REPUBLIC OF BULGARIA

Country fiche on pension projections

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Contents

1 Overview of the pension system

1.1 Description

The pension system in Bulgaria has undergone substantial structural reforms since the late 1990s. The traditional pay-as-you-go system was transformed into a three-pillar system through the introduction of compulsory and voluntary fully funded pillars. Other aspects of the pension reform include the separation of the State social insurance budget from the State budget, 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 public insurance system (first pillar), and to allow the Bulgarian population to receive 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.

Since 2000 **the old-age pension** is calculated according to the following formula:

Old-Age Pension = AR x IP x IC x AMII,

where

- *AR:* Accrual rate - currently 1.2 percent per insurance year. For periods of postponed retirement the accrual rate is 4 percent.
- IP: Insurance period, consisting of the contributory and non-contributory periods for which contributions have been paid by the State.

- IC: Individual coefficient, determined on the basis of the ratio between the insurable income of the person and the average insurable income for the country in the periods of insurance. The reference period for calculation of the individual coefficient includes the years of service after 1999.
- AMII: National average monthly insurable income in the last 12 months preceding retirement.

Minimum income support for the elderly is provided through the minimum old-age pension and the social pension for old age. The minimum old-age pension amount is set every year by the Public Social Insurance Budget Law. As from July 1, 2020, its amount is set at BGN 250.

Members of elderly households having income lower than the minimum income guarantee for the last 12 months are entitled to the social pension for old age. This pension is means-tested and is financed by the State budget. Its amount is determined by the Council of Ministers.

The maximum pension is fixed at 40 percent of the maximum insurable income. As from July 1, 2019, its amount is set at BGN 1200 (40% of 3000 BGN).

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 a student, no limit if 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.

The annual **pension indexation** is carried out in the middle of the year according to a formula that comprises 50% of the increase in the consumer price index (CPI) and 50% of the insurance income growth during the previous calendar year. In July 2019 all pensions granted until the end of 2018 were increased by 5.7%. For 2020 the percentage of the pension indexation is 6.7.

Periods in which persons receive social insurance benefits for temporary incapacity, maternity and unemployment are credited as fully-insured periods.

Other non-contributory periods, such as military service and child-rearing (for children under two years of age) are also regarded as insurance periods. Upon retirement, the contributions due for these periods are transferred from the State budget to the Public Social Security Budget.

1.1.2 Supplementary mandatory pension schemes (II pillar)

The second pillar is a supplementary mandatory pension insurance system. It is based on individual retirement savings accounts managed by private pension insurance companies. The second pillar is comprised of two types of pension funds: Universal Pension Funds and Professional Pension Funds.

The Universal Pension Funds (UPF) of Supplementary Mandatory pension insurance (second pillar) cover all persons insured through the public pension insurance born after 31 December 1959 and provide supplementary life-long old-age pensions as well as payments in case of death. They are still in accumulation phase and the first pensions are expected to be paid in 2021. The contribution rate for Universal pension funds is currently 5%. This percentage is deducted from the total pension contribution, which is 19.8%.

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. They can transfer their individual savings managed by private pension funds to the State Pension Fund (first pillar) and to continue their pension insurance in first pillar only.

The Professional Pension Funds (PPF) of Supplementary Mandatory pension insurance (second pillar) are mandatory funds for early retirement intended to cover all persons working at hazardous environment (labour ‘at risk’). The contribution rate for Professional pension funds is currently 12 % for first category of labour and 7% for second category of labour. It is paid entirely by the employer.

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: the Voluntary Pension Funds and the 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 2019 - the base year of pension projection

The contribution rate for pension[1] 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.

For 2019 the **statutory retirement age** is 64 years and 2 months for men and 61 years and 4 months for women. **The required length of service** for pension is 38 years and 8 months for men and 35 years and 8 months for women.

Insured persons who do not meet the qualifying conditions may still be eligible for old-age pension at age 66 and 4 months (both men and women) with the completion of a 15-years insurance period.

Early retirement is possible for persons working under hazardous and unhealthy working conditions or special groups such as teachers, military and police officers.

1.2 Recent pension reforms included in the projections

Between the latest two rounds of projections, no significant changes in pension legislation have been occurred. Most of the pension reform measures, legislated in 2015 and included in the 2018 Ageing Report, continue to be in force, namely:

1. **The contribution rate** for the State Pension Fund was increased by 1 %-point from 17.8% to 18.8% in 2017 and further by 1 %-point to 19.8% in 2018. The contribution rate to the second pillar pension funds remained 5%.
   The above rates are applied to workers in the normal work conditions (the third category) born before 1960. For persons born after 1959, contribution rate for pension was 12.8% in 2016 and it was increased by 1%-point each year until 2018 when it was set at 14.8%.
2. **The statutory retirement age** of men and women is gradually increased and equalized to 65 years by 2037 and thereafter automatically extended in line with the changes in life expectancy (the exact mechanism has not been legislated yet).
3. **The required contribution period** to qualify for retirement of workers in the normal working conditions (third category) is gradually increased by 2 months annually till it reaches 40 years for men and 37 years for women by 2027.
4. **The retirement age in case of shortage of insured length of service** is gradually increased to 67 years by 2023, while the minimum required length of service remains unchanged at 15 years of actual period of service (not including periods of military service, maternity leave and unemployment).

[1] Old age, Disability and Work Accident or Occupational disease pensions

5. 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.

Points 2-5 can be summarized in the following table:

Table 1 - Qualifying conditions for retirement

			2019	2030	2040	2050	2060	2070
Qualifying condition for retiring with a full pension	Statutory retirement age - men		64 y & 2 m	65 y	65 y + LE	65 y + LE	65 y + LE	65 y + LE
	Statutory retirement age - women		61 y & 4 m	63 y & 3 m	65 y + LE	65 y + LE	65 y + LE	65 y + LE
	Minimum requirements	Contributory period - men	38 y & 8 m	40 y	40 y	40 y	40 y	40 y
		Retirement age - men	64 y & 2 m	65 y	65 y + LE	65 y + LE	65 y + LE	65 y + LE
		Contributory period - women	35 y & 8 m	37 y	37 y	37 y	37 y	37 y
		Retirement age - women	61 y & 4 m	63 y & 3 m	65 y + LE	65 y + LE	65 y + LE	65 y + LE
Qualifying condition for retirement *without* a full pension	Early retirement age - men		63 y & 2 m	64 y	64 y + LE	64 y + LE	64 y + LE	64 y + LE
	Early retirement age - women		60 y & 4 m	62 y & 3 m	64 y + LE	64 y + LE	64 y + LE	64 y + LE
	Penalty in case of earliest retirement age		4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
	Bonus in case of late retirement		4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
	Minimum contributory period - men		38 y & 8 m	40 y	40 y	40 y	40 y	40 y
	Minimum contributory period - women		35 y & 8 m	37 y	37 y	37 y	37 y	37 y
	Minimum residence period - men							
	Minimum residence period - women							

Note: For workers in the normal working conditions (third category)

6. The retirement age for early retirement of workers in strenuous and hazardous work conditions (the first and second categories of labour) is gradually increased to 55 years for first category workers (in 2019 - 49 years for women and 53 years and 4 months for men) and to 60 years for second category workers (in 2019 - 54 years for women and 58 years and 4 months for men).

7. The retirement age for workers in the defence and security sector is gradually increased by 2 months annually until reaching 55 in 2029 (in 2019 - 53 years and 4 months).

8. As of 2017, the pension **accrual rate, which was 1.1 in 2016,** started to increase gradually each year with percentage equal to the sum of 50% of CPI and 50% of the average insurable income growth in previous year. Higher percentages, namely 1.126 in 2017 and 1.169 in 2018, were applied to both newly granted and already granted pensions. In 2019 the accrual rate was fixed at 1.2 for all pensions and no further increases are envisaged.

   Change in the legislation compared to The 2018 Ageing report: The pension projection for the 2018 Ageing Report was developed under the assumption that the accrual rate will continue to increase until reaching 1.5 within a period of 10 years.

2 Overview of the demographic and labour force projections

2.1 Demographic development

The new 2018-based population projection provided by EUROSTAT serves as a basis for projecting pension expenditures in long run. An overview of the demographic developments in Bulgaria for the period 2019–2070 is provided in Table 2 where the expected evolution of Bulgarian population, life expectancy, surviving probabilities and net migration are summarised.

Table 2 - Main demographic variables

	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019 2070
Population (thousand)	6 975	6 427	5 997	5 638	5 317	5 033	6974.8	2019	-1941.4
Population grow th rate	-0.7	-0.7	-0.7	-0.6	-0.6	-0.5	-0.5	2070	0.2
Old-age dependency ratio (pop 65+ / pop 20-64)	36.0	42.7	50.2	60.5	66.2	60.8	66.7	2058	24.8
Old-age dependency ratio (pop 75+ / pop 20-74)	12.3	17.1	20.0	24.7	30.2	32.1	32.7	2067	19.8
Ageing of the aged (pop 80+ / pop 65+)	22.6	27.3	30.3	31.5	38.1	45.2	45.2	2070	22.7
Men - Life expectancy at birth	71.5	74.3	76.7	79.0	81.0	82.9	82.9	2070	11.4
Women - Life expectancy at birth	78.8	80.9	82.8	84.6	86.2	87.7	87.7	2070	8.9
Men - Life expectancy at 65	14.2	15.9	17.4	18.8	20.1	21.4	21.4	2070	7.2
Women - Life expectancy at 65	18.1	19.6	20.9	22.3	23.5	24.7	24.7	2070	6.6
Men - Survivor rate at 65+	73.9	79.1	83.0	86.1	88.7	90.8	90.8	2070	16.9
Women - Survivor rate at 65+	87.2	89.7	91.6	93.1	94.3	95.3	95.3	2070	8.0
Men - Survivor rate at 80+	36.9	45.7	53.2	60.2	66.4	71.8	71.8	2070	34.9
Women - Survivor rate at 80+	59.8	66.8	72.3	77.1	81.1	84.4	84.4	2070	24.6
Net migration (thousand)	-3.9	0.8	3.1	5.5	7.7	10.0	10.0	2070	13.9
Net migration over population change	0.1	0.0	-0.1	-0.2	-0.2	-0.4	0.1	2020	-0.5

Source: EUROSTAT and Commission services

According to EUROSTAT's projection the overall size of Bulgarian population is projected to decrease by about 28% from 7.0 million people in 2019 to 5.0 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 1.58 in 2019 to 1.71 in 2070 it remains below the natural replacement level of 2.1. At the same time, the average life expectancy at birth, which was 71.5 for men and 78.8 for women in 2019, is expected to increase by 11.4 years for men and 8.9 years for women and to reach respectively 82.9 and 87.7 in 2070. Both fertility rates and life expectancy are slightly lower in the new projection compared to the 2018 Ageing report.

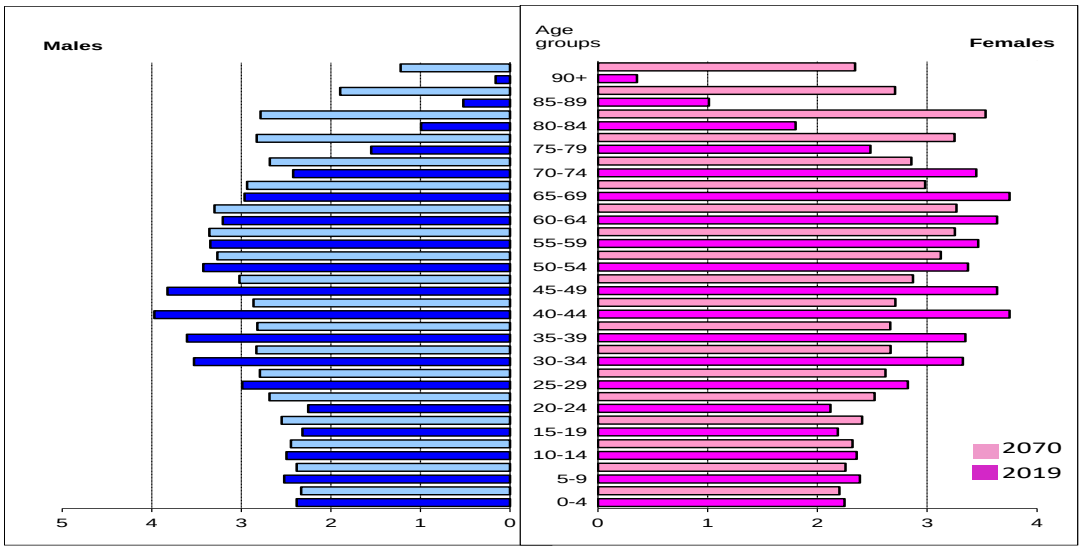
The age structure of Bulgarian population is projected to change considerably in the coming decades due to the dynamics of fertility, life expectancy and migration flows. By 2058, the working age population (20-64) decreases by 36.7%, and the population aged 65 and over increases by 17.4%. As a result, the old age dependency ratio[2] almost doubles (from 36.0% in 2019 to the peak of 66.7% in 2058), which implies that Bulgaria will move from having about 2.8 working-age people for each person aged 65+ to less than 2 working-age persons. In the last decade, the old-age dependency ratio slightly improves, decreasing to 60.8% at the end of the projection period.

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

Net migration, currently negative, is projected to reverse to a positive trend in the period between 2019 and 2030, reaching its peak of 10 thousand in 2070. Net migration in the new projection is significantly higher than in the previous round thus mitigating the negative effect of the lower fertility rates.

Graph 1 compares the age distribution of Bulgarian population at the base year 2019 with the one at the end of the projection period. The base of the population pyramid becomes narrower due to lower fertility rates while the upper part becomes wider reflecting the higher number of older 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.

Graph 1: Age pyramid comparison 2019 vs. 2070



Source: EUROSTAT and Commission services

2.2 Labour force

Table 3 focuses on some key labour market indicators as projected by the Cohort Simulation Model (CSM) developed by the European Commission.

In the long run the labour force participation rates as well as employment rates are projected to have somehow wavy developments slightly decreasing by the end projection period. More obvious increase is projected for the age group 65-74 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 2018 Ageing Report, both the participation rates and the employment rates are between 4 and 5 p.p. higher in the new projection. Employment rates of the age group 55-64 are almost 10 p.p. higher in 2019 and about 5 p.p. higher in 2070 compared to those in the 2018 Ageing Report. Participation rates of the age group 65-74 as well as employment rates for workers aged 65-74 increase by about 5 p.p. over the projection period and are slightly higher (about 1 p.p.) compared to those in the 2018 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 3 - Participation rate, employment rate and share of workers									
	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Labour force participation rate 20-64	78.5	77.3	76.7	77.0	78.1	77.5	78.5	2019	-0.9
Employment rate of workers aged 20-64	75.2	73.3	72.6	73.0	74.0	73.5	75.2	2019	-1.7
Share of workers aged 20-64 in the labour force 20-64	95.8	94.8	94.7	94.7	94.7	94.7	95.8	2019	-1.1
Labour force participation rate 20-74	66.7	66.1	64.3	63.3	64.5	66.5	66.7	2019	-0.2
Employment rate of workers aged 20-74	63.9	62.7	61.0	60.0	61.1	63.1	63.9	2019	-0.9
Share of workers aged 20-74 in the labour force 20-74	95.8	94.8	94.8	94.8	94.8	94.8	95.8	2019	-1.0
Labour force participation rate 55-64	67.1	66.5	66.5	65.8	67.8	67.7	68.3	2066	0.6
Employment rate of workers aged 55-64	64.5	63.3	63.3	62.7	64.6	64.5	65.0	2066	0.0
Share of workers aged 55-64 in the labour force 55-64	96.1	95.1	95.2	95.3	95.2	95.2	96.1	2019	-0.9
Labour force participation rate 65-74	11.0	14.9	15.3	15.4	14.9	15.9	15.9	2070	4.9
Employment rate of workers aged 65-74	10.7	14.4	14.8	14.9	14.4	15.4	15.4	2070	4.7
Share of workers aged 65-74 in the labour force 65-74	97.1	96.7	96.7	96.7	96.8	96.7	97.3	2024	-0.4
Median age of the labour force	43.0	45.0	45.0	43.0	43.0	44.0	45.0	2029	1.0

Source: Commission services

The average effective exit ages in Tables 4a and 4b are projected by CSM for both genders on the basis of participation rates and considering the increases of retirement ages. Their values are slightly lower than the statutory retirement age, taking into account the effect of the existing early retirement options.

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 38 y & 8 m in 2019 to 40 years for men and from 35 y & 8 m to 37 years for women by 2027. Taking into account the legal provisions, the average contributory period is projected to increase from 35.0 for men and 34.7 for women in 2019 to 38.5 for men in 2035 and to 36.6 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 average labour market exit age as projected by CSM. It rises by 7 years for men and by 6 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 reaches 60% for men (40% in 2020) and 70% for women (60% in 2020). By the end of the projection period women will spend in retirement 35.7% of the time after their 20th year while for men the percentage is 31.4. The increase is higher for men (7.8 p.p.) than for women (5.3 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.

TABLE 4a	Exit ages and expected duration of retirement - MEN								
	2020	2030	2040	2050	2060	2070	peak value	peak year	change 2020-2070
Average effective retirement age (administrative data)*	63.5								
Average labour market exit age (CSM)**	64.7	64.7	64.7	64.7	64.7	64.7	64.7	2026	0.0
Contributory period	35.5	37.5	38.4	38.1	37.8	37.3	38.5	2035	1.8
Duration of retirement***	14.4	15.9	17.4	18.8	20.1	21.4	21.4	2070	7.0
Duration of retirement/contributory period	0.4	0.4	0.5	0.5	0.5	0.6	0.6	2070	0.2
Percentage of adult life spent in retirement****	23.6	25.4	27.1	28.7	30.1	31.4	31.4	2070	7.8
Early/late exit*****	0.7	1.0	0.9	0.8	0.7	0.7	1.2	2023	0.0

TABLE 4b	Exit ages and expected duration of retirement - WOMEN								
	2020	2030	2040	2050	2060	2070	peak value	peak year	change 2020-2070
Average effective retirement age (administrative data)*	62.6								
Average labour market exit age (CSM)**	63.2	63.6	64.1	64.1	64.1	64.1	64.1	2038	0.9
Contributory period	35.0	36.5	36.2	35.9	35.6	35.3	36.6	2028	0.3
Duration of retirement***	19.7	20.4	21.8	23.1	24.4	25.6	25.6	2070	5.9
Duration of retirement/contributory period	0.6	0.6	0.6	0.6	0.7	0.7	0.7	2070	0.2
Percentage of adult life spent in retirement****	30.3	30.9	32.1	33.4	34.6	35.7	35.7	2070	5.3
Early/late exit*****	0.8	0.9	1.1	0.9	0.8	0.9	1.9	2035	0.1

Source: NSSI and Commission services

** The effective retirement age shows the age at which people on average start receiving an old-age pension benefit. It is calculated on the basis of the administrative data for 2019 (see Annex Tables A4a and A4b); ** The labour market exit age as calculated based on Labour Force Survey data for the base year and estimated by the Cohort Simulation Model thereafter; *** 'Duration of retirement is calculated as the 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 retire and are below the statutory retirement age and those who retire at the statutory retirement age or above.*

3 Pension projection results

The pension projections examine the long-term status of the Public pension system in Bulgaria for the period 2019-2070. 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 adequately reflects current pension legislation in Bulgaria. The latest Government decision for additional increase of minimum earnings-related pensions by 13.9% in July 2020 also was taken into account. The legislated link of the retirement age with changes in life expectancy, which is to be applied after 2037, is not taken into account 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 Extent of the coverage of the pension schemes in the 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). Up to this date these funds are in accumulation phase and all early pensions are part of the first pillar so they are included in the pension projections.
- Supplementary Voluntary Pension Funds.
- Teachers' Pension Fund – managed by NSSI.

This pension projection exercise is based on the reported data for 2019, 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 2007–2018 show differences between 0.6 – 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 amount 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 - Eurostat (ESSPROS) vs. Ageing Working Group definition of pension expenditure (% GDP)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	change 2009-2018
Eurostat total pension expenditure	8.2	8.7	8.2	8.1	8.6	8.8	8.5	8.3	8.0	7.9	-0.3
Eurostat public pension expenditure (A)	8.2	8.7	8.2	8.1	8.6	8.8	8.5	8.3	8.0	7.9	-0.3
Public pension expenditure (AWG: outcome) (B)	8.9	9.4	8.8	8.8	9.7	9.7	9.4	9.2	8.8	8.6	-0.2
Difference Eurostat/AWG: (A)-(B)	-0.7	-0.7	-0.6	-0.7	-1.1	-0.9	-0.9	-0.9	-0.8	-0.7	-0.1
Expenditure categories not considered in the ESSPROS definition	0.7	0.7	0.6	0.7	1.1	0.9	0.9	0.9	0.8	0.7	0.1
- Pensions' supplements	*0.7*	*0.7*	*0.6*	*0.7*	*1.1*	*0.9*	*0.9*	*0.9*	*0.8*	*0.7*	*0.1*

Source: Eurostat, NSSI

3.2 Overview of projection results

As the population ages and lives longer, the pension system will encounter increasing financial pressure to maintain adequate income after retirement.

Table 6 presents the projection results concerning the i) public pension expenditure as a percentage of GDP (the pension-to-GDP ratio), and ii) the public pension contributions as a percentage of GDP for the period 2019–2070, and which take into account the latest changes in the Bulgarian pension legislation.

TABLE 6 - Projected gross and net pension spending and contributions (% of GDP)

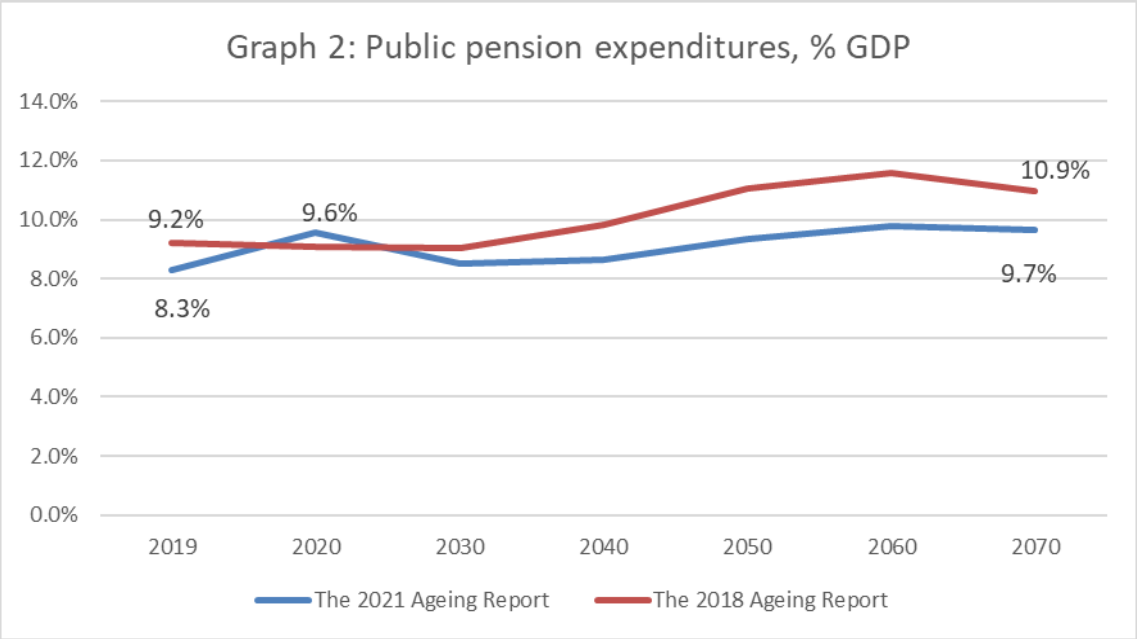
Expenditure	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Gross public pension expenditure	8.3	8.5	8.6	9.3	9.8	9.7	9.8	2059	1.4
Private occupational pensions	:	:	:	:	:	:	:	:	:
Private individual mandatory pensions	:	:	:	:	:	:	:	:	:
Private individual non-mandatory pensions	:	:	:	:	:	:	:	:	:
Gross total pension expenditure	8.3	8.5	8.6	9.3	9.8	9.7	9.8	2059	1.4
Net public pension expenditure*	8.3	8.5	8.6	9.3	9.8	9.7	9.8	2059	1.4
Net total pension expenditure*	8.3	8.5	8.6	9.3	9.8	9.7	9.8	2059	1.4
Contributions	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Public pension contributions	5.0	5.0	5.3	5.4	5.4	5.4	5.4	2051	0.4
Total pension contributions	5.0	5.0	5.3	5.4	5.4	5.4	5.4	2051	0.4

Source: NSSI and Commission services

Compared to the 2018 Ageing Report, the new results show lower values of the total pension-to-GDP ratio. Starting from 8.3 percent in 2019, the ratio reaches its peak value (9.8 percent) in 2059. A certain decrease is observed over the last decade, and at the end of the period the ratio is 9.7%. Public pension

contributions constitute 5.0 – 5.4% of GDP between 2019 and 2070 (4.9 – 5.1% in 2018 Ageing Report).

The following graph (Graph 2) shows a comparison of the pensions-to-GDP ratio between the 2018 Ageing Report base case and the new projections. The difference in the beginning of the projection period is mainly due to differences in GDP values in the base year. Namely, the higher GDP level in 2019 lowers the pension-to-GDP ratio. On the contrary, the big GDP drop in 2020 caused by the COVID-19 crisis significantly increases the ratio. The pension-to-GDP ratio in both projections has equal values in 2022 and in the new projection it remains overall lower until the end of the projection period.



Together with the demographic and macroeconomic assumptions, the main factors influencing projection results are the number of pensioners and the average pension amounts. After 2030 the number of pensioners in the new projection is higher compared to the 2018 Ageing Report due to higher population projected by Eurostat and higher employment rates. Regarding the average pension amounts, the main reason explaining the difference is the change of assumptions as a result of a policy change implemented as of the beginning of 2019. At the end of 2018, the Bulgarian Government proposed a legislative change according to which the gradual increase of the accrual rate from 1.1 to 1.5 should be abolished. The National Assembly backed up the proposal and as from 2019 the accrual rate for all pensions was fixed at 1.2% for each year of service. The current legislation does not envisage any future increases. The lower accrual rate leads to lower pension amounts which, combined with higher GDP values in nominal terms, results in lower pension expenditure (as % of GDP), compared to the previous projection exercise.

In the period 2020-2037, 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 years of service) and the associated lower number of old-age pensioners. The increasing trend in pension expenditure after 2040 mainly reflects the adverse impacts of the expected changes in the age structure of the Bulgarian population.

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 is expected to rise from 6.8% of GDP in 2019 to 8.4% by 2060, and to remain at the same level until the end of the projection period (Table 7).

Compared to the 2018 Ageing Report, the expenditure for disability pensions exhibits a lower and decreasing trend over the projection period. Apart from the higher GDP and the lower accrual rate, an additional factor explains the drop in the level of disability pension expenditure. This relates to changes in the assumptions – the probability of becoming a recipient of an invalidity pension has been reduced compared to the previous projection exercise.

In September 2018, the Bulgarian Government amended the legislation determining the assessment of working capacity. As of 2019 stricter rules on obtaining permanent disability were introduced, including regarding the accumulation of diseases. As a consequence, it became more difficult for people below the standard retirement age (the certified degree of lost working capacity for people above the standard retirement age is given for a lifetime) who have more than one chronic, but less severe, disease, to be certified as permanently disabled. Recent data shows that these changes have resulted in decreasing number of newly granted invalidity pensions and fewer renewals of the medical certificates for granting permanent disability.

This policy change leads to a lower number of disability pensioners in the base year of the current projections, compared to the corresponding year (projected data) in the previous projection exercise. The new projections therefore reflect the introduction of stricter rules to obtain disability pensions and the corresponding changes in the assumptions – the probabilities of becoming a recipient of disability pension have been adjusted downwards in the model.

The development of survivors' pension expenditures remains relatively stable over the projection period, although slightly decreasing over the last four decades.

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 expenditures for both categories remain stable over the projection period. Compared to the 2018 Ageing Report expenditures for both minimum and other pensions are significantly lower due to the following reasons:

Until the end of 2018 there was a possibility social disability pensions to be received as an additional (second) pension in amount of 25% and their number exceeded 400 000. From the beginning of 2019 by Government decision all social disability pensions paid in amount of 25% have been shifted to the Social Assistance Agency and have been transformed in social assistance benefits for people with disabilities. Thus, the number of social disability pensions dropped to about 50 000 which are pensions paid in full amount and this was considered in the new projection.

On the other hand, in the 2018 projection exercise, due to the lower participation rates and the corresponding higher number of inactive, some upward

adjustments in the number of minimum and other pensions was implemented in order to be in line with the commonly agreed assumptions to the highest extend. In the new projection, where the participation rates are higher and the number of inactive is lower, the consistency between the inactive population as projected by CSM and the number of pensioners as projected by the national pension model is better. As a result, additional adjustments to the number of minimum and other pensions have not been applied and the number of minimum and other pensions in the new projection is significantly lower compared to the 2018 Ageing Report.

TABLE 7 - Projected gross public pension spending by scheme (% of GDP)

Pension scheme	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Total public pensions	8.3	8.5	8.6	9.3	9.8	9.7	9.8	2059	1.4
Old-age and early pensions	6.8	6.8	7.0	7.8	8.4	8.3	8.4	2059	1.5
Flat component	:	:	:	:	:	:	:	:	:
Earnings-related	6.8	6.8	7.0	7.8	8.4	8.3	8.4	2059	1.5
Minimum pensions (non-contributory) i.e. minimum	0.01	0.01	0.01	0.01	0.01	0.01	0.01	2070	0.0
Disability pensions	1.11	1.22	1.16	1.14	1.09	1.00	1.3	2020	-0.1
Survivors' pensions	0.26	0.38	0.33	0.25	0.22	0.20	0.38	2030	-0.1
Other pensions	0.11	0.11	0.10	0.11	0.13	0.16	0.16	2070	0.0

Source: NSSI and Commission services

3.3 Description of the main driving forces behind the projection results and their implications for the main items of the pension questionnaire

A simple decomposition helps to assess the main driving forces behind the change in public pension expenditures between 2019 and 2070. Following the approach used in the previous round of projections, the pension expenditures as a percent of GDP can be decomposed into its main components reflecting the demographic changes (dependency ratio), eligibility conditions (coverage ratio), generosity (benefit ratio), employment and labour intensity. Calculations have been made using the number of pensioners.

As seen in Table 8 below, in long run the pensions-to-GDP ratio shows an increasing trend, reflecting the ageing of Bulgarian population. The sharper growth in 2040-2050 reflects the specificity of the demographic structure, namely the peak of births in the 1970s, leading to a higher number of retiring people between 2035 and 2050.

TABLE 8 - Factors behind the change in public pension expenditures between 2019 and 2070 (in percentage points of GDP) - pensioners						
	2019-30	2030-40	2040-50	2050-60	2060-70	2019-70
Public pensions to GDP	0.2	0.1	0.7	0.5	-0.1	1.4
Dependency ratio effect	1.6	1.4	1.7	0.9	-0.8	4.8
Coverage ratio effect*	-0.9	-0.9	-0.6	-0.2	0.4	-2.1
Coverage ratio old-age	-0.5	-0.5	-0.2	0.3	0.3	-0.7
Coverage ratio early-age	-1.7	-1.0	0.2	-1.1	-0.1	-3.7
Cohort effect	-0.3	-0.9	-2.4	-1.4	1.6	-3.4
Benefit ratio effect	-0.6	-0.4	-0.2	-0.1	0.1	-1.1
Labour market effect	0.1	0.0	-0.1	-0.1	0.2	0.1
Employment ratio effect	0.2	0.1	0.0	-0.1	0.1	0.2
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0
Career shift effect	-0.1	-0.1	-0.1	0.0	0.1	-0.1
Residual	-0.1	-0.1	-0.1	0.0	0.0	-0.3

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

Source: Commission services

The main driving factor behind the development of the public pension expenditures to GDP ratio for the period under review (2019–2070) is **the dependency ratio**, which contributes 4.8 percentage points reflecting the ageing of Bulgarian population.

The coverage ratio has a negative contribution (- 2.1 p.p.) due to the increase of the required years of service and of the statutory retirement age.

The benefit ratio has also a negative contribution (- 1.1 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 pension system.

The labour market developments have an increasing effect (0.1 p.p.) on the pension costs mainly as a result of the positive contribution of the employment ratio effect.

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 5.0% lower than the economy–wide average wage.

The political decision made in 2019 to freeze the accrual rate at 1.2 per year of service plays an important role in explaining the future changes in the benefit ratio and the replacement rate at retirement. While in the previous projection (2018 Ageing Report) it was assumed that the accrual rate should increase from 1.1 to 1.5, an amendment in the pension legislation stipulates that, as of 2019, the accrual rate to be used in the pension formula should be fixed at 1.2. The accrual rate remains unchanged over the projection period, thus lowering the pension amounts by 20% compared to the 2018 Ageing Report.

TABLE 9 - Replacement rate at retirement (RR), benefit ratio (BR) and coverage by pension scheme (in %)							
	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Public scheme (BR)	26.7%	25.1%	24.0%	23.5%	23.2%	23.5%	-3.2%
Coverage	100.0	100.0	100.0	100.0	100.0	100.0	0.0
Public scheme: old-age earnings related (BR)	29.5%	29.1%	27.6%	26.2%	25.5%	25.7%	-3.7%
Public scheme: old-age earnings related (RR)	36.2%	31.3%	31.1%	30.0%	29.9%	29.5%	-6.7%
Coverage	74.5	68.8	70.9	75.1	77.8	78.4	3.9
Private occupational scheme (BR)	:	:	:	:	:	:	:
Private occupational scheme (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Private individual schemes (BR)	:	:	:	:	:	:	:
Private individual schemes (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Total benefit ratio	26.7%	25.1%	24.0%	23.5%	23.2%	23.5%	-3.2%
Total replacement rate	36.2%	31.3%	31.1%	30.0%	29.9%	29.5%	-6.7%

Note: 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.

Source: NSSI and Commission services

The benefit ratio both of total and for old-age pensions shows a constantly decreasing trend as the drop is by more than 3 p.p. by the end of the projection period. The decreasing trend is a result of the indexation rule (50% CPI + 50% of average insurable income 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 by more than 6 p.p. over the projection period, from 36% in 2019 to 29.5% 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 will be between 20% and 25%.

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 stricter 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 90 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 36.0% in 2019 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

	2019	2030	2040	2050	2060	2070	change 2019-2070
Number of pensioners (thousand) (I)	2145.3	2030.3	1929.3	1892.5	1844.1	1733.4	-411.9
Employment (thousand) (II)	3235.1	2811.2	2517.8	2230.9	2049.5	1975.5	-1259.6
Pension system dependency ratio (SDR) (I)/(II)	66.3	72.2	76.6	84.8	90.0	87.7	21.4
Number of people aged 65+ (thousand) (III)	1497.9	1564.3	1647.7	1737.7	1730.1	1556.1	58.2
Working age population 20-64 (thousand) (IV)	4159.0	3660.4	3281.8	2873.7	2613.4	2558.9	-1600.1
Old-age dependency ratio (OADR) (III)/(IV)	36.0	42.7	50.2	60.5	66.2	60.8	24.8
System efficiency (SDR/OADR)	1.8	1.7	1.5	1.4	1.4	1.4	-0.4

Source: NSSI and Commission services

In Tables 11a and 11b 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 is that figures include working pensioners (about 10% 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.

TABLE 11a - Pensioners (public scheme) to inactive population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	10.2	10.4	8.1	6.4	5.9	5.5
Age group 55-59	126.8	102.3	85.1	87.1	85.5	86.8
Age group 60-64	133.9	106.1	104.0	97.3	97.2	97.9
Age group 65-69	118.8	99.7	97.7	96.6	96.9	95.8
Age group 70-74	109.4	102.2	95.3	98.9	102.8	102.0
Age group 75+	104.7	109.6	101.3	95.3	96.6	100.5

TABLE 11b - Pensioners (public schemes) to total population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	4.2	4.5	3.6	2.9	2.7	2.5
Age group 55-59	25.3	19.9	18.1	18.3	17.3	17.6
Age group 60-64	61.4	52.0	46.9	43.8	43.2	43.4
Age group 65-69	98.5	78.8	76.4	75.1	75.4	74.2
Age group 70-74	104.9	93.6	87.9	90.4	93.9	93.1
Age group 75+	104.7	109.6	101.3	95.3	96.6	100.5

Source: NSSI and Commission services

Tables 12a and 12b show similar results for the ratio of female pensioners to inactive population and the ratio of female pensioners to total population by age groups.

TABLE 12a - Female pensioners (public scheme) to inactive population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	9.1	7.5	5.3	4.3	4.3	4.0
Age group 55-59	88.7	111.5	85.8	86.2	85.2	86.8
Age group 60-64	118.5	102.8	107.2	98.4	95.5	98.1
Age group 65-69	109.1	93.5	97.8	94.6	94.3	93.5
Age group 70-74	105.0	90.5	93.5	98.7	98.9	98.0
Age group 75+	101.0	103.1	92.3	91.5	94.8	97.8

TABLE 12b - Female pensioners (public scheme) to total population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	4.1	3.5	2.5	2.1	2.1	1.9
Age group 55-59	18.4	22.5	19.7	19.9	19.0	19.4
Age group 60-64	63.6	58.2	52.1	48.2	46.4	47.5
Age group 65-69	95.7	77.2	79.1	75.5	75.4	74.4
Age group 70-74	101.9	83.6	87.9	90.9	91.1	90.2
Age group 75+	101.0	103.1	92.3	91.5	94.8	97.8

Source: NSSI and Commission services

Tables 13a, 13b and 13c providing information on projected new public pension expenditure and its link to the average contributory period, average pensionable earnings, average accrual rates and the number of new pensioners – total and by gender – show the consistency of the pension projections.

TABLE 13a - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) - Total

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	99.6	143.6	217.4	310.5	382.9	548.9
I. Number of new pensions (1000)	60.8	64.3	63.5	61.5	51.1	51.5
II. Average contributory period (years)	34.8	37.0	37.4	37.1	36.8	36.4
III. Average accrual rate (%)	1.2	1.2	1.2	1.2	1.2	1.2
IV. Monthly average pensionable earnings (1000 EUR)	0.6	0.8	1.2	1.7	2.6	3.8
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)	82%	67%	66%	64%	64%	64%

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

Source: NSSI

Two main differences can be highlighted between Tables 13b and 13c, 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 an 37 years for women) will be difficult to fulfil. Consequently, fewer people with full years 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 amount 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 2040, about 75% of the actual pensionable earnings will be taken into account for pension calculation.

TABLE 13b - Disaggregated new public pension expenditure (old-age and early earnings-related pensions) - MEN

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	47.6	68.9	117.7	169.2	208.9	293.5
I. Number of new pensions (1000)	26.6	28.9	31.6	31.2	25.9	25.6
II. Average contributory period (years)	35.0	37.5	38.4	38.1	37.8	37.3
III. Average accrual rate (%)	1.2	1.2	1.2	1.2	1.2	1.2
IV. Monthly average pensionable earnings (1000 EUR)	0.7	0.8	1.2	1.8	2.7	3.9
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)	89%	71%	70%	67%	67%	67%

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

TABLE 13c - Disaggregated new public pension expenditure (old-age and early earnings-related pensions) - WOMEN

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	52.0	74.7	99.7	141.2	174.0	255.4
I. Number of new pensions (1000)	34.2	35.4	31.9	30.3	25.2	25.9
II. Average contributory period (years)	34.7	36.5	36.2	35.9	35.6	35.3
III. Average accrual rate (%)	1.2	1.2	1.2	1.2	1.2	1.2
IV. Monthly average pensionable earnings (1000 EUR)	0.6	0.7	1.1	1.7	2.5	3.6
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)	77%	64%	62%	61%	61%	61%

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

Source: NSSI

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 remaining financing 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 3000 BGN	Earnings up to 3000 BGN	Declared covered earnings
Contribution rate/contribution	State pension (1st Pillar)		
Employer	8.22% for persons born after 1959; 11.02% for persons born before 1960	6.58% for persons born after 1959; 8.78% for persons born before 1960	
Employee	8.22% for persons born after 1959; 11.02% for persons born before 1960	6.58% for persons born after 1959; 8.78% for persons born before 1960	For persons born before 1960: 19.8% of declared covered earnings for previous calendar year; for persons born after 1959: 14.8% of declared covered earnings for previous calendar year.
*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	3000 BGN	3000 BGN	3000 BGN
Minimum contribution	Minimum w age	Minimum w age	Minimum w age

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 2019, the number of contributors in the Bulgarian pension system was around 2.9 million people and represented 88.4% of employment (Table 15). Starting from this level, the number of contributors is projected as a progressively increasing proportion of the employment (reaching 100% in 2044), assuming that the share of informal employment will be gradually reduced. Although this assumption could be considered as very optimistic, the results show about 31% decrease in number of contributors and about 39% decrease in employment over the projection period, as the main reason for this is the declining population in working age.

TABLE 15 - Revenue from contribution (%GDP) number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)							
	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Public pension contributions (%GDP)	5.0	5.0	5.3	5.4	5.4	5.4	0.4
Employer contributions	*3.0*	*3.0*	*3.2*	*3.3*	*3.3*	*3.3*	*0.3*
Employee contributions	*2.0*	*2.0*	*2.1*	*2.2*	*2.2*	*2.2*	*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)	2861.2	2621.2	2473.6	2230.9	2049.5	1975.5	-885.7
Employment (II) (1000)	3235.1	2811.2	2517.8	2230.9	2049.5	1975.5	-1259.6
(I) / (II)	0.9	0.9	1.0	1.0	1.0	1.0	0.1

Source: NSSI and Commission services

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. Compared to the 2018 Ageing Report four additional policy scenarios concerning the retirement age, benefit ratio and economic recovery are included (See Table 17):

- **Higher life expectancy** 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 up to 2040 and a more significant change afterwards, amounting to 0.5 p.p. higher ratio of pension expenditures to GDP in 2070 in comparison with the baseline scenario.
- **Higher/ Lower migration** has a negligible effect on the pension expenditure to GDP ratio. It 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 0.1 p.p. In the case of lower migration, pensions to GDP ratio is by 0.1 p.p. higher than in the base case.
- **Lower fertility** has the most significant effect on pension expenditure due to a lower number of people in working age 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 1.5 p.p. higher ratio of pension expenditure to GDP in 2070 compared to the baseline scenario.
- **Higher employment rate of older workers** has a favourable effect on the pension system. It implies higher GDP in the denominator which lowers the pensions to GDP ratio by 0.8 p.p. in 2050. At the end of the period this effect weakens because, by staying longer in the labour market, people acquire more pension rights and higher pensions. The cumulative effect amounts to 0.3 p.p. lower ratio of pension expenditure to GDP in 2070 compared to the baseline scenario.
- **Higher TFP growth** implies higher GDP and higher contributions revenue 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 0.2 p.p. lower at the end of the period compared to the baseline scenario.

— **TFP risk scenario** 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 1.0 p.p. higher pension expenditure as a percent of GDP at the end of the period.

TABLE17 - Public and total pension expenditure under different scenarios (p.p. deviation from the baseline)

Public pension expenditure	2019	2030	2040	2050	2060	2070	change 2019 2070 (pps)
Baseline (% GDP)	8.3	8.5	8.6	9.3	9.8	9.7	1.4
Higher life expectancy at birth (+2y)	0.0	0.1	0.2	0.3	0.4	0.5	0.5
Higher migration (+33%)	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
Lower migration (-33%)	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Lower fertility (-20%)	0.0	0.0	0.0	0.3	0.8	1.5	1.5
Higher employment rate of older workers	0.0	-0.4	-0.7	-0.8	-0.5	-0.3	-0.3
Higher TFP growth (convergence to 1.2%)	0.0	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2
TFP risk scenario (convergence to 0.8%)	0.0	-0.1	0.0	0.3	0.7	1.0	1.0
Policy scenario: linking retirement age to	0.0	-0.2	-0.4	-0.7	-0.7	-0.8	-0.8
Policy scenario: unchanged retirement age	0.0	0.0	0.3	0.3	0.3	0.3	0.3
Policy scenario: offset declining pension	0.0	0.0	0.0	0.1	0.4	0.4	0.4
Lagged recovery scenario	0.00	0.03	0.00	-0.03	-0.06	-0.05	-0.05
Adverse structural scenario	0.0	0.2	0.3	0.4	0.4	0.4	0.4

Total pension expenditure	2019	2030	2040	2050	2060	2070	change 2019 2070 (pps)
Baseline (% GDP)	8.3	8.5	8.6	9.3	9.8	9.7	1.4
Higher life expectancy at birth (+2y)	0.0	0.1	0.2	0.3	0.4	0.5	0.5
Higher migration (+33%)	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
Lower migration (-33%)	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Lower fertility (-20%)	0.0	0.0	0.0	0.3	0.8	1.5	1.5
Higher employment rate of older workers	0.0	-0.4	-0.7	-0.8	-0.5	-0.3	-0.3
Higher TFP growth (convergence to 1.2%)	0.0	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2
TFP risk scenario (convergence to 0.8%)	0.0	-0.1	0.0	0.3	0.7	1.0	1.0
Policy scenario: linking retirement age to change in life expectancy	0.0	-0.2	-0.4	-0.7	-0.7	-0.8	-0.8
Policy scenario: unchanged retirement age	0.0	0.0	0.3	0.3	0.3	0.3	0.3
Policy scenario: offset declining pension benefit ratio	0.0	0.0	0.0	0.1	0.4	0.4	0.4
Lagged recovery scenario	0.00	0.03	0.00	-0.03	-0.06	-0.05	-0.05
Adverse structural scenario	0.0	0.2	0.3	0.4	0.4	0.4	0.4

Source: NSSI and Commission services

— **Policy scenario: linking retirement age to change in life expectancy** leads to 0.8 p.p. lower ratio of pension expenditure to GDP in 2070 compared to the baseline scenario.

- **Policy scenario: unchanged retirement age** assumes that the main eligibility requirements remain unchanged from the starting point (i.e. 2019) 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: offsetting declining 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 2019, the earnings-related public benefit ratio is 29.5% and by 2048 it decreases by 10.2% (i.e. to 26.5%) in the base case. In this scenario from 2048 until the end of the projection period the benefit ratio is kept fixed at the level of 26.6% (2047) by adjusting the annual pension indexation so that the benefit ratio remains constant. The cost of preventing the pensions from significant deterioration of adequacy is 0.4 p.p. higher pension expenditure to GDP ratio by 2070.
- **Lagged recovery scenario** assumes longer recovery phase from the COVID-19 crisis and has limited impact on the pension system in long run. A small negative difference with the base case is projected after 2040 as a result of the assumption of lower employment in the period until 2036 and the respective lower number of pensioners. The pension amounts are also a bit lower due to the fact that both the age structure of the pensioners and the ratio between the number of pensioners with pensions higher/ lower than the base case' average pension have changed.
- **Adverse structural scenario** assumes that the potential GDP growth is permanently lower than in the base case scenario. In 2070 GDP is 17.7% lower than the base case and pension expenditures are 14.1% lower than the base case. The result is by 0.4 p.p. higher pension expenditure to GDP ratio at the end of the period.

3.6 Description of the changes in comparison with the 2018 Ageing Report

Differences between the new projection and 2018 Ageing Report projection results are due to:

- Change in assumptions - population, macro-economic and labour market assumptions;
- Policy related change concerning the values of accrual rate in pension formula.

Table 18 shows the overall change in public pension expenditure to GDP under the last five projection exercises.

TABLE 18 - Overall change in public pension expenditure to GDP under the 2006, 2009, 2012, 2015, 2018 and 2021 projection exercises

	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)	**3.02**	*9.07*	*-3.00*	*-1.76*	*-0.52*	*-0.77*
2012 Ageing Report (2010-2060)	**1.14**	*8.84*	*-3.93*	*-2.14*	*-0.80*	*-0.82*
2015 Ageing Report (2013-2060)	**-0.43**	*6.69*	*-3.12*	*-2.46*	*-1.19*	*-0.35*
2018 Ageing Report (2016-2070)	**1.36**	*6.02*	*-2.97*	*-1.07*	*-0.20*	*-0.425*
2021 Ageing Report (2019-2070)	**1.35**	*4.82*	*-2.11*	*-1.13*	*0.06*	*-0.283*

- The disaggregation for 2006/2009/2012 is on the basis of pensions; for 2015/2018/2021 it is on the basis of pensioners.

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

Source: Commission services

The values in Table 18 show that the increase of the pension expenditures to GDP ratio in the new projection is almost the same as in 2018 projection round. The **dependency ratio effect** has a less positive contribution to the change of pension-to-GDP ratio in the new projection due to (1) higher positive migration flows leading to higher number of people of working age and (2) lower number of people at age 65+ as a result of the lower life expectancy in the new demographic projection. **Coverage ratio** has a less negative contribution to the change in pension expenditure due to (1) higher number of pensioners as a result of the higher employment rates and (2) lower population at age 65+. The negative contribution of **benefit ratio** effect is almost the same compared to the 2018 Ageing report. This is a consequence of two processes acting in opposite directions: the legislative change in the accrual rate (permanently fixed at the level of 1.2), which has a diminishing effect on the benefit ratio, combined with significantly lower number of pensions with low amounts (minimum, other and disability pensions) and higher number of old age pensions with higher amounts, which has increasing effect on the benefit ratio. The **labour market effect** positively affects pension expenditure mainly due to the positive contribution of employment ratio effect (0.2 p.p.). In the new projection the employment rate at the beginning of the projection period is higher (75.2%) than the employment rate at the end (73.5%). However, when calculating the employment ratio effect, the employment rate is in the denominator and the result is lower employment ratio effect at the beginning than at the end of the period, which makes the contribution of employment ratio effect positive. In 2018 projection exercise the employment rate was the same (67.8%) both at the beginning and at the end of the period and this explains the zero contribution of the employment ratio effect in the previous projection where the negative contribution of labour market effect was due to the negative contribution of career shift effect.

A comparison between pension expenditure projected in the previous round and reported data for the period 2016 – 2019 shows lower reported values of pension expenditure to GDP ratio due to the difference in projected and reported values of assumptions (Table 19a). On the one hand, the higher reported values of GDP in denominator have a decreasing effect. On the other, higher reported values of the average gross wage lead to bigger lag of the pension amounts due to the indexation rule, which also has a decreasing effect on the ratio. The indicated

negative impact related to the policy in 2019 is explained by the fact that in the beginning of 2019 by Government decision all social disability pensions paid in amount of 25% were terminated and transformed to social assistance benefits for people with disabilities. Thus, the number of social disability pensions fell from 400 000 to about 50 000 pensions paid in full amount (see page 16).

TABLE 19a - Breakdown of the difference between the 2018 projections and outcome figures (% of GDP)

	2016	2017	2018	2019
Ageing Report 2018 projections	9.6	9.4	9.3	9.2
Assumptions (pps of GDP)	-0.4	-0.6	-0.7	-0.7
Coverage of projections (pps of				
Constant policy impact (pps of				
Policy-related impact (pps of GDP)				-0.2
Actual public pension expenditure	9.2	8.8	8.6	8.3

Source: NSSI

Table 19b shows the decomposition of the difference between the new public pension projection and projection included in 2018 Ageing Report. The change in demographic and macroeconomic assumptions leads to higher pension expenditure to GDP ratio in 2070 (+1.7 p.p.). The negative contribution of the policy-related changes regarding the accrual rate results in lower pension amounts in the new projection. This reduces the pension expenditure to GDP ratio by 3.0 p.p. at the end of the period.

TABLE 19b - Breakdown of the difference between the 2018 and the new public pension projection (% of GDP)

	2019	2030	2040	2050	2060	2070
Ageing Report 2018 projections	9.2	9.0	9.8	11.1	11.6	10.9
Change in assumptions (pps of GDP)	-0.7	0.3	0.6	0.9	1.2	1.7
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)	-0.2	-0.9	-1.8	-2.6	-3.0	-3.0
New projections	8.3	8.5	8.6	9.3	9.8	9.7

Source: NSSI

4 Description of the pension projection model and its base data

4.1 Institutional context

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. It is used simultaneously with the long-term pension model developed by the World Bank, which is also available to the NSSI.

4.2 Assumptions and methodologies applied

a) Demographic assumptions (new EUROSTAT 2015-based population projection)

- Mortality rates (by gender and age)
- Fertility rates (by age)
- Net-migration (by gender and age)

b) Labour market assumptions (AWG)

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

c) Macroeconomic assumptions (AWG)

- GDP (real growth)
- Labour Income share in GDP
- GDP deflator

The latest AWG assumptions concerning population, macroeconomic framework and labour market were fully incorporated in the model.

4.3 Data used to run the model

The following is the list of the statistical and financial data needed:

1) Demographic data

- Bulgarian 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 amount (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.

4.4 Reforms incorporated in the model

All legislated reforms described in part one of this fiche, were taken into account in pension projections.

4.5 General description of the model

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:

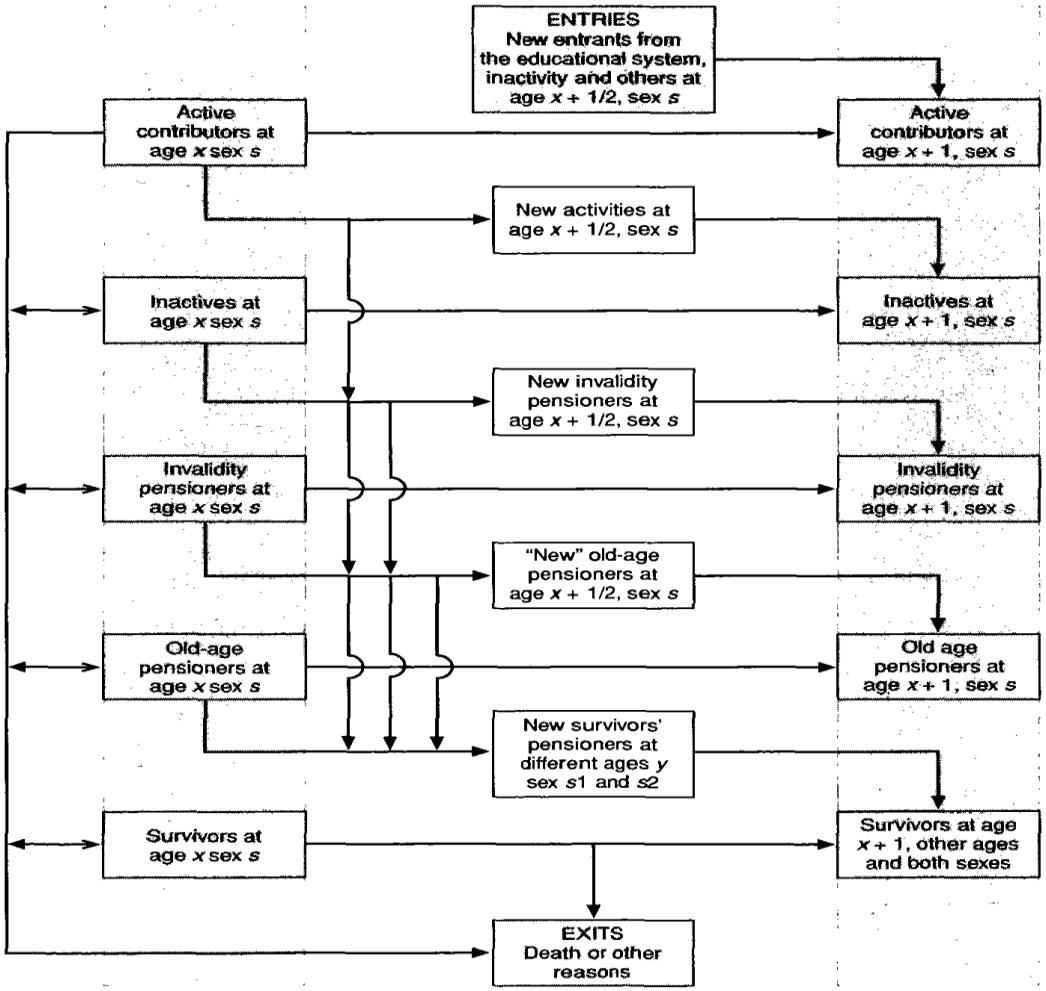
- *Demographic module*, which is used for population projections – the model projects future population by single ages and sex taking into account the assumed mortality and fertility rates as well as the migration assumptions. The population forecasts match the standard UN methodology for demographic projections;
- *Labour supply modul*e, 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 1: 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 amount. 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 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

$$OAPt,x,s = (OAPt=0,x,s / POPt=0,x,s)* POPt,x,s$$

For *x* >= statutory retirement age

Number of surviving old-age pensioners:

$$OOAPt,x,s = OAPt-1,x-1,s *(1-qx-1,s)$$

Number of new old-age pensioners:

$$NOAPt,x,s = f (MAT1 t,s ; eligibility conditions)$$

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:

$$IP\ t,x,s = IP\ t\text{-}1,x,s\ *(1\text{-}qx\text{-}1,s) + \ ir\ t,x,s\ *\ INS\ t,x,s$$

$$SPt,x,s = sur\ t,x,s\ *\ OAP\ t,x,s$$

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

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

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

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

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

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

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.

$$TE_t = (\sum_{t,x,s} (OAPt,x,s * OAt,x,s) + \sum_{t,x,s} (IPt,x,s * It,x,s) + \sum_{t,s} (SPt,s * St,s)) + AE_t + OE_t$$

Where:

TE_t - Total expenditure in *t*

$OAP_{t,x,s}$ - 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*

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

$S_{t,x,,s}$ - Survivors' pension in *t* of age *x* and sex *s*

AE_t - Administrative expense in year *t*

OE_t - Other expenditure in *t*

4.6 Additional 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.

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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. For 2019 the ratio between the average insurable income at the effective age of retirement and total average insurable income for the country is 0.95. 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)

	2019	2030	2040	2050	2060	2070	% change 2019-2070
Economy-wide average gross wage at retirement	8.4	13.2	20.3	31.1	46.2	66.6	697.5
Economy-wide average gross wage	8.8	13.9	21.4	32.7	48.7	70.1	697.5

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 (1.01) 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.

Disability pensions

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 (%)

	2019	2030	2040	2050	2060	2070
Age group -54	0.4	0.1	0.1	0.1	0.1	0.1
Age group 55-59	1.7	0.5	0.5	0.5	0.5	0.4
Age group 60-64	3.3	1.0	1.0	0.9	0.9	0.8
Age group 65-69	6.3	2.0	2.0	1.8	1.7	1.5
Age group 70-74						
Age group 75+						

Survivor pensions

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

Non-earnings-related minimum pensions

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 product 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 genders by applying insurance participation rates to the respective cohorts of the employed population.

Average insurable income is a product 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 has the same structure as Table 8. It provides a disaggregation of the factors behind the change in public pension expenditure, which is based on pension data instead of pensioners data as in Table 8.

TABLE A3 - Factors behind the change in public pension expenditure between 2019 and 2070 (percentage points of GDP) – pensions

	2019-30	2030-40	2040-50	2050-60	2060-70	2019-70
Public pensions to GDP	0.2	0.1	0.7	0.5	-0.1	1.4
Dependency ratio effect	1.6	1.4	1.7	0.9	-0.8	4.8
Coverage ratio effect*	-0.9	-0.9	-0.6	-0.2	0.4	-2.1
Coverage ratio old-age	-0.5	-0.5	-0.2	0.3	0.3	-0.7
Coverage ratio early-age	-1.7	-1.0	0.2	-1.2	-0.1	-3.7
Cohort effect	-0.3	-0.9	-2.4	-1.4	1.6	-3.4
Benefit ratio effect	-0.6	-0.4	-0.2	-0.1	0.1	-1.1
Labour market effect	0.1	0.0	-0.1	-0.1	0.2	0.1
Employment ratio effect	0.2	0.1	0.0	-0.1	0.1	0.2
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0
Career shift effect	-0.1	-0.1	-0.1	0.0	0.1	-0.1
Residual	-0.1	-0.1	-0.1	0.0	0.0	-0.3

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

Administrative data on new pensioners данни

Tables A4a, A4b and A4c contain administrative data on new pensioners in 2019 derived from the registers of the National Social Security Institute. Tables show the distribution of new pensioners by age groups and gender. The largest is the group of new old age pensioners representing 64% of all new pensioners, followed by disability pensioners (21%). The share of survivors and other pensioners is 12% and 3% respectively.

TABLE A4a - Administrative data on new pensioners (2019) - men

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	5 184	193	2 871	789	1 331
50 - 54	2 819	958	1 763	0	98
55 - 59	6 364	3 552	2 542	179	91
60 - 64	15 327	11 760	2 520	992	55
65 - 69	10 430	9 694	552	162	22
70 - 74	872	382	36	24	430
75+	124	83	12	22	7

TABLE A4b - Administrative data on new pensioners (2019) - women

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	4 958	32	3 275	853	798
50 - 54	2 390	563	1 772	0	55
55 - 59	8 519	753	2 390	5 330	46
60 - 64	26 988	23 508	1 587	1 866	27
65 - 69	9 822	8 878	358	563	23
70 - 74	926	390	58	228	250
75+	371	43	20	301	7

TABLE A4c - Administrative data on new pensioners (2019) - total

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	10 142	225	6 146	1 642	2 129
50 - 54	5 209	1 521	3 535	0	153
55 - 59	14 883	4 305	4 932	5 509	137
60 - 64	42 315	35 268	4 107	2 858	82
65 - 69	20 252	18 572	910	725	45
70 - 74	1 798	772	94	252	680
75+	495	126	32	323	14

Coverage and specification of the pension schemes covered in 2021 projections

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Table - Coverage and specification of pension schemes

	Schemes covered in the projections *(*E-r = earnings-related)*	**Schemes <u>not</u> covered**
BG	***Public pensions:*** ***Old age and early pensions*** E-r Old Age and Early Pensions (including farmers and military officials) Non E-r minimum pensions – social pensions for old age, special merits pensions, pensions by Decree **Disability Pensions** E-r Disability Pensions due to General Disease (including farmers and military officials) E-r Disability Pensions due to Work Injury and Professional Disease (including farmers and military officials) **E-r Survivors Pensions** according to relationship with the deceased – widows, children, parents **Other Pensions** Non E-r social disability pensions	***Supplementary mandatory pension schemes:*** Supplementary life-long old-age pensions - Universal Pension Funds (UPF) Early retirement pensions for a limited period of time for persons working in hazardous conditions - Professional Pension Funds (PPF) ***Supplementary voluntary pension schemes – individual private and occupational pensions*** ***Teachers Pension Fund***