions and projection methodologies',* European Economy, Institutional Paper 257.

years is expected to rise by 2070, from 22% in 2022 to 31% in 2070. As a result, the old age dependency ratio[3] almost doubles - from 36.6% in 2022 to the peak of 65.9% in 2058. In the last decade, the old-age dependency ratio slightly improves, decreasing to 60.3% at the end of the projection period.

In 2022, which is the starting year of the projections, net migration recorded an exceptional increase due to the inflow of displaced people fleeing Ukraine and in Bulgaria it reached 160 thousand. Net migration in the new projection is significantly higher than in the previous round thus mitigating the negative effect of the lower fertility rates.

Figure 1 compares the age distributions of population in 2022 and 2070. The base of the population pyramid becomes narrower due to lower fertility rates while the upper part becomes wider reflecting the higher number of elder people. All these changes will lead to lower number of insured persons and higher number of pensioners thus increasing the financial pressure on the public pension system.

FIGURE 1 – AGE STRUCTURE: 2022 VS 2070
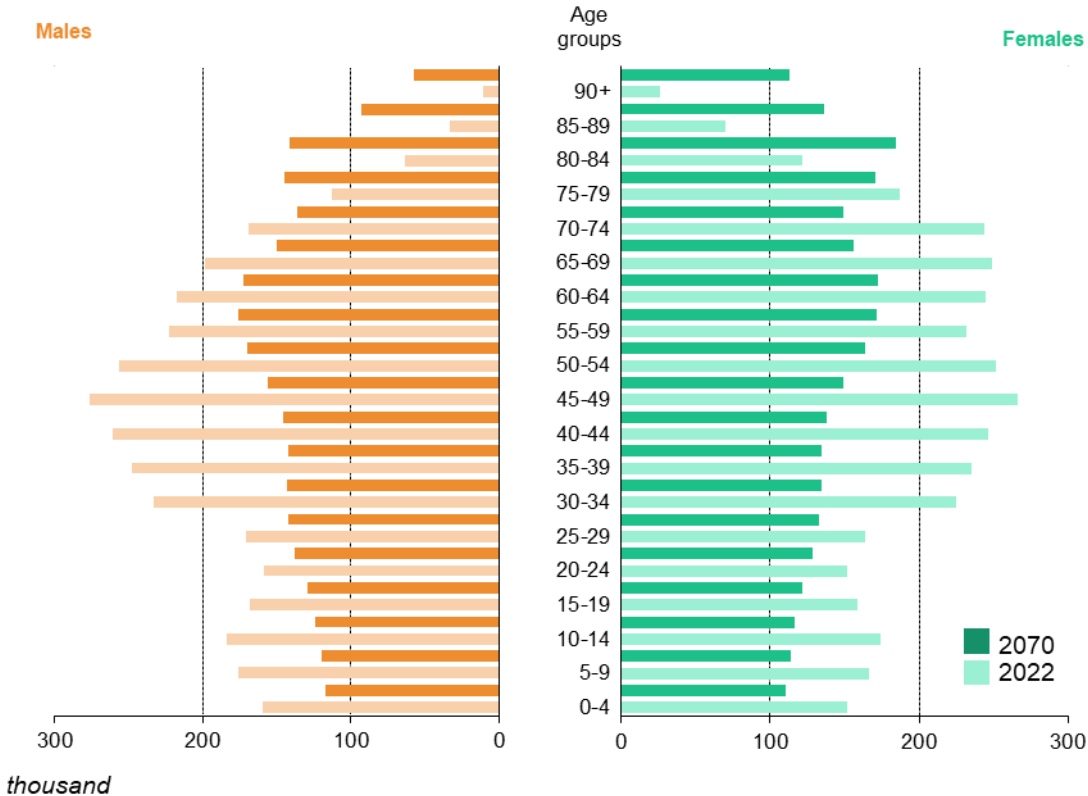
Source: Eurostat, European Commission.

---

[3] The ratio of population aged 65+ over the population aged 20-64.

2.2. Labour force projections

The labour force is projected by the Commission on the basis of the demographic projections by ESTAT described in the previous section and the participation rates as projected by means of the Cohort Simulation Model. Key variables are shown in Table 3 and Table 4.

TABLE 3 – PARTICIPATION RATE, EMPLOYMENT RATE AND SHARE OF WORKERS

	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022-2070
Labour force participation rate 20-64	79.1	77.9	78.3	79.4	80.9	80.5	80.9	2061	1.3
Employment rate of workers aged 20-64	75.8	74.4	74.5	75.5	77.0	76.6	77.0	2061	0.8
Share of workers aged 20-64 in the labour force 20-64	95.8	95.6	95.1	95.1	95.1	95.1	96.1	2025	-0.6
Labour force participation rate 20-74	67.3	66.0	64.8	63.9	65.3	68.1	68.2	2069	0.9
Employment rate of workers aged 20-74	64.4	63.1	61.7	60.9	62.2	64.8	64.9	2069	0.4
Share of workers aged 20-74 in the labour force 20-74	95.8	95.6	95.2	95.2	95.2	95.2	96.2	2025	-0.6
Labour force participation rate 55-64	71.0	66.3	68.5	69.4	72.8	73.5	73.8	2066	2.5
Employment rate of workers aged 55-64	68.5	63.8	65.7	66.6	69.9	70.5	70.8	2066	2.0
Share of workers aged 55-64 in the labour force 55-64	96.4	96.3	96.0	96.0	96.0	96.0	96.7	2025	-0.4
Labour force participation rate 65-74	11.2	10.0	10.5	10.4	10.1	11.4	12.4	2025	0.2
Employment rate of workers aged 65-74	10.9	9.8	10.1	10.1	9.8	11.1	12.0	2025	0.2
Share of workers aged 65-74 in the labour force 65-74	97.2	97.4	96.9	97.0	97.1	97.0	97.7	2027	-0.3
Median age of the labour force	44.0	44.0	45.0	43.0	43.0	44.0	45.0	2031	0.0

Source: European Commission.

Table 3 shows the expected changes in the employment and participation rates for the overall population at working age (20-64 and 20-74) as well as the rates for those age groups (55-64 and 65-74) that are the most affected by any pension reforms that shift retirement ages (either early or statutory) or by active labour market policies that aim at prolonging the working life.

In the long run the labour force participation rates as well as employment rates are projected to have somehow wavy developments slightly increasing by the end projection period. More obvious increase is projected for the age group 55-64 mostly due to the raising of statutory retirement age. The share of workers in the labour force decreases in the first decade and remains constant afterwards for all age groups.

Compared to the 2021 Ageing Report, overall the participation rates and the employment rates are higher in the new projection. Employment rates of the age group 55-64 are 6 p.p. higher in 2070 compared to those in the 2021 Ageing Report. However, participation rates and employment rates for workers aged 65-74 are lower with more than 4 p.p. compared to those in the 2021 Ageing Report. In general, the new labour force projection is more favourable compared to the previous one. The higher migration inflow as projected by Eurostat mitigates the negative effect of the lower fertility rates on the labour force.

Table 4 summarises the estimated development of career duration, the average labour market exit that correspond with the participation rate projections, and the years spent in retirement for men and women.

TABLE 4 – LABOUR MARKET EXIT BEHAVIOUR

TOTAL	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022-2070
Average effective retirement age*	62.5	63.9	64.5	64.9	65.1	65.0	65.2	2056	2.5
Average labour market exit age (CSM)**	63.0	63.6	64.0	64.1	64.2	64.3	64.3	2070	1.3
Contributory period	35.7	37.0	37.4	37.1	36.8	36.4	37.5	2035	0.8
Duration of retirement***	13.6	18.5	19.6	21.1	22.5	23.8	23.8	2070	10.2
Duration of retirement/contributory period	38%	50%	52%	57%	61%	65%	65%	2070	27%
Percentage of adult life spent in retirement****	22%	30%	31%	32%	34%	35%	35%	2070	13%
Early/late exit*****	1.1	1.1	1.4	1.2	0.9	1.0	1.7	2035	-0.1

MEN	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022-2070
Average effective retirement age*	63.0								
Average labour market exit age (CSM)**	63.5	64.0	64.1	64.2	64.3	64.4	64.4	2070	1.0
Contributory period	36.4	38.0	38.9	38.6	38.3	37.8	39.0	2035	1.4
Duration of retirement***	11.3	16.1	17.7	19.2	20.7	22.1	22.1	2070	10.8
Duration of retirement/contributory period	31%	42%	46%	50%	54%	58%	58%	2070	27%
Percentage of adult life spent in retirement****	19%	27%	29%	30%	32%	33%	33%	2070	14%
Early/late exit*****	1.8	1.4	1.4	1.2	0.9	1.0	1.8	2023	-0.8

WOMEN	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022-2070
Average effective retirement age*	62.2								
Average labour market exit age (CSM)**	62.5	63.2	63.9	64.0	64.1	64.2	64.2	2070	1.7
Contributory period	35.0	36.1	35.8	35.5	35.2	34.9	36.2	2028	-0.1
Duration of retirement***	15.9	20.8	21.4	22.9	24.2	25.5	25.5	2070	9.6
Duration of retirement/contributory period	45%	58%	60%	64%	69%	73%	73%	2070	28%
Percentage of adult life spent in retirement****	25%	33%	33%	34%	35%	37%	37%	2070	11%
Early/late exit*****	0.4	0.7	1.3	1.2	0.9	1.0	1.8	2035	0.6

*The 'average effective retirement age' is the age at which people start receiving a pension benefit (old-age, early or disability). It is calculated on the basis of the administrative data on newpensioners for 2022, showing projected data for the other years for the total. ** 'Average labour market exit age (Cohort Simulation Model)' refers to 2023 instead of 2022. *** 'Duration of retirement' is the remaining life expectancy at the average labour market exit age. **** The 'percentage of adult life spent in retirement' is calculated as the ratio between the duration of retirement and the life expectancy minus 20 years. ***** 'Early/late exit' is the ratio between those who exit the labour market before reaching the statutory retirement age and those who exit at or beyond the statutory retirement age. For 2022, the value refers to 2023.

Average contributory period is projected by the national long-term pension model. According to Bulgarian pension legislation the required contributory period for pension gradually increases from 39y&2m for men and 36y&2m for women in 2022 to 40 years and 37 years respectively in 2027. Considering the legal provisions, the average contributory period is projected to increase from 36.4 for men and 35.0 for women in 2022 to 39.0 for men in 2035 and to 36.2 for women in 2028. For the rest of the projection period the average contributory period slightly decreases for both genders due to the fact that more people will have not enough years of contributions and will not be able to retire at statutory retirement age so that they will have to retire later, after reaching 67 years of age, when the legislation gives them the possibility to retire with at least 15 years of service.

The average duration of retirement is equal to life expectancy at the average labour market exit age as projected by CSM. It rises by 11 years for men and by 10 years for women over the projection horizon. The ratio of duration of retirement to average contributory period is projected to grow for both sexes and in 2070 it will reach 58.0% for men (60.0% in AR21) and 73.0% for women (70.0% in AR21). By the end of the projection period women will spend in retirement 37.0% of the time after their 20th year while for men the percentage is 33.0. The increase is higher for men (14 p.p.) than for women (11 p.p.). This trend follows the demographic projections showing that the life expectancy for men is expected to grow at a higher pace compared to the life expectancy of women.

3. Pension projection results

The pension projections examine the long-term status of the public pension system in Bulgaria for the period 2022-2070. The objective of the analysis is to determine the influence of the demographic and economic factors over the sustainability of the Bulgarian public pension system in the long run. An actuarial model for long-term projections of the development of State Social Insurance Budget is used for producing these projections.

The new pension projection reflects current pension legislation in Bulgaria. The legislated link of the retirement age with changes in life expectancy, which should be applied after 2037, is not considered due to the fact that at this stage there is no clear methodological rule in the legislation.

The projection was made fully in compliance with the set of commonly agreed underlying assumptions elaborated by the European Commission.

3.1. Coverage of the pension projections

The actuarial model of the National Social Security Institute (NSSI) projects the status of the I Pillar mandatory pension insurance and in particular earnings-related public pensions including old-age, disability and survivors' pensions, which are covered by the projection. Pensions not related to labour activity paid from the State budget are also included. Currently, they are not incorporated in the model and therefore are projected separately.

The following pension schemes are not included in the projections:

- Universal Pension Funds (UPF) of Supplementary Mandatory pension scheme (second pillar).

- Professional Pension Funds (PPF) of Supplementary Mandatory pension scheme (second pillar).

- Supplementary Voluntary Pension Funds.

- Teachers' Pension Fund – managed by NSSI.

This pension projection exercise is based on the reported data for 2022, which is the base year of the projection. Comparison between EUROSTAT official figures (ESSPROS) and Ageing Working Group (AWG) data on pension expenditure for the period 2013–2020 show differences between 0.7-1.1 percent of GDP. These differences are mainly due to existence of some pension expenditure categories, which are included in AWG definition, while in the ESSPROS data they are reported under separate items and are not included in the total amount of Eurostat pension expenditures.

The following supplements paid to pensions are not considered as pension expenditures under ESSPROS methodology:

- Disability supplements, paid to pensioners with over 90% lost capacity to work, and in need of assistance;

- Widows' supplements, equal to 26.5% of the pension benefit of the dead spouse;

- Lump sums paid to pensioners as Christmas and Easter supplements (bonuses) as a result of Government decision;

- Other supplements, stipulated in other laws.

TABLE 5 – ESSPROS AND AWG DEFINITION OF PENSION EXPENDITURE (%GDP)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	change 2013-2021
Eurostat total pension expenditure	8.6	8.7	8.5	8.3	8.0	7.8	7.5	8.1	7.8	-0.8
Eurostat public pension expenditure (A)	8.6	8.7	8.5	8.3	8.0	7.8	7.5	8.1	:	-0.5
Public pension expenditure (AWG: outcome) (B)	9.6	9.6	9.4	9.1	8.8	8.6	8.2	9.2	9.6	0.0
Difference Eurostat/AWG: (A)-(B)	-1.0	-0.9	-0.9	-0.8	-0.8	-0.8	-0.7	-1.1	:	-0.1
Expenditure categories not included in the AWG definition										
- Pension supplements	-1.0	-0.9	-0.9	-0.8	-0.8	-0.8	-0.7	-1.1	:	:

Source: Eurostat, European Commission.

3.2. Overview of projection results

Table 6 presents a general overview of the main projection results concerning the 1) public pension expenditure as a percentage of GDP (the pension-to-GDP ratio), and 2) the public pension contributions as a percentage of GDP for the period 2022–2070, considering the latest changes in the Bulgarian pension legislation.

TABLE 6 – PROJECTED GROSS AND NET PENSION SPENDING AND CONTRIBUTIONS (%GDP)

	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022-2070
Expenditure									
Gross public pension expenditure	**9.5**	**10.2**	**9.4**	**9.4**	**9.7**	**9.6**	**10.8**	**2025**	**0.1**
Private occupational pensions	:	:	:	:	:	:	:	:	:
Private individual mandatory pensions	:	:	:	:	:	:	:	:	:
Private individual non-mandatory pensions	:	:	:	:	:	:	:	:	:
Gross total pension expenditure	9.5	10.2	9.4	9.4	9.7	9.6	10.8	2025	0.1
Net public pension expenditure*	9.5	10.2	9.4	9.4	9.7	9.6	10.8	2025	0.1
Net total pension expenditure*	9.5	10.2	9.4	9.4	9.7	9.6	10.8	2025	0.1
Contributions									
Public pension contributions	4.7	4.8	5.1	5.1	5.1	5.1	5.1	2043	0.4
Total pension contributions	4.7	4.8	5.1	5.1	5.1	5.1	5.1	2043	0.4
Balance of the public pension system (%GDP)**	-4.8%	-5.4%	-4.2%	-4.3%	-4.6%	-4.4%	-6.0%	2025	0.3%

*Net pension expenditure excludes taxes on pensions and compulsory social security contributions paid by beneficiaries. **Public pension contributions - gross public pension expenditure (peak value/year shows most negative value).

Source: European Commission, EPC.

Compared to the 2021 Ageing Report, the new results show higher values of the total pension-to-GDP ratio. Starting from 9.5 percent in 2022, the ratio reaches its peak value (10.8 percent) in 2025 and afterwards starts decreasing. The lowest values can be expected in the period 2040-2050 followed by certain increase so at the end of the period the ratio reaches 9.6%. Public pension contributions constitute 4.7 – 5.1% of GDP between 2022 and 2070 (5.0 – 5.4% in 2021 Ageing Report).

The following graph (Figure 2) shows a comparison of the pensions-to-GDP ratio between the 2021 Ageing Report baseline and the new projection. The higher values of pensions-to-GDP ratio are mainly due to: 1) measures and policies undertaken for increasing the amounts of pensions; and 2) higher projected indexation values (higher inflation and wages assumptions), which have a significant impact on pension expenditures both in 2022 and in the long term.

Peak value in spending in 2025 (10.8%) is influenced by current price and wage dynamics which drive up the pension indexation compared to GDP for several years. This effect abates in a few years' time and then costs begin to gradually decrease, remaining relatively flat at the levels about 9.4% in 2040-2050. Compared to AR2021, public spending is projected to be significantly higher until 2050. Afterwards the ratio of public pension expenditures to GDP in both projections almost coincide.

FIGURE 2 – PUBLIC PENSION EXPENDITURES, % GDP
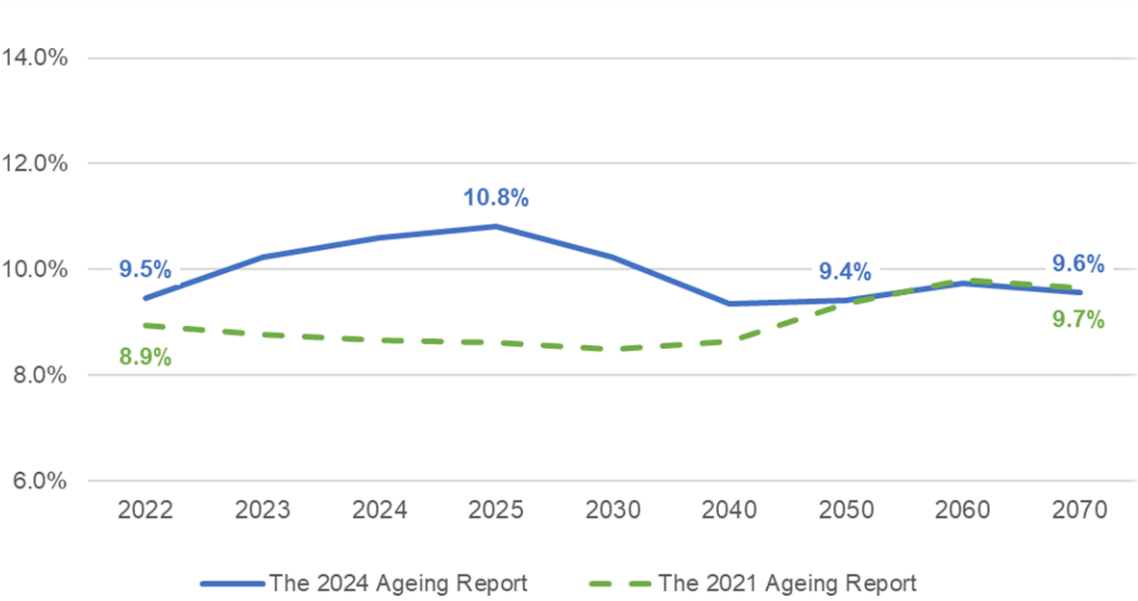
Source: NSSI.

Along with the demographic and macroeconomic assumptions, the main factors influencing projection results are the number of pensioners and the average pension benefits. The number of pensioners in the new projection is lower compared to the 2021 Ageing Report. The data reported in 2022 show about 57 000 pensioners less compared to the number projected in AR 2021. This lower starting point and the higher mortality rates in the first half of the period as projected by Eurostat lead to the lower number of pensioners in this round. Regarding the average pension benefits, the main reason explaining the difference is the change of assumptions as a result of a policy change described in Section 1.2, that leads to higher pension benefits.

After its peak in 2025, the projected pension-to-GDP ratio shows a decreasing trend, as a result of the tightened eligibility conditions for acquiring an old-age pension (i.e. increase of statutory retirement age and of required length of service) and the associated lower number of old-age pensioners. The increasing trend in pension expenditure after 2050 mainly reflects the adverse impacts of the expected changes in the age structure of the Bulgarian population.

TABLE 7 – GROSS PUBLIC PENSION SPENDING BY SCHEME (%GDP)

	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022-2070
Total public pensions	9.5	10.2	9.4	9.4	9.7	9.6	10.8	2025	0.1
Old-age and early pensions	7.5	7.8	7.1	7.4	7.8	7.7	8.5	2025	0.2
Flat component	:	:	:	:	:	:	:	:	:
Earnings-related	7.5	7.8	7.1	7.3	7.8	7.7	8.5	2025	0.2
Minimum pensions (non-contributory)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2062	0.0
Disability pensions	1.5	1.8	1.7	1.6	1.5	1.4	1.8	2032	0.0
Survivor pensions	0.3	0.5	0.4	0.3	0.2	0.2	0.5	2031	-0.1
Other pensions	0.1	0.2	0.2	0.2	0.2	0.2	0.2	2070	0.1

Source: European Commission, EPC.

The old-age and early earnings-related pensions most contribute to the growth in pension expenditure in the new projection. The expenditure for these pensions (Table 7) is expected to increase over the projection horizon from 7.5% of GDP in 2022 (peaking at 8.5% in 2025) to 7.7% of GDP in 2070.

Compared to the 2021 Ageing Report, the expenditure for old age pensions in the new projection is lower and for disability pensions it is higher over the projection period. The recently observed increase in the number of disability pensions caused by the impact of the COVID-19 pandemic and high post-COVID-19-associated morbidity is taken into account.

The development of survivors' pension expenditures remains relatively stable over the projection period. The majority of survivors' pensions are granted in the form of a surviving spouse's pension and only a small number are granted to orphans.

The expenditure on non-earnings-related pensions are reported under two different items. Social pensions for old-age are included under the item "Minimum pensions" of 'Old-age and early pensions" category, while social disability pensions are reported under the item "Other pensions". The minimum pension expenditure represents insignificant part of the total expenditure and their share of GDP is close to zero. Compared to the 2021 Ageing Report expenditures for both minimum and other pensions are higher due to the increase in average amounts of pensions and projected higher number of pensioners receiving social pensions in order to fill the gap between the number of pensioners and inactive population.

3.3. Description of main driving forces behind the projection results and their implications

This part provides more details about the development of public pension expenditures (Table 8). It uses a standard arithmetic disaggregation of the pension expenditures-to-GDP ratio into the dependency ratio, coverage ratio, benefit ratio and a labour market effect (Figure 3, first equation). Two further sub-decompositions have been agreed in the past. First, the coverage ratio can be split to look into the take-up ratios for old-age pensions and early pensions (second equation in Figure 2). Second, the labour market indicator is further disaggregated according to the third equation in Figure 3.

FIGURE 3 – DISAGGREGATION OF PUBLIC PENSION EXPENDITURE

$$\frac{pension\ expenditure}{GDP} = \underbrace{\frac{population\ 65+}{population\ 20-64}}_{dependency\ ratio} \times \underbrace{\frac{number\ of\ pensioners}{population\ 65+}}_{coverage\ ratio} \times \underbrace{\frac{average\ pension\ income}{\frac{GDP}{hours\ worked\ 20-74}}}_{benefit\ ratio} \times \underbrace{\frac{population\ 20-64}{hours\ worked\ 20-74}}_{labour\ market\ effect} \quad [1]$$

$$\frac{number\ of\ pensioners}{population\ 65+} = \underbrace{\frac{number\ of\ pensioners\ 65+}{population\ 65+}}_{coverage\ ratio\ old\text{-}age} + \left(\underbrace{\frac{number\ of\ pensioners\ \leq 65}{population\ 50-64}}_{coverage\ ratio\ early\text{-}age} \times \underbrace{\frac{population\ 50-64}{population\ 65+}}_{cohort\ effect}\right) \quad [2]$$

$$\frac{population\ 20-64}{hours\ worked\ 20-74} = \underbrace{\frac{population\ 20-64}{employed\ people\ 20-64}}_{1/employment\ rate} \times \underbrace{\frac{employed\ people\ 20-64}{hours\ worked\ by\ people\ 20-64}}_{1/labour\ intensity} \times \underbrace{\frac{hours\ worked\ by\ people\ 20-64}{hours\ worked\ by\ people\ 20-74}}_{1/career\ shift} \quad [3]$$

Source: European Commission, EPC.

The breakdown is calculated on the basis of pensioners (Table 8), with the disaggregation based on pensions reported in annex Table A3.

TABLE 8 – FACTORS BEHIND THE CHANGE IN PUBLIC PENSION EXPENDITURE BETWEEN 2022 AND 2070 (PPS OF GDP) – PENSIONERS[4]

	2022-30	2030-40	2040-50	2050-60	2060-70	2022-70
Public pensions to GDP	0.8	-0.9	0.1	0.3	-0.2	0.1
Dependency ratio effect	1.0	1.8	2.0	1.1	-0.8	5.1
Coverage ratio effect*	-0.8	-1.2	-0.9	-0.1	0.6	-2.4
Coverage ratio old-age	-0.5	-0.9	-0.4	0.4	0.5	-0.9
Coverage ratio early-age	-1.7	-1.4	0.1	-1.1	-0.4	-4.5
Cohort effect	0.2	-1.1	-2.7	-1.6	1.7	-3.5
Benefit ratio effect	0.4	-1.2	-0.8	-0.4	-0.1	-2.1
Labour market effect	0.2	-0.1	-0.2	-0.2	0.1	-0.1
Employment ratio effect	0.2	0.0	-0.1	-0.2	0.1	-0.1
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0
Career shift effect	0.0	-0.1	0.0	0.0	0.0	0.0
Residual	-0.1	-0.1	-0.1	-0.1	0.0	-0.4

 * Subcomponents of the coverage ratio effect do not add up necessarily.

Source: European Commission, EPC.

Over the projection horizon 2022-2070, the public pension expenditure is projected to increase by 0.1 p.p. of GDP (Table 8).

---

[4] For the disaggregation based on the number of *pensions*, see Table A3 in the methodological annex.

The main driving force behind the increase is the unfavorable development of the **dependency ratio**, which is projected to contribute by 5.1 p.p. of GDP reflecting the ageing of Bulgarian population.

The **coverage ratio** will contribute by -2.4 p.p. of GDP due to the increase of the required length of service and of the statutory retirement age.

The **benefit ratio** will also have a mitigating effect of -2.1 p.p. due to the fact that the indexation rule leads to lower percentage increase of pensions than the projected wage growth. Another reason is that the generations born after 1959, for whom a part of the pension contribution is transferred to the second pillar, will receive proportionally reduced pensions from the state/public pension system.

The **labour market developments** have a small negative effect due to projected decrease in the employment rates and in the participation rates in the first half of the projected period.

Table 9 shows the evolution of **benefit ratio (BR)** and **replacement rate at retirement (RR)** over time. The benefit ratio is the ratio of the average pension in payment to the economy–wide average wage, whereas the replacement rate at retirement is calculated as the ratio of the average newly granted pension to the average gross wage at the age of retirement. According to the statistical data available in the National Social Security Institute, the average gross wage at the age of retirement is about 8.0% lower than the economy–wide average wage.

The political decision made in 2022 to increase the accrual rate from 1.2 to 1.35 plays an important role in explaining the future changes in the benefit ratio and the replacement rate at retirement. While in the previous projection (2021 Ageing Report) it was assumed that the accrual rate should be fixed at 1.2, an amendment in the pension legislation adopted in 2022 stipulates that the accrual rate to be used in the pension formula should be fixed at 1.35 and it remains unchanged over the projection period.

TABLE 9 – BENEFIT RATIO (BR), REPLACEMENT RATE AT RETIREMENT (RR) AND COVERAGE BY PENSION SCHEME (IN %)

	2022	2030	2040	2050	2060	2070	change 2022-2070 (pps)
Public scheme (BR)	31%	32%	28%	26%	25%	25%	-7%
Coverage	100%	100%	100%	100%	100%	100%	0%
Public scheme: old-age earnings related (BR)	33%	37%	32%	29%	27%	27%	-7%
Public scheme: old-age earnings related (RR)	42%	36%	33%	31%	30%	30%	-12%
Coverage	74%	67%	67%	71%	74%	74%	0%
Private occupational scheme (BR)	:	:	:	:	:	:	:
Private occupational scheme (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Private individual schemes (BR)	:	:	:	:	:	:	:
Private individual schemes (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Total benefit ratio	31%	32%	28%	26%	25%	25%	-7%
Total replacement rate (earnings-related benefits)	42%	36%	33%	31%	30%	30%	-12%

Coverage of each pension scheme is calculated as a ratio of the number of pensioners within the scheme and the total number of pensioners in the country. In case data on pensioners are not available, the calculation is based on the number of pensions.

Source: European Commission, EPC.

The benefit ratio both of total and for old-age pensions increases in the beginning of the period and shows a constantly decreasing trend after 2026 as the drop by the end of the projection period is around 7 p.p. The decreasing trend is a result of the indexation rule (50% inflation + 50% of wage growth). Another reason for the observed decline is that the pensions from the first pillar of persons born after 1959 who are insured also in the second pillar should be reduced in compliance with the percentage of the pension contribution rate, which as of 2002 was transferred to the second pillar pension schemes.

The replacement rate at retirement, decreases about 12 p.p. over the projection period, from 42% in 2022 to 30.0% in 2070. As expected, the effect of the reduction that should be applied to the pensions of people insured in the second pillar has a stronger influence on the replacement rate than on the benefit ratio. It will affect all new pensions that will be granted in future years leading to significantly lower replacement rate as the reduction of the first pillar pensions, which is now about 10%, will reach 25% by 2050.

Table 10 presents two important indicators concerning the financial sustainability of the public pension system – **the Pension System Dependency Ratio** (the ratio of pensioners to employment) and **the Old-age Dependency Ratio** (the ratio of people aged 65+ to working age population). The total number of pensioners shows a declining trend over the projection period reflecting the demographic developments and the tightened eligibility rules. The number of employed persons also decreases over the projection period following the trend in working age population. Looking at the ratio between the number of pensioners and employment representing Pension System Dependency Ratio, it can be seen that the ratio gradually increases due to the ageing of the Bulgarian population, reaching 82 pensioners per 100 employed persons in 2060. A certain decrease in this ratio is observed over the last decade as a result of lower levels of the Old-age Dependency Ratio, as projected by Eurostat.

The ratio between the number of people aged 65+ and working age population (Old-age Dependency Ratio) increases, therefore reflecting the ageing process of the Bulgarian population. Starting from 37.0% in 2022 it almost doubles by 2060 going beyond the level of 66.0% which means 66 people aged 65+ per 100 people at working age. The improvement in this ratio at the end of projection period is due to the assumption for higher positive net migration leading to more people at working age.

TABLE 10 – SYSTEM DEPENDENCY RATIO AND OLD-AGE DEPENDENCY RATIO

	2022	2030	2040	2050	2060	2070	change 2022-2070
Number of pensioners (thousand) (I)	2037	1925	1816	1788	1798	1739	-298
Employment (thousand) (II)	3184	2906	2638	2374	2201	2149	-1035
Pension system dependency ratio (SDR) (I)/(II)	64%	66%	69%	75%	82%	81%	17%
Number of people aged 65+ (thousand) (III)	1488	1519	1628	1767	1801	1633	145
Working-age population 20-64 (thousand) (IV)	4063	3781	3411	3015	2749	2710	-1353
Old-age dependency ratio (OADR) (III)/(IV)	37%	40%	48%	59%	66%	60%	24%
System efficiency (SDR/OADR)	1.7	1.6	1.4	1.3	1.2	1.3	-0.4

Source: European Commission, EPC.

In order to further investigate the behaviour of the coverage ratio and, additionally, the consistency between the labour force, demographic assumptions and pension expenditure projections, the number of pensioners by age group is compared to the inactive population in the same age group and the total population in the age group (Table 11).

The total number of pensioners by age groups is divided by inactive population in the same groups and by total population by age groups. The younger age groups (up to age 64) of the population are mostly affected by the tightened eligibility conditions and the increasing of statutory retirement age, which explains the observed decreasing trends in these groups in both tables.

The reason for the higher than 100% ratios in the begging of the period is that figures include working pensioners (about 17% of Bulgarian pensioners work and acquire additional pension rights, appearing at the same time as employed persons and thus decreasing the size of inactive population), as well as pensioners living outside the country.

Afterwards the ratio of pensioners to inactive and to population decrease below 100%. Compared to the 2021 Ageing Report the ratios are lower now. The main reasons for that are: 1) Eurostat projects higher number people in the population over the whole projection period and in all age groups. Respectively CSM projects higher number of inactive. 2) At the same time number of pensioners decreases rapidly in the first half because of the higher mortality and this has an influence on their number over the whole period.

The same analysis is done with a focus on women (Table 12), where the results are similar for the ratio of female pensioners to inactive population and the ratio of female pensioners to total population by age groups.

TABLE 11 – PUBLIC PENSIONERS TO (INACTIVE) POPULATION BY AGE GROUP (%)

pensioners / inactive population	2022	2030	2040	2050	2060	2070
Age group -54	9.5	10.8	9.0	6.9	6.5	6.0
Age group 55-59	119.5	85.3	78.6	81.6	86.1	87.1
Age group 60-64	138.1	85.4	84.8	84.2	87.6	88.7
Age group 65-69	114.5	83.2	81.6	83.6	86.6	92.7
Age group 70-74	109.1	103.8	87.6	87.0	92.4	96.7
Age group 75+	103.7	109.5	101.0	90.6	91.6	96.3

pensioners / total population	2022	2030	2040	2050	2060	2070
Age group -54	4.0	4.6	3.8	3.0	2.8	2.6
Age group 55-59	21.9	17.7	15.0	14.6	13.8	13.7
Age group 60-64	54.5	41.1	36.7	34.5	33.9	33.1
Age group 65-69	94.5	70.8	68.4	69.4	71.8	75.9
Age group 70-74	104.3	98.9	84.5	83.6	88.6	92.5
Age group 75+	103.7	109.5	101.0	90.6	91.6	96.3

Source: European Commission, EPC.

TABLE 12 – FEMALE PENSIONERS TO (INACTIVE) POPULATION BY AGE GROUP (%)

female pensioners / inactive population	2022	2030	2040	2050	2060	2070
Age group -54	8.7	7.2	5.5	4.5	4.3	4.1
Age group 55-59	103.0	85.6	72.1	68.9	73.7	74.1
Age group 60-64	135.3	87.5	93.7	90.6	92.6	95.0
Age group 65-69	111.8	79.4	83.5	84.8	88.8	99.9
Age group 70-74	108.0	103.2	87.5	87.5	93.3	98.3
Age group 75+	103.8	107.7	98.0	88.9	91.5	96.2

female pensioners / total population	2022	2030	2040	2050	2060	2070
Age group -54	3.9	3.3	2.5	2.1	2.0	1.9
Age group 55-59	20.4	19.4	15.2	14.1	13.6	13.5
Age group 60-64	63.9	45.4	41.9	37.8	36.9	36.7
Age group 65-69	97.7	70.1	72.3	72.5	76.1	84.6
Age group 70-74	104.7	99.4	85.0	84.7	90.1	94.7
Age group 75+	103.8	107.7	98.0	88.9	91.5	96.2

Source: European Commission, EPC.

To assess the consistency of the pension projections, Table 13 provides information on new old-age pension expenditure, the number of new pensions and the main parameters concerning the calculation of the new pensions.

Two main differences can be highlighted between men and women, and they concern, respectively, the average contributory period and the monthly average pensionable earnings of both genders. Male pensioners have a higher average contributory period and higher average pensionable earnings, which result in higher pension amounts compared to female pensioners. The reasons could be found in legislation – the required length of service for men is 3 years higher than for women. However, the values of this indicator slightly decrease after 2040 for both genders due to the fact that the necessary requirements to qualify for retirement (40 years for men and 37 years for women) will be difficult to be reached. Consequently, fewer people with full periods of service will be able to retire at the statutory retirement age. This will force them to postpone their retirement until 67 years of age, when the legislation provides for retirement with the completion of at least 15 years of contributions.

The ratio of the monthly average pensionable earnings to economy-wide average wage decreases over time as a result of the legislated reduction of pensionable earnings which are taken into account when calculating the pension benefits for people contributing to the second pillar (born after 1959). The reduction factor is equal to the ratio of second pillar contribution rate to the total pension contribution. According to the current legislation, for all people with full contribution period in the second pillar who retire after 2050, about 75% of the actual pensionable earnings will be considered for pension calculation.

TOTAL	2022	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	138	217	326	456	580	791
I. Number of new pensions (1000)	56.8	60.5	61.6	58.9	51.6	50.5
II. Average contributory period (years)	35.7	37.0	37.4	37.1	36.8	36.4
III. Average accrual rate (%)	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
IV. Monthly average pensionable earnings (1000 EUR)	0.8	1.1	1.6	2.4	3.5	4.9
V. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VI. Average number of months paid the first year	6.5	6.5	6.5	6.5	6.5	6.5
Monthly average pensionable earnings / monthly economy-wide average wage	0.7	0.6	0.6	0.6	0.6	0.6

MEN	2022	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	66	105	172	244	309	422
I. Number of new pensions (1000)	24.8	26.3	28.9	28.3	24.8	24.4
II. Average contributory period (years)	36.4	38.0	38.9	38.6	38.3	37.8
III. Average accrual rate (%)	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
IV. Monthly average pensionable earnings (1000 EUR)	0.8	1.2	1.7	2.5	3.7	5.2
V. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VI. Average number of months paid the first year	6.5	6.5	6.5	6.5	6.5	6.5
Monthly average pensionable earnings / monthly economy-wide average wage	0.8	0.7	0.6	0.6	0.6	0.6

WOMEN	2022	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	72	113	154	212	270	369
I. Number of new pensions (1000)	32.0	34.2	32.7	30.6	26.8	26.2
II. Average contributory period (years)	35.0	36.1	35.8	35.5	35.2	34.9
III. Average accrual rate (%)	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
IV. Monthly average pensionable earnings (1000 EUR)	0.7	1.0	1.5	2.2	3.3	4.6
V. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VI. Average number of months paid the first year	6.5	6.5	6.5	6.5	6.5	6.5
Monthly average pensionable earnings / monthly economy-wide average wage	0.7	0.6	0.5	0.5	0.5	0.5

*New pension expenditure equals the product of I, II, III, IV, V & VI.

Source: European Commission, EPC.

3.4. Financing of the pension system

Pension contributions to the public pension system in Bulgaria are shared between employer and employee. The total contribution rate for pension is 19.8% of the gross insurable income. For persons born after 1959, the contribution rate for first pillar is 14.8% and 5% are transferred to the second pillar. Employer pays 56% of the total contribution and the remaining 44% are on behalf of employee. The contribution rate for military and police officers is 60.8% (55.8% respectively) and it is entirely covered by the State. In addition, the State has the obligation to cover any financial gaps and deficits of the public pension system.

TABLE 14 – FINANCING OF THE PUBLIC PENSION SYSTEM

	Public employees	Private employees	Self-employed
Contribution base	Earnings up to 3400 BGN	Earnings up to 3400 BGN	Declared covered earnings
Contribution rate/contribution			
Employer	8.22% w hen born after 1959; 11.02% w hen born before 1960	8.22% w hen born after 1959; 11.02% w hen born before 1960	Born before 1960: 19.8% of declared covered earnings in the preceding year; born after 1959: 14.8% of declared covered earnings.
Employee	6.58% w hen born after 1959; 8.78% w hen born before 1960	6.58% w hen born after 1959; 8.78% w hen born before 1960	
State*	-	-	-
Other revenues*	State commitment for covering the deficit on an annual basis.	State commitment for covering the deficit on an annual basis.	State commitment for covering the deficit on an annual basis.
Maximum contribution	3400 BGN	3400 BGN	3400 BGN
Minimum contribution	Minimum w age	Minimum w age	Minimum w age

*Only legislated contributions are reported.

Source: NSSI.

The projected revenue from contributions is calculated using a contribution rate, which is weighted average of the rates for people born before 1960 and after 1959. The contribution for work injury and professional disease, which is between 0.4% and 1.1%, is also included in the calculation, as all pensions for disability due to work injury and professional disease are included in the projection.

In 2022, the number of contributors in the Bulgarian pension system was around 2.9 million people and represented 93.2% of employment (Table 15). Starting from this level, the number of contributors is projected as a progressively increasing proportion of the employment, assuming that the share of informal employment will be gradually reduced. Although this assumption could be considered as very optimistic, the results show about 26% decrease in number of contributors and about 30% decrease in employment over the projection period, as the main reason for this is the declining population in working age.

TABLE 15 – REVENUE FROM CONTRIBUTIONS AND NUMBER OF CONTRIBUTORS IN THE PUBLIC SCHEME

	2022	2030	2040	2050	2060	2070	change 2022-2070 (pps)
Public pension contributions (%GDP)	4.7	4.8	5.1	5.1	5.1	5.1	0.4
Employer contributions	2.8	2.9	3.1	3.1	3.1	3.1	0.3
Employee contributions	1.9	1.9	2.0	2.1	2.1	2.1	0.2
State contribution*	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other revenues*	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number of contributors (I) (1000)	2875	2747	2628	2374	2201	2149	-726
Employment (II) (1000)	3184	2906	2638	2374	2201	2149	-1035
(I) / (II)	0.9	0.9	1.0	1.0	1.0	1.0	0.1

*Includes only legislated contributions.

Source: European Commission, EPC.

3.5. Sensitivity analysis

The sensitivity tests allow for a quantitative assessment of the sensitivity of the public pension expenditures to economic and demographic changes. They provide useful information about how changes in the key underlying assumptions influence the pension projection results. Table 16 presents the different scenarios in terms of deviation from the baseline.

Public pension expenditure	2022	2030	2040	2050	2060	2070	change 2022-2070 (pps)
Baseline (%GDP)	9.5	10.2	9.4	9.4	9.7	9.6	0.1
Higher life expectancy at birth (+2y)	0.0	0.1	0.2	0.3	0.4	0.6	0.6
Higher migration (+33%)	0.0	-0.1	-0.2	-0.3	-0.4	-0.4	-0.4
Lower migration (-33%)	0.0	0.1	0.2	0.3	0.4	0.5	0.5
Lower fertility (-20%)	0.0	0.0	0.0	0.1	0.5	0.9	0.9
Higher inflation scenario (2% by 2052)	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
Higher employment rate of older workers (+10 pps)	0.0	-0.4	-0.6	-0.6	-0.5	-0.4	-0.4
Higher productivity (TFP converges to 1%)	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1
Lower productivity (TFP converges to 0.6%)	0.0	0.0	0.1	0.2	0.2	0.3	0.3
Policy scenario: link retirement age to longevity	0.0	0.0	-0.1	-0.5	-0.6	-0.9	-0.9
Policy scenario: constant retirement age	0.0	0.2	0.4	0.4	0.2	0.3	0.3
Policy scenario: constant benefit ratio	0.0	0.0	0.0	0.5	1.1	1.3	1.3

Total pension expenditure	2022	2030	2040	2050	2060	2070	change 2022-2070 (pps)
Baseline (%GDP)	9.5	10.2	9.4	9.4	9.7	9.6	0.1
Higher life expectancy at birth (+2y)	0.0	0.1	0.2	0.3	0.4	0.6	0.6
Higher migration (+33%)	0.0	-0.1	-0.2	-0.3	-0.4	-0.4	-0.4
Lower migration (-33%)	0.0	0.1	0.2	0.3	0.4	0.5	0.5
Lower fertility (-20%)	0.0	0.0	0.0	0.1	0.5	0.9	0.9
Higher inflation scenario (2% by 2052)	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
Higher employment rate of older workers (+10 pps)	0.0	-0.4	-0.6	-0.6	-0.5	-0.4	-0.4
Higher productivity (TFP converges to 1%)	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1
Lower productivity (TFP converges to 0.6%)	0.0	0.0	0.1	0.2	0.2	0.3	0.3
Policy scenario: link retirement age to longevity	0.0	0.0	-0.1	-0.5	-0.6	-0.9	-0.9
Policy scenario: constant retirement age	0.0	0.2	0.4	0.4	0.2	0.3	0.3
Policy scenario: constant benefit ratio	0.0	0.0	0.0	0.5	1.1	1.3	1.3

Source: European Commission, EPC.

- **Higher life expectancy at birth** in comparison with the baseline scenario implies higher pension expenditures due to the higher number of pensioners. The results show a gradual increase in pension expenditure amounting to 0.6 p.p. higher ratio of pension expenditures to GDP in 2070 in comparison with the baseline scenario.

- **Higher/ Lower migration** mainly affects the population of working age rather than the population at retirement age, and the effect is more evident at the end of the period where the positive migration flow is higher/lower and the higher migration flow lowers the pensions to GDP ratio by 0.4 p.p. In the case of lower migration, pensions to GDP ratio is by 0.5 p.p. higher than in the base case.

- **Lower fertility** has one of the most significant effects on pension expenditure due to a lower number of working-age population and lower GDP compared to the base case. Under the assumption of 20% lower fertility than in the baseline scenario at the end of the period, the results show a 0.9 p.p. higher ratio of pension expenditure to GDP in 2070 compared to the baseline scenario.

- **Higher inflation** has negligible effect on the pension expenditure to GDP ratio. It decreases by 0,1 p.p. in 2030, even though higher inflation rates lead to higher

---

[5] For more information on the design of the sensitivity scenarios, see Chapter 5 of Part 1 in European Commission and EPC (2023), '*The 2024 Ageing Report: Underlying assumptions and projection methodologies*.' European Economy, Institutional Paper 257.

indexation and higher pension benefits. The effect of lower spending is a result of the higher increase of nominal GDP and a relatively smaller increase in the pension expenditure due to the higher inflation. Thus, expenditure as a share of GDP declines despite its higher nominal value.

- **Higher employment rate** of older workers has a favourable effect on the pension system. It implies higher GDP in the denominator which lowers the pension expenditure to GDP ratio by 0.6 p.p. in 2040-2050. At the end of the period this effect wears off because by staying longer in the labour market, people acquire more pension rights and higher pensions. The cumulative effect amounts to 0.4 p.p. lower ratio of pension expenditure to GDP in 2070 compared to the baseline scenario.

- **Higher TFP growth** implies higher GDP and higher contribution revenues in the public pension scheme. Pension expenditure is also higher than in the baseline scenario due to higher amounts of the average wages leading to higher percentages of the annual indexation as well as to higher amounts of the newly granted pensions. However, the ratio of pension expenditure to GDP is lower than in baseline scenario due to the indexation rule - the rise of pensions lags behind the rise of incomes. In this scenario, the lag is more pronounced than in the baseline scenario and the pension-to-GDP ratio is approximately 0.1 p.p. lower at the end of the period compared to the baseline scenario.

- **Lower TFP growth** has the opposite effect on the public pension scheme - lower GDP and lower revenues from contributions. Pension expenditure is also lower than in the baseline scenario. The lag of the pension amounts from wages is lower compared to the baseline scenario and this results in approximately a 0.3 p.p. higher pension expenditure as a percent of GDP at the end of the period.

- **Policy scenario: linking retirement age to change in life expectancy** leads to 0.9 p.p. lower ratio of pension expenditure to GDP in 2070 compared to the baseline scenario.

- **Policy scenario: constant retirement age** assumes that the main eligibility requirements remain unchanged from 2022 until the end of the projection period, thus assessing the risk underlying pension reforms reversals. The unfavourable effect on the pension system results from the higher number of pensioners, and it would raise the pension expenditure-to-GDP ratio by 0.3 p.p., compared to the base case.

- **Policy scenario: constant benefit ratio** assumes that in case the benefit ratio decreases by more than 10% compared to the base year, it should be then kept constant at this 10% lower point for the rest of the projection period. In 2022, the old-age earnings-related benefit ratio was 33.4%. By 2044 it decreases to 30.3% (i.e. by 9.3 p.p.) in the base case and in 2045 it is 29.9% or 10.5% lower than in the base year. In this scenario from 2045 until the end of the projection period the benefit ratio is kept constant at the level of around 30.0% by having annual pension indexation equal to the average wage growth. The cost of preventing pensions from significant deterioration of adequacy leads to 1.3 p.p. higher pension expenditure to GDP ratio by 2070.

3.6. Changes in comparison with previous Ageing Report projections

Differences between the new projection and 2021 Ageing Report projection results are due to:

- Change in assumptions - demographic, macroeconomic and labour market assumptions;

- Policy related change concerning the measures for improving pensions adequacy implemented in the base year 2022 as described in Section 1.2.

Table 17 shows the overall change in public pension expenditure to GDP under the last six projection exercises.

TABLE 17 – DISAGGREGATION OF THE CHANGE IN THE PUBLIC PENSION EXPENDITURE-TO-GDP RATIO IN CONSECUTIVE AGEING REPORTS (PPS OF GDP)

	Public pension expenditure	Dependency ratio effect	Coverage ratio effect	Benefit ratio effect	Labour market effect	Residual (incl. interaction effect)
2006 Ageing Report (2004-2050)	:	:	:	:	:	:
2009 Ageing Report (2007-2060)	**3.0**	9.1	-3.0	-1.8	-0.5	-0.8
2012 Ageing Report (2010-2060)	**1.1**	8.8	-3.9	-2.1	-0.8	-0.8
2015 Ageing Report (2013-2060)	**-0.4**	6.7	-3.1	-2.5	-1.2	-0.3
2018 Ageing Report (2016-2070)	**1.4**	6.0	-3.0	-1.1	-0.2	-0.4
2021 Ageing Report (2019-2070)	**1.4**	4.8	-2.1	-1.1	0.1	-0.3
2024 Ageing Report (2022-2070)	**0.1**	5.1	-2.4	-2.1	-0.1	-0.4

- The disaggregation for 2006/2009/2012 is on the basis of the number of pensions; for the other vintages it is on the basis of pensioners.

- The projection horizon has been extended over consecutive Ageing Reports, limiting comparability over time.

Source: European Commission, EPC.

Alike the previous projection rounds, the dependency ratio is the main driving force for the increase in pension expenditure. Compared to the previous projection, the coverage ratio and benefit ratio in new projection have a considerable downward effect on pension expenditure. On the other hand, the labour market effect is opposite compared to the previous projection round, mitigating expenditure rather than increasing.

Table 18 compares the projections of the 2021 Ageing Report with actual public pension expenditure between 2019 (the previous base year) and 2022 (the new base year). The differences in reported data and pension expenditures projected in previous round are attribute to changes in assumptions, mainly in GDP values. Significantly increasing pension expenditure to GDP ratio in 2021 and 2022 expenditure in comparison with the 2021 Ageing report are due to policy-related changes – inclusion of COVID supplements and increasing pension benefits.

TABLE 18 – DISAGGREGATION OF THE DIFFERENCE BETWEEN THE 2021 PROJECTIONS AND ACTUAL PUBLIC PENSION EXPENDITURE IN 2019-2022 (%GDP)

	2019	2020	2021	2022
Ageing Report 2021 projections (%GDP)	8.3	9.6	9.1	8.9
Assumptions (pps of GDP)	-0.1	-0.8	-1.1	-1.8
Coverage of projections (pps of GDP)				
Constant policy impact (pps of GDP)				
Policy-related impact (pps of GDP)		0.4	1.6	2.4
Actual public pension expenditure (%GDP)	8.2	9.2	9.6	9.5

Source: NSSI.

Table 19 shows the decomposition of the difference between the new public pension projection and projection included in 2021 Ageing Report. The change in demographic and macroeconomic assumptions leads to lower pension expenditure to GDP ratio in 2070 (-0.2 p.p.). The positive contribution of the policy-related changes is regarding the measures described in Section 1.2. and higher percentages of pension indexations leading to higher pension benefits in the beginning of the period.

TABLE 19 – DISAGGREGATION OF THE DIFFERENCE BETWEEN THE 2021 AND THE NEW PUBLIC PENSION PROJECTIONS (%GDP)

	2022	2030	2040	2050	2060	2070
Ageing Report 2021 projections	8.9	8.5	8.6	9.3	9.8	9.7
Change in assumptions (pps of GDP)	-1.8	-0.9	-0.7	-0.7	-0.5	-0.2
Improvement in the coverage or in the modelling (pps of GDP)						
Change in the interpretation of constant policy (pps of GDP)						
Policy-related changes (pps of GDP)	2.4	2.6	1.5	0.8	0.4	0.1
New projections	9.5	10.2	9.4	9.4	9.7	9.6

Source: NSSI.

4. Description of the pension projection model and the base data

4.1. Institutional context in which the projections are made

The model used for projecting revenues and expenditures of the public pension scheme in Bulgaria is the Pension projection model developed by the Financial, Actuarial and Statistical Branch of the International Labour Organization (ILO). The model was calibrated for the specific needs of the Bulgarian public pension system and adjusted to the country-specific conditions. It is based on historical demographic and pension data and enables the NSSI to make long-term projections and to simulate the impact of changes in all the relevant parameters of the current pension system.

4.2. Data used to run the model

The following statistical and financial data is used in the model:

1) **Demographic data**

   - Population in the base year (by gender and age);

2) **Labour statistics**

   - Labour Force (by gender and age);

   - Employed population (by gender and age);

   - Average wage.

3) **Macroeconomic and financial statistics**

   - GDP (nominal);

   - Rate of inflation (GDP deflator).

4) **Scheme-specific data and information**

   - Number of insured persons (by age and gender) - from NSSI Register of Insured Persons;

   - Average insurable income (by age and gender) - from NSSI Register of Insured Persons;

   - Number of existing pensioners (by type of pension, gender and age) - from NSSI Register "Pensions";

   - Average pension benefit (by type of pension, gender and age) - from NSSI Register "Pensions";

   - Information of legislation – pension formula, contribution rate and eligibility conditions stipulated in the Social Security Code.

The following assumptions are used in the model:

1) **Demographic assumptions (EUROPOP2023)**

- Mortality rates (by gender and age);

- Fertility rates (by age);

- Net-migration (by gender and age).

2) **Labour market assumptions (AWG)**

- Labour Force Participation rates (by gender and age);

- Unemployment rates (by gender and age).

3) **Macroeconomic assumptions (AWG)**

- GDP (real growth);

- Labour Income shares in GDP;

- GDP deflator.

4.3. Reforms incorporated in the model

All legislated reforms described in Section 1.2 were taken into account in pension projections.

4.4. General description of the model(s)

The model is a standard deterministic cohort-based projection model. It has been structured in a modularised form. All model components calculate their respective variables by straightforward deterministic equations. It uses both the Excel spreadsheets and Visual Basic for Application (VBA) capabilities.

The model consists of four components, which are subject to a hierarchical dependency structure:

- *Demographic module*, which is used for population projections – the model projects future population by single ages and sex taking into account the assumed mortality and fertility rates as well as the migration assumptions. The population forecasts match the standard UN methodology for demographic projections;

- *Labour supply module*, which allows for projections of labour supply and labour demand. Labour supply for both men and women is obtained by multiplying population by labour force participation rates for single age groups. Aggregate unemployment results from the multiplication of the assumed unemployment rates by labour force. The difference between labour force and aggregate unemployment is the employment. Employment and unemployment are then distributed among individual age groups in line with the age distribution of the labour force.

- *Economic module*, which is designed for projecting GDP, labour productivity and wage growth, future inflation, etc., including a whole range of variables which have a direct impact on public pension system. Real economic growth rates and GDP deflators are exogenous inputs (assumptions). Thus, nominal and real GDP figures are obtained. Labour productivity per capita

is calculated by dividing real GDP by number of employed people. Total labour income is calculated as a portion of nominal GDP. The sum of wages and salaries are calculated by subtracting the employer contributions from total labour income. Then the national average wage is a sum of wages and salaries divided by the number of employees. Finally, the average income subject to social insurance contributions is projected as a proportion of the average wage.

- *Pension module*, which projects number of pensioners receiving the different types of pensions, average pensions, and revenues and expenditures of the pension system through year-by-year simulations.

From a methodological and programming point of view, the pension module is constructed as an extension of the labour force module. The essential part of the long-term pension estimates is programmed in a Visual Basic for Application Module. The figure provides a visual representation of the main transition processes in the pension model.

FIGURE 3: DEMOGRAPHIC TRANSFORMATION FROM T TO T+1 FOR AGE X AND GENDER S
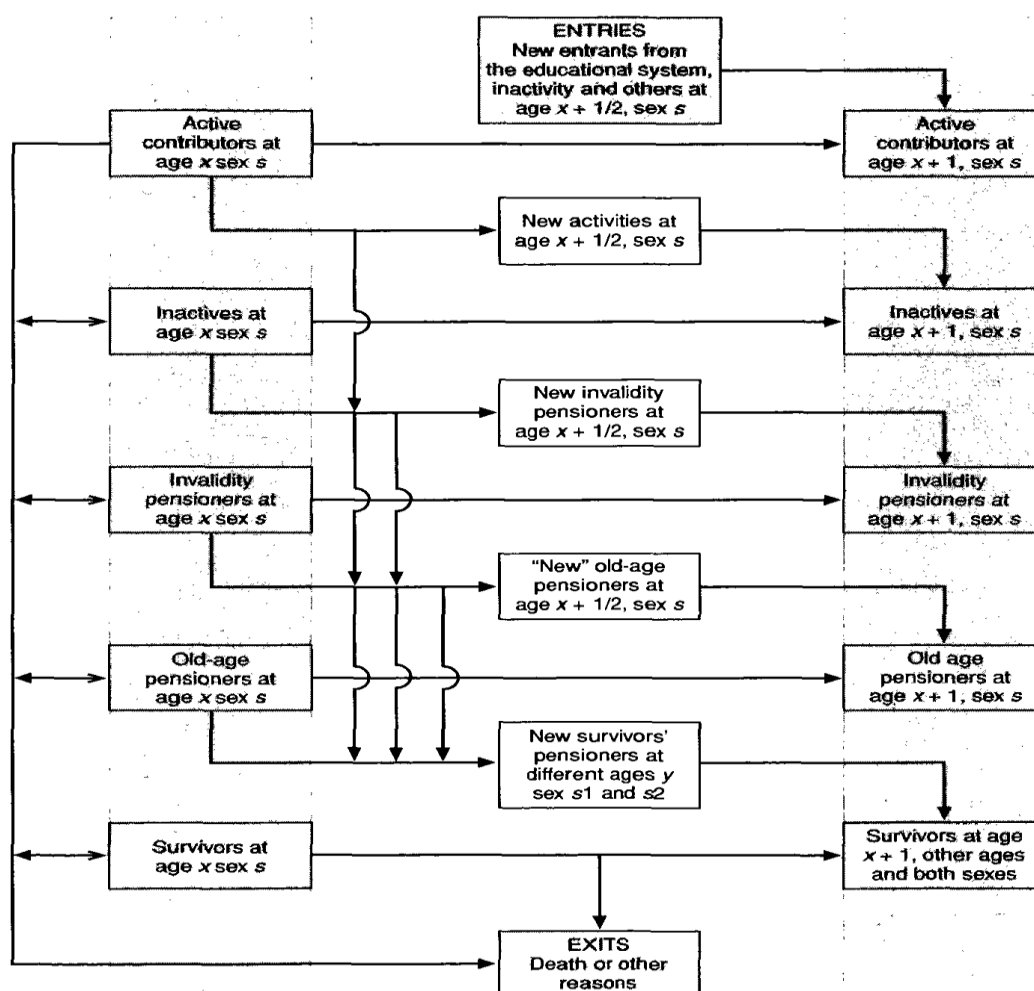
Source: ILO

The model covers all earnings-related pensions (old-age, disability and survivors) provided by the public pension scheme. The supplements paid to the pensions are included in the average pension benefit.

Pensions not related to labour activity, which are currently financed by the State budget, are not incorporated in the model. The projection of these pensions was done separately and included in the projection results.

In general, the model calculates the number of insured persons by single ages and gender by applying insurance participation rates to the respective cohorts of the employed population.

The projection of pensioners is done by ageing the existing pensioners (taking into account mortality rates) and by adding the number of new pensioners. The model first calculates the number of new disability pensions as a proportion of the contributing population using probability coefficients based on historical data. The total number is projected by adding the number of new disability pensioners to the number of surviving disability pensioners.

The method for projecting the number of old-age pensioners is a combination of a stock and flow approach. For pensioners younger than the statutory retirement age, the stock method is used. The numbers are projected by keeping the ratio of the number of pensioners to the total population in a single age constant under the statutory retirement age, which is different for men and women. For old-age pensioners at and over the statutory retirement age, the flow method is used. For each year of the projection period, the number of newly awarded old-age pensioners is estimated by applying the eligibility conditions for pension to all subgroups of population depending on the age, sex and past service.

Survivors' pensions are projected as a proportion of old-age pensioners.

For projecting the number of old-age pensioners the following equations are applied:

For   x < statutory retirement age

$OAP_{t,x,s} = (OAP_{t=0,x,s} / POP_{t=0,x,s})* POP_{t,x,s}$

For x >= statutory retirement age

Number of surviving old-age pensioners:

$OOAP_{t,x,s} = OAP_{t-1,x-1,s} *(1-q_{x-1,s})$

Number of new old-age pensioners:

$NOAP_{t,x,s} = f (MAT1_{t,s} ; eligibility conditions)$

Total number of new old-age pensioners:

$OAP_{t,x,s} = NOAP_{t,x,s} + OOAP_{t,x,s}$

For projecting the number of disability and survivors' pensioners the following equations are applied:

$$IP_{t,x,s} = IP_{t-1,x,s} *(1-q_{x-1,s}) +   ir_{t,x,s} * INS_{t,x,s}$$

$$SP_{t,x,s} = sur_{t,x,s} * OAP_{t,x,s}$$

where

$POP_{t,x,s}$ - Population in t of age x and sex s

$OAP_{t,x,s}$ - Old-age pensioners in t of age x and sex s

$q_{x-1, s}$ - Mortality rate of age x-1 and sex s

$OOAP_{t,x,s}$ - Surviving old-age pensioners in t of age x and sex

$NOAP_{t,x,s,}$ - New old-age pensioners in t of age x and sex s

$MAT1_{t,s}$ - past-service-age matrix in t of sex s

$IP_{t,x,s}$ - Disability pensioners in t of age x and sex s

$ir_{t,x,s}$ - Probability to become disability pensioner in t of age x and sex s

$INS_{tx,s}$ - Insured persons in period t of sex s

$SP_{t,x,s}$ - Survivors' pensioners in t of age x and sex s

$sur_{t,x,s}$ - Survivors' pensioners ratio in t of age x and sex s

$OAP_{t,x,s}$ - Old-age pensioners in t of age x and sex s

The financial projections of the model consist of calculation of the average insurable income by type of insured persons and the calculation of average pension benefit in each category of pensions – old-age, disability and survivors. When these averages have been projected, the total amounts of revenues and expenditures can be calculated.

Average insurable earnings are a product of the average economy-wide wage multiplied by factor, which accounts for the difference normally observed between average wage and statistically reported average insurable earnings.

The amount of newly granted pensions is calculated by applying the pension formula to each age and gender cohort of new pensioners. To apply the individual formula to cohort-specific (average) reference wages and cohort-specific (average) service, the pension model uses an established distribution of the duration of length of service and assumes three different levels of reference earnings (as a function of the observed wage base). These two parameters are then combined in a way, which reflects the observed correlation between income levels and duration of past service. Past service distributions are built up by a flow procedure. First an initial matrix of past service distribution for each gender and each individual age cohort is established. Then, for each year of the projection period, a certain credit is added to each past service data. For each cohort belonging to a certain cell in the past-service-reference-earnings (PSRE) matrix, this credit depends on the accrual rate of the pension formula and the measured average annual density of contribution payment, which is the proportion of the year during which the cohort paid contributions. The bi-variant distribution described by the PSRE matrix is kept constant throughout the projection period, whereas the average number of past service years and the average reference wage is changing over time.

The average amount of newly awarded disability pensions is considered equal to the average new old-age pension. Survivors' pensions are calculated as 50 per cent of pension entitlements of a deceased active insured person or of the old-age pension of a deceased pensioner.

Pensions in payment are adjusted over time, according to the indexation rules.

The following equations are applied, when calculating the average pensions:

For pensions granted

$$OA\ t,x,s = OA\ t\text{-}1,x\text{-}1,s * [1 + \text{average annual increase in t} / 100]$$

$$I\ t,x,s = OA\ t,x,s$$

$$S\ t,x,s = 50\% * OA\ t,x,s$$

The average rate of increase of pensions granted for each year differs from the rate of indexation due to the fact that the annual indexation takes place in July and not in the beginning of the year.

For newly granted old-age pensions

$$NOA\ t,x,s = f\ (MAT2\ t,s;\ \text{pension formula})$$

Where

OA t,x,s   - Average old-age pension in t of age x and sex s

I t,x,s   - Disability pension in t of age x and sex s

S t,x,s   - Survivors' pension in t of age x and sex s

NOA t,x,s   - New old-age pension in t of age x and sex s

MAT2 t,s   - Past-service-reference-earnings matrix

After projecting the number of pensioners and pension benefit levels for each year of the projection period, the model calculates total pensions expenditure by multiplying the number of pensioners by the average benefit. Administrative expenditure is calculated as a percentage of total benefit expenditures.

$$TEt = \left(\sum_{t,x,s}(OAPt,x,s * OAt,x,s) + \sum_{t,x,s}(IPt,x,s * It,x,s) + \sum_{t,s}(SPt,s * St,s) \right) + AEt + OEt$$

Where:

TEt   - Total expenditure in t

OAPt,x,s   - Old-age pensioner in t of age x and sex s

OA t,x,s   - Average old-age pension in t of age x and sex s

IP t,x,s   - Disability pensioners in t of age x and sex s

I t,x,,s   - Disability pension in t of age x and sex s

SPt,x,s   - Survivors' pensioner in t of age x and sex s

S t,x,,s   - Survivors' pension in t of age x and sex s

AEt   - Administrative expense in year t

OEt   - Other expenditure in t

4.5. Other features of the projection model

The present version of the ILO Pension model has been developed to support actuarial analyses of the mandatory public pension scheme. It helps to provide the quantitative basis for making policy decisions. Based on a detailed analysis of the latest demographic and financial situation the model enables:

- Projections of future benefit expenditures and contributions revenues through year-by year simulations;

- Determination of the future contribution rates under alternative financing methods;

- Assess the financial impact of future modifications to the pension system (planned reforms).

The results of the model are also used for calculating nominal and real growth of the pension benefits as well as the average replacement rate. The average replacement rate of new retirees is calculated in the model as the average amount of newly awarded pension is divided by average gross insurable income for the respective year.

Accounting for other income and using the contribution rate, the annual fiscal balance of the pension scheme throughout the projection period, the PAYG cost rate as well as the development of any reserves can be calculated.

A special feature of the model is that it is not suitable for budgeting procedures in private social security schemes or in any other institutions. Rather, it was specifically created for the needs of the State Social Security System in Bulgaria.

Methodological annex

Economy-wide average wage at retirement

The average gross wage at retirement is calculated on the basis of the statistical data on insured persons distributed by gender and single ages available in the NSSI. In 2022 the ratio between the average insurable income at the effective age of retirement and total average insurable income for the country is 0.92. The same ratio was applied to the economy-wide average wage in order to project the values of average gross wage at retirement.

TABLE A1 – ECONOMY-WIDE AVERAGE WAGE AT RETIREMENT (1000 EUR)

	2022	2030	2040	2050	2060	2070
Economy-wide average gross wage at retirement	11.6	19.4	30.6	46.9	69.4	97.8
Economy-wide average gross wage	12.6	21.1	33.2	51.0	75.4	106.3

Source: European Commission, EPC.

Pensioners vs pensions

The model projects the number of earnings-related pensioners and does not project number of pensions. The number of earnings-related pensions is projected by applying the statistically observed ratio of pensions to pensioners (1.0055) and by keeping it constant over the projection period. For non-earnings-related minimum pensions and for the "Others" pensions the number of pensioners is equal to the number of pensions.

Pension taxation

Pension benefits are not taxed.

Disability pensioners

The number of new disability pensions is calculated as a proportion of the contributing population using probability coefficients based on historical data. The total number is projected by adding the number of new disability pensioners to the number of surviving disability pensioners.

TABLE A2 – DISABILITY RATES BY AGE GROUPS (%)

	2022	2030	2040	2050	2060	2070
Age group -54	0.4	0.2	0.2	0.1	0.2	0.2
Age group 55-59	1.6	0.8	0.6	0.7	0.7	0.7
Age group 60-64	2.5	1.4	1.2	1.2	1.3	1.3
Age group 65-69	3.1	3.9	3.2	3.6	4.0	4.4
Age group 70-74	:	:	:	:	:	:
Age group 75+	:	:	:	:	:	:

Source: NSSI.

Survivors' pensions

Survivor pensions are projected as a share of old-age pensioners.

Non-earnings-related minimum pension

Non-earnings-related minimum pensions are financed by the State budget and are not incorporated in the model. The projection of these pensions was done separately and included in the projection results.

Contributions

Contribution revenue is a result of the number of insured persons, average insurable income and average contribution rate. All calculations are done by type of insured persons.

In general, the model calculates the number of insured persons by single ages and gender by applying insurance participation rates to the respective cohorts of the employed population.

Average insurable income is a result of the average economy-wide wage multiplied by factor, which accounts for the difference, normally observed between the average wage and statistically reported average insurable earnings.

Alternative pension spending disaggregation

Table A3 is similar to Table 8 but provides a disaggregation of the change in pension expenditure based on the number of pensions as compared to the number of pensioners in Table 8.

TABLE A3 – FACTORS BEHIND THE CHANGE IN PUBLIC PENSION EXPENDITURE BETWEEN 2022 AND 2070 (PPS OF GDP) – PENSIONS

	2022-30	2030-40	2040-50	2050-60	2060-70	2022-70
Public pensions to GDP	0.8	-0.9	0.1	0.3	-0.2	0.1
Dependency ratio effect	1.0	1.8	2.0	1.1	-0.8	5.1
Coverage ratio effect*	-0.7	-1.2	-0.9	-0.1	0.6	-2.3
Coverage ratio old-age	-0.5	-0.9	-0.4	0.4	0.5	-1.0
Coverage ratio early-age	-1.4	-1.4	0.1	-1.1	-0.4	-4.2
Cohort effect	0.1	-1.1	-2.7	-1.6	1.7	-3.5
Benefit ratio effect	-0.4	-1.2	-0.8	-0.4	-0.1	-2.9
Labour market effect	0.2	-0.1	-0.2	-0.2	0.1	-0.1
Employment ratio effect	0.1	0.0	-0.1	-0.2	0.1	-0.1
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0
Career shift effect	0.0	-0.1	0.0	0.0	0.0	0.0
Residual	0.7	-0.1	-0.1	-0.1	0.0	0.4

* Subcomponents of the coverage ratio effect do not add up necessarily.

Source: European Commission, EPC.

Annexes

Coverage and specification of pension schemes in Bulgaria	
Schemes covered in the projections	**Schemes <u>not</u> covered**
Public pensions: old-age and early pensions Earnings-related old-age pensions (including farmers and military officials). *Public pensions: other* Earnings-related disability pensions due to general disease (including farmers and military officials). Earnings-related disability pensions due to work injury and professional disease (including farmers and military officials). Earnings-related survivors' pensions according to relationship with the deceased – widows, children, parents. Pensions not related to employment – social pensions, special merits pensions, pensions by Decree.	*Supplementary mandatory pension schemes* Supplementary life-long old-age pensions - Universal Pension Funds (UPF). Early retirement pensions for a limited period of time for people working in hazardous conditions - Professional Pension Funds (PPF). *Supplementary voluntary pension schemes – individual private and occupational pensions.* *Teachers' Pension Fund.*