REPUBLIC OF BULGARIA

Country fiche on pension projections

Sofia, November 2017

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 administered 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:

$$\textbf{\textit{Old-Age Pension = AR x IP x IC x AMII,}}$$

where

AR: Accrual rate,
IP: Insurance period,
IC: Individual coefficient, and
AMII: National average monthly insurable income in the last 12 months preceding retirement.

The main components of the pension formula are explained as follows:

- The accrual rate until the end of 2016 was 1.1 percent per insurance year. For periods of postponed retirement the accrual rate is 4 percent.

- The insurance period consists of the contributory and non-contributory periods for which contributions have been paid by the State.

- The individual coefficient is the ratio of an individual's average insurable income to the national average insurable income. When calculating the individual coefficient, the individual's average is calculated from (i) their best three consecutive years out of the last 15 years of service before 1 January 1997 and (ii) the whole period after 31 December 1996. As from January 2019 the choice of the 3 best years will be abolished and the reference period for calculation of the individual coefficient will include only the service after 1996.

- The national average monthly insurable income for the 12 months preceding retirement is calculated and reported by the National Social Security Institute on a monthly basis.

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.

Members of elderly households having income lower than the minimum income guarantee are entitled to the social pension for old age. This pension is means-tested and is financed by the State budget.

The maximum pension is fixed at 35 percent of the maximum insurable income (35% of 2600 BGN).

Disability pensions are payable to insured persons who have lost more than 50 percent of their ability to work and have completed a minimum five-year insurance period. 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 more than 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.

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 after 2020.

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').

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 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 <u>in 2016</u> - the base year of pension projection

The contribution rate for pension is 17.8% of the gross insurable income. For persons born after 1959, the contribution rate for first pillar is 12.8% 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 40.8% (35.8% respectively) and is entirely on behalf of the State.

For 2016 **the statutory retirement age** is 63 years and 10 months for men and 60 years and 10 months for women. **The required length of service** for pension is 38 years and 2 months for men and 35 years and 2 months for women.

Insured persons who do not meet the qualifying conditions may still be eligible for old-age pension at age 65 and 10 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

The following summarizes the legislated reform measures:

1. **The contribution rate** for the State Pension Fund is 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 remains 5%. As of 1 January 2016 the State participation as a "third insurer" (12% State contribution) is abolished.
   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 is 12.8% in 2016 and increases by 1%-point each year until 2018 when it will be 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 (not clear rule in the legislation). The reform slows down the pace of the increase in statutory retirement age -   for men 65 are reached in 2029 instead of 2018. In the case of women 63 are reached in 2029 (against 2021) and then the statutory retirement age continues increasing till reaching 65 in 2037.
   Pre-reform settings applied in AWG 2015 country fiche: Rises in the statutory retirement age were set to 4 months each year until reaching 65 years of age for men and 63 years of age for women.

3. **The required contribution period** for qualifying retirement for 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.
   Pre-reform settings as from the AWG 2015 country fiche: The required length of service for pension was set to rise by 4 months each year until 37 years for women and 40 years for men are reached. The pace of the increase is now slower, 37 (W) and 40 (M) are now reached in 2027 (2021 in the AWG).

4. **The retirement age in case of shortage of insured length of service** is gradually increased to 67 years, 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).

5. A possibility for granting a **reduced early retirement pension** is 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:

TABLE1 - Qualifying conditions for retiring			2016	2020	2030	2040	2050	2060	2070
Qualifying condition for retiring with a full pension	Minimum requirements	Contributory period - men	38 y & 2 m	38 y &10 m	40 y	40 y	40 y	40 y	40 y
		Retirement age - men	63 y & 10 m	64 y & 3 m	65 y	65 y + LE	65 y + LE	65 y + LE	65 y + LE
		Contributory period - women	35 y & 2 m	35 y &10 m	37 y	37 y	37 y	37 y	37 y
		Retirement age - women	60 y & 10 m	61y & 6 m	63 y & 3 m	65 y + LE	65 y + LE	65 y + LE	65 y + LE
	Statutory retirement age - men		63 y & 10 m	64 y & 3 m	65 y	65 y + LE	65 y + LE	65 y + LE	65 y + LE
	Statutory retirement age - women		60 y & 10 m	61y & 6 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		62 y & 10 m	63 y & 3 m	64 y	64 y + LE	64 y + LE	64 y + LE	64 y + LE
	Early retirement age - women		59 y & 10 m	60 y & 6 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%	4.8%
	Bonus in case of late retirement		4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
	Minimum contributory period - men		38 y & 2 m	38 y &10 m	40 y	40 y	40 y	40 y	40 y
	Minimum contributory period - women		35 y & 2 m	35 y &10 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 workers in strenuous and hazardous work conditions (the first and second categories) is gradually increased to 55 years (for first category workers) and to 60 years (for second category workers).

7. As of January 2016 a minimum retirement age of 52 years and 10 months is introduced for workers in the defence and security sector in addition to the required minimum length of service 27 years. The minimum retirement age will be increased by 2 months annually to 55 years.

8. As of 2017 pension **accrual rate, which was 1.1 in 2016,** starts 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 until reaching 1.5. **The new values are applied to both newly granted and already granted pensions. Pensions in payment are recalculated in July each year using the new value thus replacing the annual indexation in July.** All new pensions granted from January to December of the respective year will be calculated with the new value. For 2017 the legislated value of accrual rate is 1.126.
Pre-reform settings as from the AWG 2015 country fiche: The accrual rate was planned to be increased from 1.1 to 1.2 in 2017 for newly granted pensions only.

9. 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.

In Table 2, the administrative data on new pensions for 2015 are shown. The largest is the group of new old age pensioners representing 57.8% of all new pensioners, followed by disability pensions (29.2 %). The share of survivors and other pensions is 9.6% and 3.6% respectively.

TABLE 2 - Number of new pensioners by age group - administrative data 2015					
Age group (MEN)	All	Old age	Disability	Survivor	Other (including minimum)
15 - 49	10 608	2 125	5 794	942	1 747
50 - 54	5 190	1 971	3 077	0	142
55 - 59	9 977	5 633	4 214	0	130
60 - 64	18 352	13 297	3 772	1 201	82
65 - 69	9 286	8 596	532	110	48
70 - 74	686	142	274	17	253
Age group (WOMEN)	All	Old age	Disability	Survivor	Other (including minimum)
15 - 49	6 831	93	4 577	1 137	1 024
50 - 54	4 114	992	3 062	0	60
55 - 59	10 262	1 196	3 999	5 018	49
60 - 64	26 709	23 119	1 959	1 597	34
65 - 69	5 808	5 248	250	284	26
70 - 74	255	32	13	55	155
Age group (TOTAL)	All	Old age	Disability	Survivor	Other (including minimum)
15 - 49	17 439	2 218	10 371	2 079	2 771
50 - 54	9 304	2 963	6 139	0	202
55 - 59	20 239	6 829	8 213	5 018	179
60 - 64	45 061	36 416	5 731	2 798	116
65 - 69	15 094	13 844	782	394	74
70 - 74	941	174	287	72	408

2 Overview of the demographic and labour force projections

2.1 Demographic development

The new 2015-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 2016–2070 is provided in Table 3 where the expected evolution of Bulgarian population, life expectancy, surviving probabilities and net migration are summarised.

According to EUROSTAT's projection the overall size of the population is projected to decrease by more than 30% from 7.1 million people in 2016 to 4.9 million in 2070.

Bulgaria is one of the fastest-ageing economies in the EU due to lower fertility rates and growing life expectancies. Although the total fertility rate is projected to rise from 1.5 in 2016 to 1.8 in 2017 it still remains much below the natural replacement level of 2.1. At the same time the average life expectancy at birth which in 2016 is 71.8 for men and 78.5 for women increases by 11.5 years for men and 9.3 years for women reaching respectively 83.3 and 87.8 in 2070.

The age structure of the BG population is projected to change considerably in the coming decades due to the dynamics of fertility, life expectancy and migration rates. By 2060, the working age population (15-64) decreases by 41% and the population aged 65 and over increases by 18%. As a result, the old age dependency ratio[1] doubles (from 31.5% in 2016 to 63.0% in 2060), which implies that Bulgaria will move from having more than 3 working-age people for every person aged over 65 years to less than 2 working-age persons. In the last decade, the old-age dependency ratio slightly improves, decreasing to 56.2% at the end of the period.

The net migration flow that is currently negative is projected to reverse to positive after 2030, reaching its peak in 2051.

---

[1] The ratio of population aged 65+ over the population aged 15-64

Table 3 - Main demographic variables evolution								
	2016	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**	**Peak year***
Population (thousand)	7 131	6 928	6 382	5 913	5 548	5 208	4 856	2016
Population growth rate	-0.7	-0.8	-0.8	-0.7	-0.6	-0.7	-0.7	2051
Old-age dependency ratio (pop65/pop15-64)	31.5	34.4	40.3	48.1	58.1	63.0	56.2	2057
Ageing of the aged (pop80+/pop65+)	22.9	22.5	27.9	30.9	31.9	39.1	47.7	2070
Men - Life expectancy at birth	71.8	72.6	75.1	77.4	79.5	81.5	83.3	2070
Men - Life expectancy at 65	14.5	14.9	16.3	17.7	19.0	20.3	21.5	2070
Women - Life expectancy at birth	78.5	79.2	81.2	83.0	84.7	86.3	87.8	2070
Women - Life expectancy at 65	17.9	18.3	19.7	21.0	22.3	23.5	24.7	2070
Men - Survivor rate at 65+	72.7	74.5	79.1	83.0	86.1	88.7	90.8	2070
Men - Survivor rate at 80+	35.0	37.7	45.7	53.2	60.2	66.4	71.8	2070
Women - Survivor rate at 65+	86.6	87.5	89.7	91.6	93.1	94.3	95.3	2070
Women - Survivor rate at 80+	58.2	60.5	66.8	72.3	77.1	81.1	84.4	2070
Net migration	-4.3	-11.9	-9.1	0.5	3.9	0.7	1.3	2051
Net migration over population change	0.1	0.2	0.2	0.0	-0.1	0.0	0.0	2022

Source: EUROSTAT and Commission services

Graph 1 compares the age distribution of Bulgarian population at the base year 2016 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 2016 vs. 2070
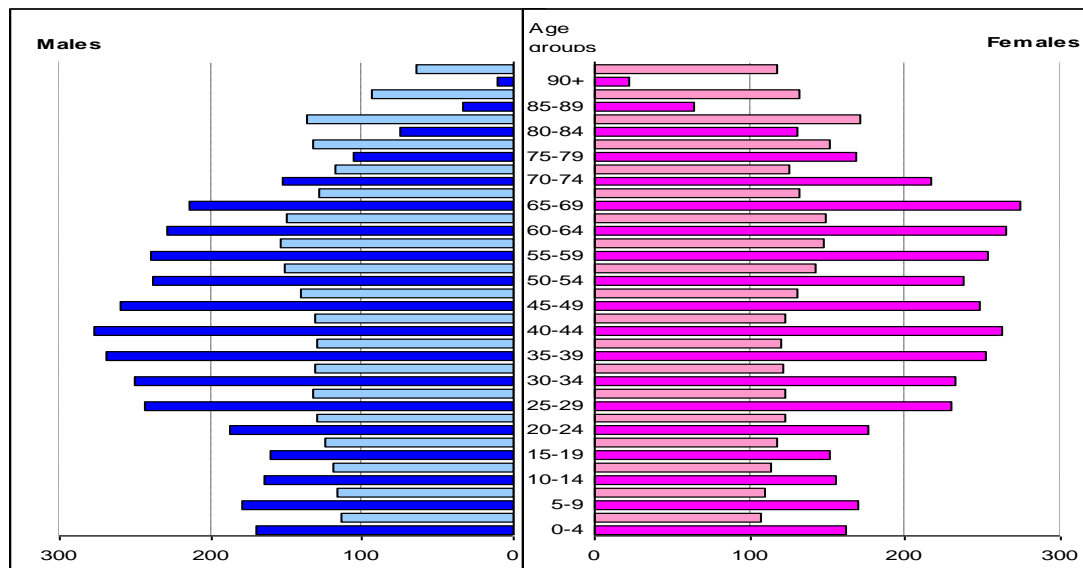
2.2 Labour forces

Table 4 focuses on some key labour market indicators as projected by the Cohort Simulation Model (CSM) developed by the European Commission.

The labour force participation rates as well as employment rates of older workers are projected to increase, mostly due to raising of statutory retirement age. In the new projection, the participation rate of the age group 55-64 rises by 4.4 percentage points between 2016 and 2070. Compared to the 2015 Ageing Report, the rates are between 2 and 3 p.p. higher. Employment rate of the age group 55-64 increases by 4.7 p.p., reaching 59.3% in 2070. Compared to the 2015 Ageing Report, these rates are about 5 p.p. higher in 2020 and about 3 p.p. higher in 2060. Participation rates of the age group 65-74 as well as employment rates for workers aged 65-74 increase significantly over the projection period

by more than 7.0 p.p. In the period 2020 – 2040 the values are lower than those in the 2015 Ageing Report. Afterwards the difference is diminishing and by 2060 both participation rates and employment rates of this group are the same as in 2015 projection.

Table 4 - Participation rate, emoloyment rate and share of workers for the age groups 55-64 and 65-74								
	2016	2020	2030	2040	2050	2060	2070	Peak year*
Labour force participation rate 55-64	58.9	58.6	63.1	63.2	61.6	63.4	63.3	2066
Employment rate for workers aged 55-64	54.6	55.4	59.1	59.3	57.7	59.5	59.3	2066
Share of workers aged 55-64 on the total labour force 55-64	92.7	94.5	93.6	93.8	93.8	93.7	93.8	2019
Labour force participation rate 65-74	7.3	9.5	12.8	14.5	14.6	13.9	14.9	2044
Employment rate for workers aged 65-74	7.1	9.3	12.6	14.3	14.3	13.7	14.6	2044
Share of workers aged 65-74 on the total labour force 65-74	97.42	98.23	98.29	98.22	98.42	98.64	98.37	2062
Median age of labour force	42.00	43.00	45.00	46.00	43.00	43.00	43.00	2035

Source: Commission services

The average effective exit ages in Tables 5a and 5b are projected by CSM for both genders on the basis of participation rates and taking into account the increases of retirement ages. Average contributory period is projected by the national long-term pension model. According to BG pension legislation the required contributory period for pension gradually increases from 38 y & 2 m to 40 years for men and from 35 y & 2 m to 37 years for women. Taking into account the legal provisions, the average contributory period is projected to increase from 35.7 for men and 35.0 for women in 2017 to 39.9 for men in 2031 and to 37.0 for women in 2030. 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 but will have to postpone their retirement until 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 effective exit age. It increases approximately by 6 years for both genders over the projection horizon. The ratio of duration of retirement to average contributory period increases from around 40% to 60% for men. For women this ratio increases more moderately from 60% in 2017 to 70% in 2070. By the end of projection period women will spend almost 36% of their adult time in retirement while for men this percentage is 31.5.

TABLE 5a - Labour market effective exit age and expected duration of life spent at retirement - MEN								
	2017	2020	2030	2040	2050	2060	2070	Peak year
Average effective exit age (CSM) (II)	63.8	64.0	64.7	64.7	64.7	64.7	64.7	2055
Contributory period	35.7	36.5	39.5	39.7	39.4	39.0	38.5	2031
Duration of retirement	15.1	15.6	16.3	17.7	19.0	20.3	21.5	2070
Duration of retirement/contributory period	0.4	0.4	0.4	0.4	0.5	0.5	0.6	2070
Percentage of adult life spent at retirement	24.8	25.3	25.9	27.5	28.9	30.3	31.5	2070
Early/late exit	1.1	1.0	1.1	0.9	0.8	0.6	0.7	2023

TABLE 5b - Labour market effective exit ahe and expected duration of life spent at retirement - WOMEN								
	2017	2020	2030	2040	2050	2060	2070	Peak year
Average effective exit age (CSM) (II)	62.6	62.8	63.6	64.1	64.1	64.1	64.1	2038
Contributory period	35.0	35.7	37.0	36.7	36.4	36.1	35.8	2030
Duration of retirement	19.5	19.9	20.5	21.8	23.1	24.4	25.6	2070
Duration of retirement/contributory period	0.6	0.6	0.6	0.6	0.6	0.7	0.7	2070
Percentage of adult life spent at retirement	30.4	30.8	31.0	32.1	33.4	34.6	35.7	2070
Early/late exit	0.5	1.0	1.0	1.1	0.9	0.7	0.8	2035

Source: NSSI and Commission services

3 Pension projection results

The projections examine the long-term status of the Public pension insurance in Bulgaria for the period 2016-2070. 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 Public Social Insurance (PSI) Budget is used for producing these projections.

The new pension projection adequately reflects the most recent (August 2015) amendments in the Bulgarian pension legislation. The latest Government decision for additional increase of minimum earnings-related pensions in July and in October 2017 also was taken into account. The legislated link of the retirement age with changes in life expectancy, which is to be applied after 2037, was 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 2016, 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 2007–2014 show difference between 0.6 – 1.0 percent of GDP. This difference is 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 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 6 - Eurostat (ESSPROS) vs. Ageing Working Group definition of pension expenditure (% GDP)								
	2007	2008	2009	2010	2011	2012	2013	2014
1. Eurostat total pension expenditure	6.5	6.7	8.2	8.7	8.1	8.1	8.6	8.8
2. Eurostat public pension expenditure	6.5	6.7	8.2	8.7	8.1	8.1	8.6	8.8
3. Public pension expenditure (AWG)	7.4	7.7	8.9	9.3	8.8	8.8	9.4	9.7
4. Difference (2) - (3)	-0.9	-1.0	-0.6	-0.7	-0.6	-0.7	-0.8	-0.9
5. *Expenditure categories not considered in the ESSPROS definition, please specify:*	**0.9**	**1.0**	**0.6**	**0.7**	**0.6**	**0.7**	**0.8**	**0.9**
5.1 Suplements paid to the pensions	0.9	1.0	0.6	0.7	0.6	0.7	0.8	0.9

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 7 presents the projection results concerning the public pension expenditure as a percentage of GDP (the pension-to-GDP ratio) for the period 2016 - 2070 taking into account the latest changes   (August 2015) in the Bulgarian pension legislation.

Table 7 - Projected gross and net pension spending and contributions (% of GDP)								
Expenditure	**2016**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**	**Peak year ***
Gross public pension expenditures	9.6	9.1	9.0	9.8	11.1	11.6	10.9	2058
Private occupational pensions								
Private individualpensions								
Mandatory private								
Non-mandatory private								
Gross total pension expenditures	9.6	9.1	9.0	9.8	11.1	11.6	10.9	2058
Net public pension expenditure	9.6	9.1	9.0	9.8	11.1	11.6	10.9	2058
Net total pension expenditure	9.6	9.1	9.0	9.8	11.1	11.6	10.9	2058
Contributions	**2016**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**	**Peak year ***
Public pension contributions	4.2	4.9	5.1	5.1	5.1	5.1	5.1	2063
Total pension contributions	4.2	4.9	5.1	5.1	5.1	5.1	5.1	2063

Source: NSSI and Commission services

While the projection results included in The 2015 Ageing Report, showed a decrease in the total pensions-to-GDP ratio from 9.9 percent in 2013 to 9.4 percent in 2060 (GDP adjusted to ESA 2010), the new results show higher percentages of pension expenditures to GDP ratio. The difference in 2060 is more than 2 p.p. when the ratio reaches 11.6%. Certain decrease is observed over the last decade and at the end of the period the ratio is 10.9%. Public pension contributions constitute 4.2 – 5.1% of GDP between 2016 and 2070 (7.2 - 7.4% in 2015 Ageing Report) due to abolishment of the State participation with 12% contribution as of 2016.

After the pension reform measures described in section 1.2 were legislated, an updated version of the pension projection showing the effect of the change in pension policy was presented before the Ageing Working Group in May 2016.

The following graph shows pensions-to-GDP ratio according to 2015 Ageing Report base case, 2016 update and the new projection. The difference between 2015 Ageing Report and 2016 update is a result of the change in pension policy and the difference between 2016 update and the new projection is entirely due to the change in assumptions.

Graph 2: Public Pension expenditures, % GDP
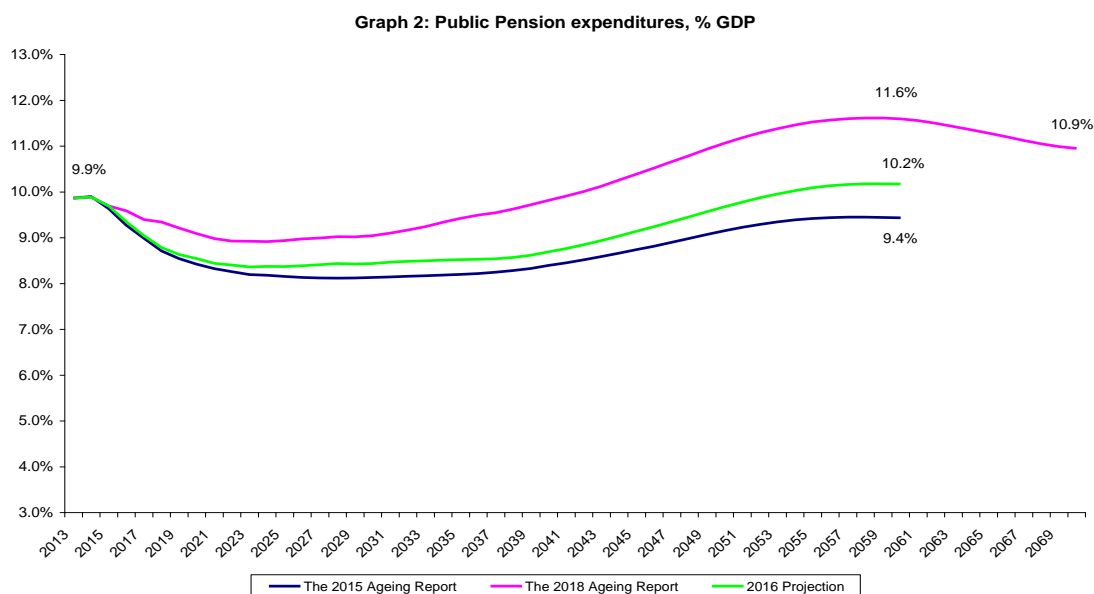
The main factors influencing pension expenditures are the number of pensioners and the average pension amount. In the new projection the number of pensioners in the second half of the period is lower comparing to the 2015 Ageing Report due to legislated equalization of the retirement ages of men and women. Regarding average amounts, they are higher now due to projected accrual rate gradual increase from 1.1 to 1.5 instead of to 1.2 as well as due to higher percentages of the annual pension's indexations. Greatest effect towards increase in the percentage of pension costs should be expected from the change in accrual rate, which is now 25% higher.

In the beginning of the period the projected public pension expenditures to GDP ratio shows a decreasing trend which is a result of the tightened eligibility conditions for acquiring old age pension (increase of statutory retirement age and of required years of service) and the associated lower number of old age pensioners. The increasing trend in the pension expenditures after 2030 reflects the adverse effects of the expected changes in the age structure of the Bulgarian population as well as the higher pension amounts.

The growth in pension expenditure in the new projection (especially vis-à-vis the 2015 projections) is primarily in the category of old-age and early earnings-related pensions. Old-age and early pensions were forecast in the 2015 projection to fall from 8.1% of GDP in 2013 to 7.5% of GDP in 2060, and in the 2016 projection, from 7.9% in 2013 to 7.7% in 2060. In the current projection they are projected to rise from 7.7% of GDP in 2016 to 8.9% by 2060 (Table 8). (Disability pensions rise from 1.3% in 2016 to 1.7% by 2070 but this is not that different from the 2015 projection where disability pensions rose from 1.3% in 2013 to 1.6% in 2060).

The expenditure for disability pensions rise from 1.3% in 2016 to 1.7% by 2070. Although in 2070 the value is slightly higher than in AR 2015, the percentages over the projection period are significantly higher now, rising to 2.5 by 2050 and then slightly decreasing to 2.1 by 2060 (1.6 in AR 2015), due to expected higher number of disability pensions as an

alternative of the introduction of stronger eligibility conditions for acquiring old-age pension.

The development of survivors' pension expenditures remains relatively stable over the projection period, slightly decreasing over the last three decades. Due to change in the structure of pension projection questionnaire, expenditures for non-earnings related minimum pensions are now reported under two different items – social pensions for old age are included in old age and early pensions and social disability pensions are reported under the item "other pensions". Expenditures for social pensions for old age show an increasing trend because these pensions are used as a tool to fill the gap between number of pensioners and inactive at the end of the period. Double increase is envisaged in "other pensions" expenditures between 2030 and 2070 due to the same reason.

Table 8 - Projected gross public pension spending by schemes (% of GDP)								
Pension scheme	2016	2020	2030	2040	2050	2060	2070	Peak year *
Total public pensions	9.6	9.1	9.0	9.8	11.1	11.6	10.9	2058
of which								
Old age and early pensions:	7.7	7.1	6.6	7.0	8.1	8.9	8.7	2061
Flat component	:	:	:	:	:	:	:	:
Earnings related	7.7	7.0	6.6	7.0	8.1	8.9	8.6	2061
Minimum pensions (non-contributory) i.e. minimum income guarantee for people above 65	0.01	0.01	0.01	0.01	0.02	0.03	0.04	2070
Disability pensions	1.28	1.48	1.92	2.37	2.47	2.18	1.74	2046
Survivor pensions	0.30	0.34	0.37	0.33	0.26	0.25	0.24	2027
Other pensions	0.31	0.22	0.14	0.13	0.20	0.25	0.29	2016

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 2016 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 9 below, the pensions-to-GDP ratio shows an increasing trend after 2030, reflecting the ageing of Bulgarian population. The sharper growth in 2030-2050 reflects the specificity of Bulgarian demographic structure, namely the peak of births in the 1970s, leading to a higher number of retiring people between 2035 and 2050.

The main driving factor behind the development of the public pension expenditures to GDP ratio for the period under review (2016–2070) is **the dependency ratio**, which contributes 6.0 percentage points reflecting the ageing of Bulgarian population.

The coverage ratio has a negative contribution (- 3.0 p.p.) due to the increase of the required years of service and of the statutory retirement age.

The benefit ratio has a negative contribution (- 1.1 p.p.) due to the fact that the indexation rule gives lower percentage increase of pensions than the projected wage growth.

The labour market developments have also a decreasing effect (-0.2 p.p.) on the pension costs mainly as a result of the career shift effect.

Table 9 - Factors behind the change in public pension expenditures between 2016 and 2070 (in percentage points of GDP) - pensioners

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70	Average annual change
Public pensions to GDP	**-0.5**	**0.0**	**0.8**	**1.2**	**0.5**	**-0.6**	**1.4**	0.025
Dependency ratio effect	**0.9**	**1.6**	**1.7**	**2.0**	**1.0**	**-1.3**	**6.0**	10.7%
Coverage ratio effect	**-0.5**	**-0.8**	**-1.1**	**-0.7**	**-0.3**	**0.5**	**-3.0**	-5.7%
Coverage ratio old-age	*0.0*	*-0.5*	*-0.8*	*-0.2*	*0.4*	*0.2*	*-0.9*	-1.8%
Coverage ratio earliy-age	*-1.1*	*-1.3*	*-0.8*	*0.3*	*-1.9*	*-0.5*	*-5.3*	-10.2%
Cohort effect	*-0.6*	*-0.3*	*-1.0*	*-3.0*	*-1.9*	*2.6*	*-4.3*	-9.1%
Benefit ratio effect	**-0.5**	**-0.8**	**0.2**	**0.1**	**0.0**	**0.0**	**-1.1**	-2.0%
Labour Market/Labour intensity effect	**-0.3**	**0.1**	**0.0**	**-0.1**	**-0.1**	**0.3**	**-0.2**	-0.4%
Employment ratio effect	*-0.3*	*0.2*	*0.2*	*0.0*	*-0.2*	*0.1*	*0.0*	-0.1%
Labour intensity effect	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0%
Career shift effect	*-0.1*	*-0.1*	*-0.1*	*-0.1*	*0.1*	*0.1*	*-0.2*	-0.3%
Residual	**-0.1**	**-0.1**	**-0.1**	**-0.1**	**0.0**	**0.0**	**-0.4**	-0.2%

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

Source: Commission services

Table 10 shows the evolution of replacement rate at retirement (RR) and benefit ratio (BR) over time. **Benefit ratio** is the ratio between average pension in payment and economy–wide average wage whereas **Replacement rate at retirement** is calculated as the ratio between the average newly granted pension and average gross wage at the age of retirement. According to statistical information available in the NSSI, the average gross wage at the age of retirement is about 4.0% higher than economy–wide average wage.

An important role for future development of benefit ratio and replacement rate at retirement plays the gradual increase of the accrual rate from 1.1 to 1.5. While in the previous projection (2015 Ageing Report) it was assumed that the accrual rate will increase from 1.1 to 1.2 in 2017, the new legislation stipulates that as of 2017 the accrual rate in pension formula will start to increase gradually with a percentage equal to the sum of 50% of CPI and 50% of the average insurable income growth in previous year. **The new values will be applied both to newly granted and already granted pensions. Pensions in payment will be recalculated using the new values in July each year and the resulting increase in pension amounts will replace the annual indexation. All new pensions granted from January to December of the respective year will be calculated with the new value.** Thus the accrual rate will be increased every year and this process will continue until it reaches 1.5 in 2026. Comparing to The 2015 Ageing Report the accrual rate in the new projection is 25% higher.

Table 10 - Replacement rate at retirement (RR), benefit ratio (BR) and coverage by pension scheme (in %)

		2016	2020	2030	2040	2050	2060	2070
Public Scheme (BR)		31.2	29.6	27.5	28.4	29.2	29.5	30.1
Public Scheme (RR)		29.1	31.5	32.4	32.7	33.6	33.9	34.0
	Coverage	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Public scheme old-age earnings related (BR)		33.9	33.1	32.6	34.9	35.3	34.7	34.8
Public scheme old-age earnings related (RR)		35.8	40.6	41.8	40.8	39.3	39.4	39.2
	Coverage	74.3	69.2	60.8	56.8	58.6	62.2	64.0
Private occupational scheme (RR)								
Private occupational scheme (BR)								
	Coverage							
Private individual scheme (RR)								
Private individual scheme (BR)								
	Coverage							
Total (BR)		31.2%	29.6%	27.5%	28.4%	29.2%	29.5%	30.1%
Total (RR)		29.1%	31.5%	32.4%	32.7%	33.6%	33.9%	34.0%

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.

Total benefit ratio is influenced both by the accrual rate increase and by indexation rule. In the beginning of the period its level is around 31%. The decreasing values in the first two decades are a consequence of the accrual rate increase without annual indexation until 2026. Afterwards, when the accrual rate is 1.5 and the annual indexation is resumed it starts increasing and at the end of the projection period it reaches values close to those in the base year. The same is the trend for old age pensions but the values are higher (about 35% in 2070).

Replacement rate at retirement, both in total and for old age pensions, increases significantly over the projection period due to legislated increase in accrual rate. At the end of the period the total replacement rate reaches 34.0%. Replacement rate for old age pensions increases from 35.8% in 2016 to 39.2% in 2070. The equalization of the retirement ages of men and women at 65 also has an increasing effect on the replacement rate in the new projection.

In Table 11 two important indicators concerning the financial sustainability of the public pension system are presented - Pension System Dependency Ratio (the ratio of pensioners to employment) and Old-age Dependency Ratio (the ratio of people aged 65+ to working age population). The total number of pensioners shows a diminishing 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 98.2 pensioners per 100 employed persons in 2060. Certain decrease in this ratio is observed over the last decade as a consequence of the lower levels of the Old-age Dependency Ratio as projected by Eurostat. The ratio between number of people aged 65+ and working age population (Old-age Dependency Ratio) increases reflecting the process of ageing of Bulgarian population. Starting from 31.5% in 2016 it doubles in 2060 reaching the level of 63% which means 63 people aged 65+ per 100 people at working age. The improvement in this ratio at the end of projection period is due to higher fertility rates leading to more people at working age.

Table 11 - System Dependency Ratio and Old Age Dependency Ratio							
	2016	2020	2030	2040	2050	2060	2070
Number of pensioners (thousand) (I)	2 181.4	2 135.5	2 030.6	1 898.9	1 856.9	1 779.8	1 605.2
Employment (thousand) (II)	3 021.1	2 953.9	2 574.6	2 268.2	1 988.4	1 813.0	1 730.8
Pension System Dependency Ratio (SDR) (I)/(II)	72.2	72.3	78.9	83.7	93.4	98.2	92.7
Number of people aged 65+ (thousand) (III)	1 468.7	1 517.0	1 583.2	1 667.3	1 757.1	1 732.4	1 502.3
Working age population 15 - 64 (thousand) (IV)	4 663.3	4 412.3	3 929.3	3 465.7	3 023.4	2 751.1	2 673.2
Old-age Dependency Ratio (ODR) (III)/(IV)	31.5	34.4	40.3	48.1	58.1	63.0	56.2
System efficiency (SDR/ODR)	2.3	2.1	2.0	1.7	1.6	1.6	1.7

In Tables 12a and 12b 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 60) of the population are mostly affected by the tightened eligibility conditions and increasing of the statutory retirement age, which explains the observed decreasing trends in these groups in both tables. The ratios in the age group 60 – 64 are lower compared to the 2015 Ageing report due to the continuing increase of the retirement

age of women beyond the age required in 2015 projection (63) in order to be equalized with that of men (65).

Special attention should be paid to the age group 65-69, where the coverage drops from 110.1% to 79.0% in the period 2016 - 2030. The reasons can be divided into two types – change in legislation and change in assumptions. The following legislative measure influences the coverage rates of the age group 65-69:

(1) The retirement age in case of shortage of insured service is gradually increasing from 65 to 67 years of age for both genders - pensioners who have not contributed enough at statutory retirement age, have to wait until they are 67 years old, when they can retire if they have at least 15 years of contributions. Otherwise they have to wait until age of 70 and only if they are very poor (at household level), they could get a social pension, which is means tested.

The change in assumptions influencing the coverage for the age group 65-69, especially in the period 2020 – 2030, is:

(2) Labour force participation rates 65 – 74 in the new projection are lower (Table 4) - 9.5% (2020) and 12.8% (2030) vs. 11.4% (2020) and 14.0% (2030) in the 2015 Ageing Report. The lower participation rates create more inactive people in the indicated group.

As a result of (2), in 2030 the number of inactive in the group 65-69 according to the new projection is 332.1 thousands vs. 327.7 in 2015 projection or 1.3% more inactive in the new projection. Simultaneously, in 2030 the number of pensioners in the same group is lower, 262.2 in the new projection vs. 266.3 in 2015 projection, due to the change in legislation (1). The lower number of pensioners in combination with higher number of inactive people results in lower ratio of pensioners to inactive in the new projection – 79.0 vs. 81.2 in AR 2015 (2030).

For the ratios higher than 100% contribute working pensioners (about 10% of Bulgarian pensioners work and acquire additional pension rights, appearing at the same time as insured persons and thus decreasing the size of inactive population) as well as pensioners living outside the country.

Table 12a - Pensioners (public schemes) to inactive population ratio by age group (%)							
	2016	2020	2030	2040	2050	2060	2070
Age group -54	10.6%	11.2%	11.2%	9.5%	7.0%	6.1%	5.2%
Age group 55-59	108.0%	88.7%	92.1%	87.7%	81.3%	71.3%	71.2%
Age group 60-64	115.2%	94.6%	86.4%	83.1%	80.4%	77.2%	78.8%
Age group 65-69	110.1%	101.7%	79.0%	79.4%	79.3%	79.1%	78.3%
Age group 70-74	107.3%	119.1%	101.7%	94.4%	99.3%	102.0%	103.0%
Age group 75+	105.0%	105.6%	113.7%	101.2%	94.7%	96.0%	97.7%

Table 12b - Pensioners (public schemes) to population ratio by age group (%)							
	2016	2020	2030	2040	2050	2060	2070
Age group -54	4.7%	5.0%	5.2%	4.6%	3.5%	3.0%	2.6%
Age group 55-59	28.0%	22.5%	22.1%	21.8%	21.1%	18.2%	18.2%
Age group 60-64	64.8%	54.2%	44.3%	39.8%	38.9%	37.2%	37.8%
Age group 65-69	98.7%	86.4%	64.1%	63.0%	62.5%	62.7%	61.8%
Age group 70-74	103.8%	114.9%	95.1%	87.4%	91.2%	93.6%	94.6%
Age group 75+	104.8%	105.6%	113.7%	101.2%	94.7%	96.0%	97.7%

Source: NSSI and Commission services

Tables 13a and 13b 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 13a - Female pensioners to inactive population ratio by age group (%)						
	2016	2020	2030	2040	2050	2060	2070
Age group -54	9.0%	9.3%	8.2%	6.6%	4.8%	4.3%	3.7%
Age group 55-59	78.3%	81.7%	94.3%	77.3%	71.0%	66.9%	71.6%
Age group 60-64	105.1%	78.4%	85.3%	80.6%	76.7%	78.0%	85.9%
Age group 65-69	103.7%	97.8%	75.1%	78.6%	76.0%	77.4%	80.6%
Age group 70-74	103.4%	111.3%	91.0%	91.8%	97.1%	99.2%	101.7%
Age group 75+	101.1%	101.9%	107.1%	95.0%	93.9%	96.2%	97.1%

Table 13b - Female pensioners to population ratio by age group (%)						
	2016	2020	2030	2040	2050	2060	2070
Age group -54	4.2%	4.4%	4.1%	3.4%	2.6%	2.3%	2.0%
Age group 55-59	20.3%	19.9%	23.3%	20.9%	20.3%	18.8%	20.1%
Age group 60-64	67.1%	51.7%	49.4%	41.7%	40.3%	40.9%	44.9%
Age group 65-69	96.6%	85.3%	62.7%	64.4%	61.5%	63.0%	65.4%
Age group 70-74	100.9%	108.5%	86.0%	86.5%	89.9%	92.0%	94.2%
Age group 75+	101.0%	101.9%	107.1%	95.0%	93.9%	96.2%	97.1%

Source: NSSI and Commission services

Tables 14a, 14b and 14c 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 14a - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pension) - Total						
New pensions - Total	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	80.1	95.2	149.9	237.1	373.7	468.8	604.8
II. Average contributory period	35.2	36.1	38.2	38.3	38.0	37.7	37.3
III. Monthly average pensionable earnings	530.4	631.7	841.3	1274.9	1893.1	2841.0	4107.8
IV. Average accrual rates (%)	1.1	1.2	1.5	1.5	1.5	1.5	1.5
V. Sustainability/Adjustment factor							
VI. Number of new pensions ('000)	60.0	52.0	47.9	49.8	53.3	44.9	40.5
VII Average number of months paid the first year	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Monthly average pensionable earnings / Monthly economy-wide average wage	1.0	0.9	0.8	0.7	0.7	0.7	0.7

Source: NSSI

Two main differences between tables 14b and 14c make an impression and they concern the average contributory period and monthly average pensionable earnings of both genders. Obviously males have higher average contributory period and higher average pensionable earnings which determines higher pension amounts for males compared to female pensioners. The reasons could be found in legislation – required length of service for men is 3 years higher than that for women. The values of this indicator slightly decrease after 2040 for both genders due to the fact that the requirements necessary for acquiring pension (40 years for men an 37 years for women) will be difficult to be fulfilled and more people who have not enough years of service will not be able to retire at statutory retirement age and will have to postpone their retirement until reaching 67 years of age when the legislation gives them the possibility to retire with at least 15 years of contributions.

The ratio of monthly average pensionable earnings to economy-wide average wage is not constant over the projection period. It 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 will retire after 2040, about 75% of the actual pensionable earnings will be taken into account for pension calculation.

Table 14b - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pension) - MEN							
New pensions - MEN	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	45.8	46.5	70.5	132.3	202.7	259.9	345.5
II. Average contributory period	35.5	36.5	39.5	39.7	39.4	39.0	38.5
III. Monthly average pensionable earnings	577.3	698.2	934.8	1410.1	2073.2	3109.8	4481.3
IV. Average accrual rates (%)	1.1	1.2	1.5	1.5	1.5	1.5	1.5
V. Sustainability/Adjustment factor							
VI. Number of new pensions ('000)	31.2	22.7	19.6	24.2	25.4	22.0	20.5
VII Average number of months paid the first year	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Monthly average pensionable earnings / Monthly economy-wide average wage	1.0	1.0	0.8	0.8	0.8	0.8	0.8

Table 14c - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pension) - WOMEN							
New pensions - WOMEN	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	**34.4**	**48.7**	**79.3**	**104.8**	**171.0**	**208.9**	**259.3**
II. Average contributory period	34.8	35.7	37.0	36.7	36.4	36.1	35.8
III. Monthly average pensionable earnings	479.7	580.2	776.7	1146.7	1728.9	2584.0	3723.6
IV. Average accrual rates (%)	1.1	1.2	1.5	1.5	1.5	1.5	1.5
V. Sustainability/Adjustment factor							
VI. Number of new pensions ('000)	28.8	29.3	28.3	25.5	27.9	23.0	20.0
VII Average number of months paid the first year	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Monthly average pensionable earnings / Monthly economy-wide average wage	0.9	0.9	0.7	0.7	0.7	0.7	0.7

Source: NSSI

3.4 Financing of the pension system

Pension contributions to the public pension system in Bulgaria are distributed between employer and employee. The total contribution rate for pension in 2016 is 17.8% of the gross insurable income. For persons born after 1959, the contribution rate for first pillar is 12.8% 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 40.8% (35.8% respectively) in 2016 and 60.8% (55.8% respectively) as of 2017 and is entirely on behalf of the State. In the period 2009 - 2015 the State participated as a "third insurer" and paid contribution equal to 12% of the total insurance income of all insured persons. As of 1 January 2016 the State contribution is abolished. The contribution rate for pension is increased by 1 %-point in 2017 and further by 1 %-point in 2018 when it will reach 19.8%. In addition, the State has the obligation to cover any remaining financing gaps and deficits of the public pension system.

Table 15 - Financing of the system			
	Public employees	Private employees	Self-employed
Contribution base	Earnings up to 2600 BGN	Earnings up to 2600 BGN	Declared covered earnings
Contribution rate/contribution	State pension (1st Pillar)		
Employer	7.7% in 2017 and 8.3% in 2018 (born after December 1959) / 10.5% in 2017 and 11.1% in 2018 (born before January 1960)	7.7% in 2017 and 8.3% in 2018 (born after December 1959) / 10.5% in 2017 and 11.1% in 2018 (born before January 1960)	
Employee	6.1 in 2017 and 6.5% in 2018% (born after December 1959) / 8.3% in 2017 and 8.7% in 2018 (born before January 1960)	6.1 in 2017 and 6.5% in 2018% (born after December 1959) / 8.3% in 2017 and 8.7% in 2018 (born before January 1960)	For persons born before January 1, 1960, 18.8% of declared covered earnings in 2017 and 19.8% in 2018; for persons born after December 31, 1959, is 13.8% in 2017 and 14.8% in 2018 of declared covered earnings
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 base	2600 BGN	2600 BGN	2600 BGN
Minimum contribution base	Minimum wage	Minimum wage	Minimum wage

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 2016, the number of contributors in Bulgarian pension system was around 2.8 million people and represented 91.5% of employment (Table 16). Starting from this level, the number of contributors is projected as a progressively increasing proportion of the employment (reaching 100% in 2033), assuming that the share of informal employment will be significantly reduced. Although this assumption could be considered as very optimistic, the results show about 37% decrease in number of contributors and about 57% decrease in employment over the projection period, as the main reason for this is the declining population in working age.

Table 16 - Revenue from contribution (Millions), number of contributors in public scheme (in 1000), total employment (in 1000) and related ratios (%)							
	2016	2020	2030	2040	2050	2060	2070
Public contribution	2 002	2 741	4 101	5 737	7 714	10 465	14 396
Employer contribution	1 101	1 507	2 256	3 156	4 243	5 756	7 918
Employee contribution	901	1 233	1 846	2 582	3 472	4 709	6 478
State contribution	-	-	-	-	-	-	-
Other revenues							
Number of contributors (I)	2 765.1	2 762.7	2 536.7	2 268.2	1 988.4	1 813.0	1 730.8
Employment (II)	3 021.1	2 953.9	2 574.6	2 268.2	1 988.4	1 813.0	1 730.8
Ratio of (I)/(II)	0.9	0.9	1.0	1.0	1.0	1.0	1.0

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. Comparing to the 2015 Ageing Report three additional scenarios are included – lower employment rate, higher migration and lower fertility rate (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 of pension expenditures up to 2040 and a more significant change afterwards, amounting to 0.7 p.p. higher ratio of pension expenditures to GDP in 2070 in comparison with the baseline scenario.

— **Higher labour productivity** 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 wage and higher amounts of the newly granted pensions respectively. The ratio of pension expenditures to GDP however, 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 obvious than in the baseline scenario and the difference is approximately 0.5 p.p. lower ratio of pension expenditure to GDP at the end of the period in comparison with the baseline scenario.

— **Lower labour productivity** implies lower GDP and lower contributions revenue in the public pension scheme. Pension expenditure is also lower than in baseline scenario due to lower amounts of the average wage and lower amounts of the newly granted pensions respectively. Even though the rise of pensions in payment lags behind the rise of incomes, the lag is lower than in the baseline scenario and the result is approximately 0.6 p.p. higher pension expenditures as a percent of GDP at the end of the period in comparison with the baseline scenario.

— **Higher employment rate** in comparison with the baseline scenario implies higher GDP in the denominator which lowers the pensions to GDP ratio, as in 2030 it is 0.3 p.p. lower than in the baseline scenario. In long term this effect weakens because by staying longer on the labour market people acquire more pension rights and have higher pensions. The cumulative effect amounts to 0.1 p.p. lower ratio of pension expenditure to GDP in 2070 compared to the baseline scenario.

— **Lower employment rate** has the opposite effect on pension expenditures compared to higher employment rate scenario resulting in 0.1 p.p. higher pensions to GDP ratio in 2070 compared to the baseline scenario.

— **Higher employment rate of older workers** significantly lowers the pension expenditures compared to the baseline. The effect amounts to 0.6 p.p. lower ratio of pension expenditure to GDP in 2070 in comparison with the baseline scenario.

— **Higher migration** in the case of Bulgaria decreases population at the end of projection period compared to the baseline and has more significant impact in the middle of projection period but over the last decade the difference with base case scenario is diminishing and at the end of the period there is no difference with the baseline scenario.

— **Lower migration** has the opposite effect and it lowers pension expenditure to GDP ratio in the middle of the projection period. Over the last decade the

difference with base case scenario is diminishing and at the end of the period there is no difference compared to the baseline.

— **Lower fertility** has the most significant effect on pension expenditure due to lower number of people in working age creating less GDP than in base case. Under the assumption of 20% lower fertility than in the baseline scenario at the end of the period, the results show 2.3 p.p. higher ratio of pension expenditure to GDP in 2070 compared to the baseline scenario.

— **Risk scenario** leads to results similar to lower labour productivity scenario. The effect amounts to 0.3 p.p. higher ratio of pension expenditure to GDP in 2070 in comparison with the baseline scenario.

— **Policy scenario** leads to 1.3 p.p. lower ratio of pension expenditure to GDP in 2070 in comparison with the baseline scenario.

Table 17 - Public and total pension expenditures under different scenarios (p.p. deviation from the baseline)							
	2016	2020	2030	2040	2050	2060	2070
Public Pension Expenditure							
Baseline	9.6	9.1	9.0	9.8	11.1	11.6	10.9
Higher life expectancy (extra 2 years)	0.0	0.0	0.1	0.2	0.4	0.6	0.7
Higher lab. Productivity (+0.25 pp.)	0.0	0.0	0.0	-0.2	-0.4	-0.5	-0.5
Lower lab.productivity (-0.25 pp.)	0.0	0.0	0.0	0.2	0.5	0.6	0.6
Higher emp. rate (+2 pp.)	0.0	-0.1	-0.3	-0.2	-0.2	-0.1	-0.1
Lower emp.rate (-2 pp.)	0.0	0.1	0.3	0.3	0.2	0.2	0.1
Higher emp. of older workers (+10 pp.)	0.0	-0.2	-0.9	-0.9	-0.9	-0.6	-0.6
Higher migration (+20%)	0.0	0.0	0.1	0.2	0.2	0.2	0.0
Lower migration (-20%)	0.0	0.0	-0.1	-0.2	-0.2	-0.1	-0.0
Lower fertility	0.0	0.0	0.0	0.1	0.7	1.4	2.3
Risk scenario	0.0	0.0	0.2	0.3	0.3	0.3	0.3
Policy scenario: linking retirement age to increases in life ecpectancy	0.0	0.0	-0.3	-0.7	-1.1	-1.1	-1.3
Total Pension Expenditure							
Baseline	9.6	9.1	9.0	9.8	11.1	11.6	10.9
Higher life expectancy (extra 2 years)	0.0	0.0	0.1	0.2	0.4	0.6	0.7
Higher lab. Productivity (+0.25 pp.)	0.0	0.0	0.0	-0.2	-0.4	-0.5	-0.5
Lower lab.productivity (-0.25 pp.)	0.0	0.0	0.0	0.2	0.5	0.6	0.6
Higher emp. rate (+2 pp.)	0.0	-0.1	-0.3	-0.2	-0.2	-0.1	-0.1
Lower emp.rate (-2 pp.)	0.0	0.1	0.3	0.3	0.2	0.2	0.1
Higher emp. of older workers (+10 pp.)	0.0	-0.2	-0.9	-0.9	-0.9	-0.6	-0.6
Higher migration (+20%)	0.0	0.0	0.1	0.2	0.2	0.2	0.0
Lower migration (-20%)	0.0	0.0	-0.1	-0.2	-0.2	-0.1	-0.0
Lower fertility	0.0	0.0	0.0	0.1	0.7	1.4	2.3
Risk scenario	0.0	0.0	0.2	0.3	0.3	0.3	0.3
Policy scenario: linking retirement age to increases in life ecpectancy	0.0	0.0	-0.3	-0.7	-1.1	-1.1	-1.3

Source: NSSI and Commission services

3.6 Description of the changes in comparison with the 2015 Ageing Report

Differences between the new projection and 2015 Ageing Report projection results are due to:

— Change in assumptions - population, macro-economic and labour market assumptions;

— Policy related changes with regard to contribution rate, eligibility conditions for retirement and accrual rate in pension formula.

Table 18 shows the overall change in public pension expenditure to GDP under 2009, 2012, 2015 and 2018 projection exercises.

Table 18 - Overal change in public pension expenditure to GDP under the 2009, 20012, 2015 and 2018 projection exercises						
	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
2009 **	3.02	9.07	-3.00	-0.52	-1.76	:	-0.77
2012 ***	1.14	8.84	-3.93	-0.80	-2.14	0.00	-0.82
2015****	-0.43	6.69	-3.12	-0.89	-2.46	0.00	-0.65
2018*****	1.36	6.02	-2.97	-0.02	-1.07	0.00	-0.60

** 2007-2060; *** 2010-2060; **** 2013-2060; *****2016-2070

The values in Table 18 show that the most significant differences between AR 2015 and AR 2018 results are due to the lower contribution of both - the employment effect and benefit ratio effect in the new projection. The lower employment rates in the new projection have a decreasing effect over GDP in the denominator. As a result, the higher pensions-to-GDP ratio leads to lower negative contribution of the employment effect comparing to AR 2015. The lower contribution of the benefit ratio effect is a consequence of the legislated accrual rate increase (1.5 in AR 2018 vs. 1.2 in AR 2015) and change in assumptions (higher wages leading to higher pension amounts in the new projection). The latest Government decision for additional increases of minimum earnings-related pensions on an ad-hoc basis (in July and in October 2017) also has some influence over the benefit ratio.

Table 19 shows the decomposition of the difference between the new public pension projection and projection included in 2015 Ageing report. The main difference is due to change in assumptions leading to 1.4 p.p. higher pensions to GDP ratio in 2060. Policy related changes also have significant impact contributing to the higher values of pensions to GDP ratio in the new projection.

Table 19 - Decomposition of the difference between 2015 and the new public pension projection (% of GDP)							
	2016	2020	2030	2040	2050	2060	2070
Ageing Report 2015	9.3	8.4	8.1	8.4	9.1	9.4	
Change in assumptions	0.3	0.3	0.5	1.0	1.2	1.4	
Imrpovement in the coverage or in the modelling							
Change in the interpretation of constant policy							
Policy related changes		0.4	0.4	0.4	0.8	0.8	
Ageing Report 2018	9.6	9.1	9.0	9.8	11.1	11.6	10.9

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 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.
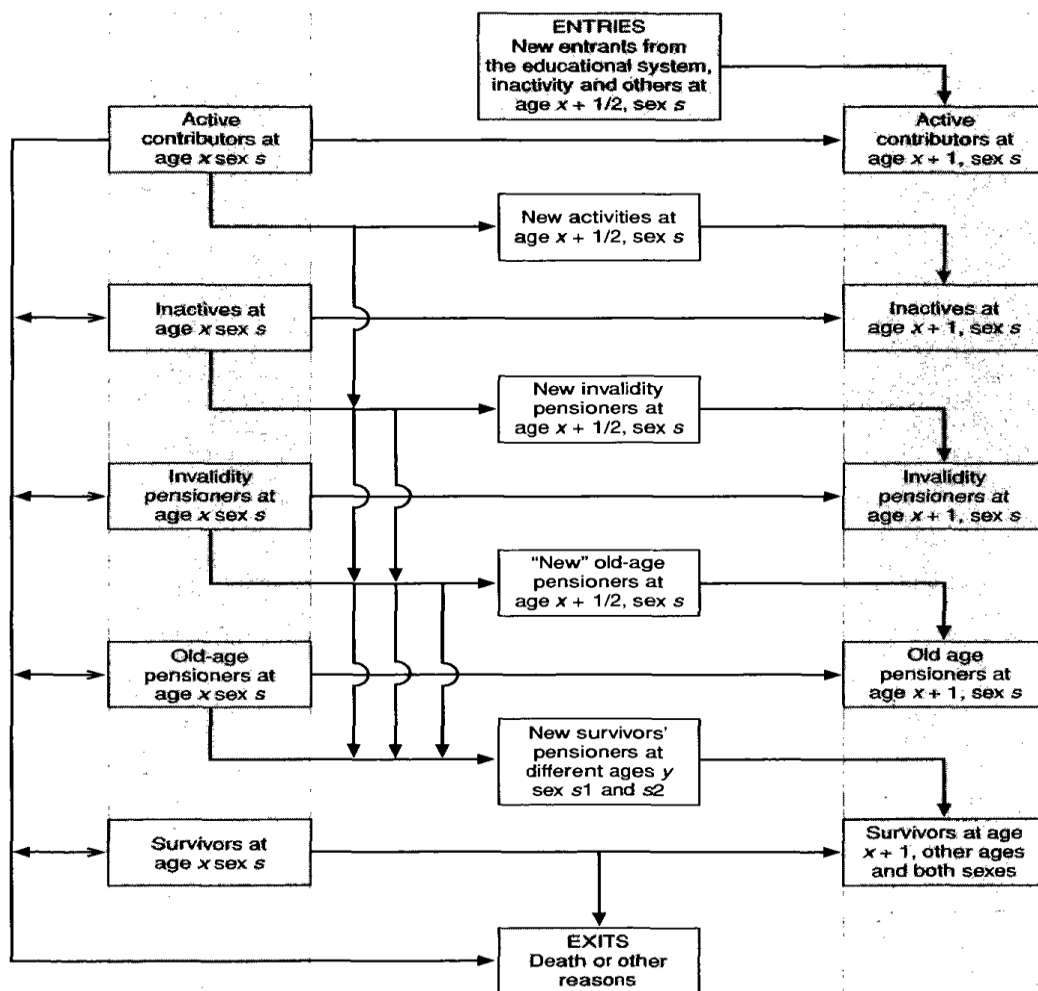

Figure 1: Demographic transformation from *t* to t+1 for age x and gender s

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

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

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:

$$NOAP_{t,x,s} = f\ (MAT1\ _{t,s}\ ;\ \textit{eligibility conditions})$$

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
$INS_{t,x,s}$	- 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

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

$$I_{t,x,s} = OA_{t,x,s}$$

$$S_{t,x,s} = 50\% * OA_{t,x,s}$$

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.

$$TE_t = \left(\sum_{t,x,s}(OAP_{t,x,s} * OA_{t,x,s}) \;+\; \sum_{t,x,s}(IP_{t,x,s} * I_{t,x,s}) \;+\; \sum_{t,s}(SP_{t,s} * S_{t,s}) \right) + AE_t + OE_t$$

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.

References

Convergence Programme of the Republic of Bulgaria 2017-2020

Europe 2020: National Reform Programme of the Republic of Bulgaria - 2017 update

EUROSTAT 2015-based population projection

DG ECFIN Macroeconomic Scenarios for Bulgaria

European Commission (2017), Economic Policy Committee, *Suggested structure for the country fiche on pension*

European Commission (2017), Economic Policy Committee, *Sensitivity tests for the pension projection exercise*

European Commission (2017), Economic Policy Committee*, Structure of the country fiche on pension*

Internal guidelines for the actuarial analysis of a national social security pension scheme – ILO Geneva

Law on the Public Social Insurance Budget 2016 and 2017

Law on the State Budget for 2016 and 2017

Social Budgeting – ILO Geneva

Social Insurance Code

The ILO Social Budget Model, a Technical Guide – ILO Geneva

The ILO Pension Model, a Technical Guide – ILO Geneva

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 2016 the ratio between the average insurable income at the effective age of retirement and total average insurable income for the country is 1.04. 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 evolution (in thousands euro)							
	2016	2020	2030	2040	2050	2060	2070
Economy-wide average wage	6.6	9.4	15.2	23.6	35.8	52.6	52.6
Economy-wide average wage at retirement	6.9	9.7	15.8	24.5	37.2	54.7	54.7

Pensioners vs Pensions

The model works with 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.

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 (%)							
	2016	2020	2030	2040	2050	2060	2070
Age group -54	0.7	0.6	0.5	0.5	0.3	0.2	0.2
Age group 55-59	2.4	2.2	1.5	1.6	1.1	0.8	0.7
Age group 60-64	2.9	2.8	2.4	2.4	1.7	1.2	1.1
Age group 65-69	0.8	1.1	0.9	1.1	0.7	0.5	0.5
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 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.

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 gender 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 average wage and statistically reported average insurable earnings.

Coverage and specification of pension schemes covered in 2018 projections

	BULGARIA

	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*