REPUBLIC OF BULGARIA

Country fiche on pension projections

Sofia, November 2014

Contents

1 Overview of the pension system

1.1 Description

The pension system in Bulgaria has undergone substantial structural reform 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. Since 2009 the State has become a "third insurer" and pays contributions equal to 12 percent of the total insurance income of all insured persons. In addition, the State has the obligation to cover any remaining financial gaps and deficits of the public pension system.

The **contribution rate for pension** (without the State contribution) 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.

In 2014, **the statutory retirement age** is 63 years and 8 months for men and 60 years and 8 months for women. The required length of service is 37 years and 8 months for men and 34 years and 8 months for women.

Insured persons who do not meet the qualifying conditions may still be eligible for old-age pensions at age 65 and 8 months (both men and women) with the completion of a 15-years insurance period.

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

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.

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 is currently 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. The reference period for calculation of individual coefficient is gradually extended to one's whole working life for persons entering the labour market after 1993.

- 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 with an 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 2400 BGN in 2014).

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 or soldier, no limit if disabled), a surviving spouse within 5 years prior to statutory retirement age (earlier if disabled), and 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.

Up to 2007 pensions were annually updated in June, depending on the financial capacity of the system. Amendments in the Social Insurance Code (SIC) which entered into force at the beginning of 2007 stipulated that **pensions' 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 ("Golden Swiss Rule").

In the period 2010–2012 due to the financial and economic crisis and the necessity from austerity measures, pension indexation has been suspended.

In 2013 as a result of political decision, an indexation with 9,3% on average took place in April. As of 2014 pensions are indexed in July every year with percentage equal to 50% of the increase in the consumer price index (CPI) + 50% of the insurance income growth during the previous calendar year.

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.

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 licensed private pension insurance companies. The mandatory 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 scheme (second pillar) are managed by private pension insurance companies. These are mandatory funds covering all persons insured through the public pension insurance born after 31 December 1959 and providing supplementary life-long old-age pensions as well as payments in case of death. They are still in accumulation phase and the first pensions from these funds are expected to be paid after 2020.

The Professional Pension Funds (PPF) of Supplementary Mandatory pension scheme (second pillar) are managed by private pension insurance companies. These are mandatory funds for early retirement intended to cover all persons working at hazardous environment (labour 'at risk'). Up to this date these funds are in accumulation phase and all early pensions are part of the first pillar.

1.1.3 Supplementary voluntary pension schemes (III pillar)

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

Contributions to the third pillar are paid by the members themselves or by their employers. Contributions to the Funds 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.

1.2 Recent pension reforms

New pension system reform measures entered into force on 1 January 2011, with amendments to the Social Insurance Code (SIC), aiming at financial stabilization of the first pillar of the Bulgarian pension system and increasing the adequacy of pension benefits. One year later, some additional measures aiming at acceleration of the pension reform have been adopted by the Parliament. They envisage the gradual increase in the required length of service and in statutory retirement age as follows:

  — As of 1 January 2012, the required length of service for pension is raised by 4 months each year until 37 years for women and 40 years for men are reached in 2020 (in 2011 the required years were respectively 34 and 37 years).

  — Rises in the statutory retirement age are brought forward to 2012, instead of 2021 as initially planned. These rises are set to 4 months each year until reaching 65 years of age for men in 2017 and 63 years of age for women in 2020 (in 2011 the statutory retirement age was respectively 60 and 63 years).

At the end of 2013 the Bulgarian parliament decided to freeze the retirement age for 2014 on the 2013 levels - 60 years and 8 months for women and 63 years and 8 months for men. The required years of service also remained on 2013 levels – 34 years and 8 months for women and 37 years and 8 months for men. In the new pension projection it is assumed that freezing of the retirement age and required years of service would be temporary for one year only (2014) and it will continue to rise the same way as it had been planed earlier, but with one year delay. A decision concerning early retirement of the people working in hazardous environments is expected to be taken until the end of 2014.

In the period 2010–2012 **pension indexation** has been suspended. At the end of 2011 amendments in the pension legislation stipulated that a CPI indexation will be carried out every year, starting from 2013. In April 2013 as a result of political decision, pensions were indexed on average by 9.3%. In the second half of 2013 the indexation rule was changed again to the Golden Swiss rule that has to be applied as from 2014.

In order to improve the pension adequacy, the **accrual rate** for newly granted pensions will be increased from 1.1 to 1.2 as of 1 January 2017. From the same date the contribution rate for the mandatory second pillar (Universal pension funds) will be increased by 2 percentage points to 7%.

	YEAR	2013	2020	2030	2040	2050	2060
Men - with 20 contribution years	statutory retirement age	65 y & 8 m	67 y	67 y	67 y	67 y	67 y
	earliest retirement age	52 y & 8 m	67 y	67 y	67 y	67 y	67 y
	penalty in case of earliest retirement age						
	bonus in case of late retirement						
Men - with 40 contribution years	statutory retirement age	63 y & 8 m	65 y	65 y	65 y	65 y	65 y
	earliest retirement age	63 y & 8 m	65 y	65 y	65 y	65 y	65 y
	penalty in case of earliest retirement age						
	bonus in case of late retirement	4%	4%	4%	4%	4%	4%
Women - with 20 contribution years	statutory retirement age	65 y & 8 m	67 y	67 y	67 y	67 y	67 y
	earliest retirement age	47 y & 8 m	67 y	67 y	67 y	67 y	67 y
	penalty in case of earliest retirement age						
	bonus in case of late retirement						
Women - with 40 contribution years	statutory retirement age	60 y & 8 m	62 y & 8 m	63 y	63 y	63 y	63 y
	earliest retirement age	60 y & 8 m	62 y & 8 m	63 y	63 y	63 y	63 y
	penalty in case of earliest retirement age						
	bonus in case of late retirement	4%	4%	4%	4%	4%	4%

Table 1 - Statutory retirement age, earliest retirement age and penalties for early retirement

Note: Military and police officers can retire regardless of their age with completed 27 contribution years.

Source: NSSI

2 Overview of the demographic and labour force projections

2.1 Demographic development

The new population projection provided by EUROSTAT (EUROPOP2013) serves as a basis for projecting pension expenditures in long run. An overview of the demographic developments in Bulgaria for the period 2013–2060 is provided in Table 2 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 almost 25% from 7.3 million people in 2013 to 5.5 million in 2060.

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 1.51 to 1.77 it still remains much below the natural replacement level of 2.1. At the same time the average life expectancy at birth which in 2013 is 71.1 for men and 78.0 for women increases by 10 years for men and 8.4 years for women reaching 81.6 and 86.4 in 2060.

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 39% and the population aged 65 and over increases by 23%. As a result, the old age dependency ratio[1] doubles (from 28.9% in 2013 to 58.4% 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.

The net migration flow that is currently negative is projected to reverse to positive after 2030, reaching its peak in 2039.

Table 2 - Main demographic variables evolution							
	2013	2020	2030	2040	2050	2060	Peak year*
Population (thousand)	7264	6952	6455	6071	5767	5461	2013
Population growth rate	-0.6	-0.7	-0.7	-0.5	-0.5	-0.6	2044
Old-age dependency ratio (pop65/pop15-64)	28.9	33.9	39.1	45.8	54.3	58.4	2057
Ageing of the aged (pop80+/pop65+)	22.5	22.4	27.6	30.6	31.6	38.4	2060
Men - Life expectancy at birth	71.1	72.9	75.3	77.6	79.6	81.6	2060
Men - Life expectancy at 65	14.0	15.0	16.4	17.7	19.1	20.3	2060
Women - Life expectancy at birth	78.0	79.4	81.3	83.1	84.8	86.4	2060
Women - Life expectancy at 65	17.3	18.2	19.6	20.9	22.2	23.4	2060
Men - Survivor rate at 65+	71.7	75.4	79.8	83.5	86.6	89.1	2060
Men - Survivor rate at 80+	33.0	38.6	46.5	53.9	60.7	66.8	2060
Women - Survivor rate at 65+	86.8	88.4	90.5	92.1	93.5	94.6	2060
Women - Survivor rate at 80+	56.0	60.8	67.1	72.5	77.2	81.2	2060
Net migration	-2.9	-5.8	-5.8	5.3	3.7	0.6	2039
Net migration over population change	0.1	0.1	0.1	-0.2	-0.1	0.0	2024

Source: EUROSTAT and Commission services

Graph 1 compares the age distribution of the Bulgarian population at the base year 2013 with the one at the end of the projection period. The base of the population pyramid becomes smaller 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.

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

Graph 1: Age pyramid comparison 2013 vs 2060
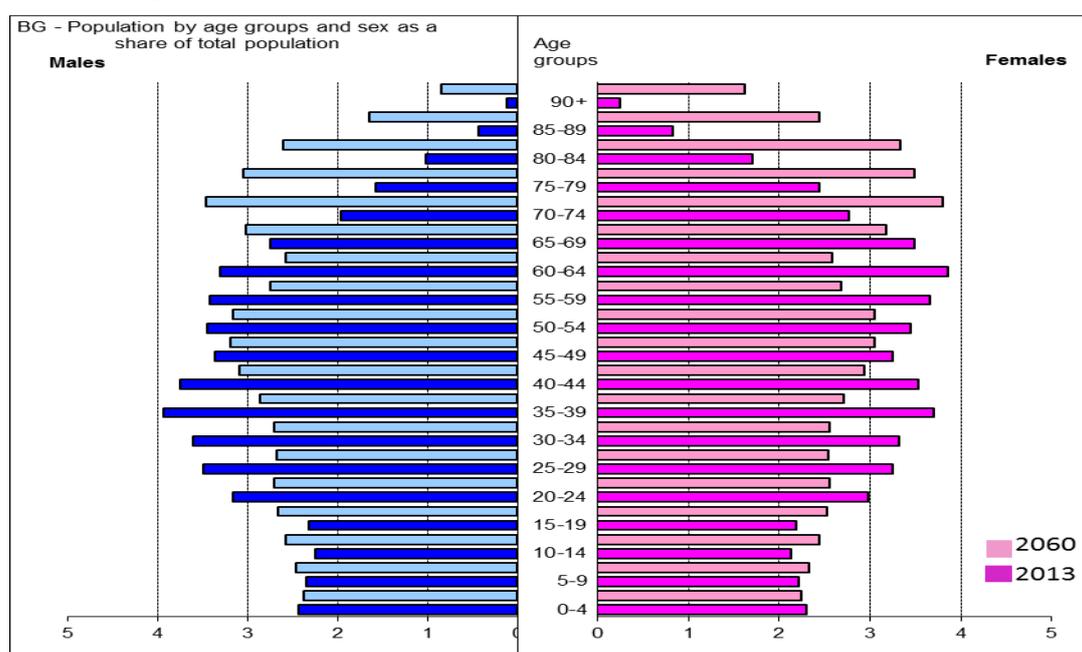
2.2 Labour forces

Table 3 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 the employment rates of older workers are projected to increase, mostly due to the raising of statutory retirement age. As the employment rate increases more rapidly during the projection period, the share of older workers in the total labour force also increases.

Table 3 - Participation rate, emoloyment rate and share of workers for the age groups 55-64 and 65-74							
	2013	2020	2030	2040	2050	2060	Peak year*
Labour force participation rate 55-64	54.4	57.4	61.3	60.0	58.8	61.0	2031
Employment rate for workers aged 55-64	47.6	50.8	55.9	55.7	54.6	56.7	2060
Share of workers aged 55-64 on the total labour force	87.6	88.4	91.2	92.9	92.9	92.9	2044
Labour force participation rate 65-74	5.9	11.4	14.0	15.2	14.4	13.9	2040
Employment rate for workers aged 65-74	5.5	10.8	13.5	14.7	14.0	13.5	2040
Share of workers aged 65-74 on the total labour force	93.2	94.2	96.1	96.7	96.9	97.1	2060
Median age of the labour force	41.0	42.0	44.0	45.0	42.0	42.0	2032

Source: Commission services

The average entry and exit ages in Tables 4a and 4b are projected for both genders on the basis of participation rates. The average effective working career projected by CSM remains constant over the projection period with exception of the first year. The average contributory period in the tables below is projected by the national long-term pension model. According to BG pension legislation the required contributory period for pension gradually increases from 37.67 years to 40 years for men and from 34.67 years to 37 years for women. Taking into account the legal provisions, the average contributory period is projected to increase from 35.5 for men and 33.6 for women in 2013 to 39.7 for men and 37.0 for women in 2030. For the rest of the projection period the average contributory period decreases for both genders due to the fact that more people (especially those whose working career starts about 1990's) 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 by approximately 8 years during the projection horizon. The ratio of duration of retirement to average working career increases from around 1:3 (29.8%) to 1:2 (48.7%) for men. For women the ratio reaches 68% in 2060 starting from 44% in 2013.

Table 4a - Labour market entry age, exit age and expected duration of life spent at retirement - MEN							
	2013	2020	2030	2040	2050	2060	Peak year*
Average effective entry age (CSM) (I)	24.0	23.1	23.1	23.1	23.1	23.1	2013
Average effective exit age (CSM) (II)	66.9	64.8	64.8	64.8	64.8	64.8	2013
Average effective working career (CSM) (II)- (I)	42.9	41.7	41.7	41.7	41.7	41.7	2013
Contributory period	35.5	37.6	39.7	39.5	39.2	38.8	2027
Contributory period/Average working career	82.9	90.3	95.2	94.8	94.1	93.1	2027
Duration of retirement **	12.8	15.0	16.4	17.7	19.1	20.3	2060
Duration of retirement/average working career	29.8	36.0	39.3	42.4	45.8	48.7	2060
Percentage of adult life spent at retirement***	20.7	24.3	25.9	27.4	29.0	30.2	2060
Early/late exit****	1.5	1.2	1.0	0.9	0.8	0.7	2014

Table 4b - Labour market entry age, exit age and expected duration of life spent at retirement - WOMEN							
	2013	2020	2030	2040	2050	2060	Peak year*
Average effective entry age (CSM) (I)	26.8	25.6	25.6	25.6	25.6	25.6	2013
Average effective exit age (CSM) (II)	65.5	62.5	62.5	62.5	62.5	62.5	2013
Average effective working career (CSM) (II)- (I)	38.7	37.0	37.0	37.0	37.0	37.0	2013
Contributory period	33.6	35.7	37.1	36.4	36.3	36.2	2028
Contributory period/Average working career	86.9	96.6	100.4	98.4	98.1	97.9	2028
Duration of retirement **	17.3	19.9	21.3	22.6	24.0	25.2	2060
Duration of retirement/average working career	44.7	53.8	57.6	61.2	64.9	68.2	2060
Percentage of adult life spent at retirement***	26.7	30.9	32.4	33.7	35.0	36.1	2060
Early/late exit****	1.1	1.4	1.2	1.1	1.0	0.9	2015

Source: NSSI and Commission services

3 Pension projection results

The projections examine the long-term status of the Public pension insurance for the period 2013-2060. 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 current (October 2014) situation in the Bulgarian pension legislation. It is fully in compliance with the final set of the 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 had been 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 and 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 2013, 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 2006–2012 show difference of 0.7 – 1.1 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 5 - Eurostat (ESSPROS) vs. Ageing Working Group definition of pension expenditure (% GDP)							
	2006	2007	2008	2009	2010	2011	2012
1. Eurostat total pension expenditure	7.2	6.9	7.0	8.8	9.2	8.7	8.5
2. Eurostat public pension expenditure	7.2	6.9	7.0	8.8	9.2	8.7	8.5
3. Public pension expenditure (AWG)	8.1	7.8	8.1	9.5	9.9	9.4	9.2
4. Difference (2) - (3)	-0.9	-0.9	-1.1	-0.7	-0.7	-0.7	-0.8
5. Expenditure categories not considered in the ESSPROS definition, please specify:	**-0.9**	**-0.9**	**-1.1**	**-0.7**	**-0.7**	**-0.7**	**-0.8**
5.1 Pensions for people living outside the country	-0.1						
5.2 Suplements paid to the pensions	-0.8	-0.9	-1.1	-0.7	-0.7	-0.7	-0.8

Source: Eurostat, NSSI

3.2 Overview of projection results

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

Table 6 presents the projection results concerning the public pension expenditure as a percentage of GDP (the pension-to-GDP ratio) for the period from 2013 to 2060 according to the current (October 2014) situation in the Bulgarian pension legislation.

Table 6 - Projected gross and net pension spending and contributions (% of GDP)							
Expenditure	2013	2020	2030	2040	2050	2060	Peak year *
Gross public pension expenditures	10.1	8.7	8.4	8.6	9.4	9.7	2014
Private occupational pensions							
Private individualpensions							
Mandatory private							
Non-mandatory private							
Gross total pension expenditures	10.1	8.7	8.4	8.6	9.4	9.7	2014
Net public pension expenditure	10.1	8.7	8.4	8.6	9.4	9.7	2014
Net total pension expenditure	10.1	8.7	8.4	8.6	9.4	9.7	2014
Contributions	2013	2020	2030	2040	2050	2060	Peak year *
Public pension contributions	7.5	7.2	7.2	7.2	7.3	7.4	2014
Total pension contributions	7.5	7.2	7.2	7.2	7.3	7.4	2014

Source: NSSI

While the projection results included in The 2012 Ageing Report, showed an increase in the total pensions-to-GDP ratio from 9.9 percent in 2010 to 11.1 percent in 2060, the new results show lower percentages of pension expenditures to GDP ratio and at the end of the period this ratio is 9.7% or 1.4 percentage points lower.

GRAPH 2: PUBLIC PENSION EXPENDITURES, % OF GDP
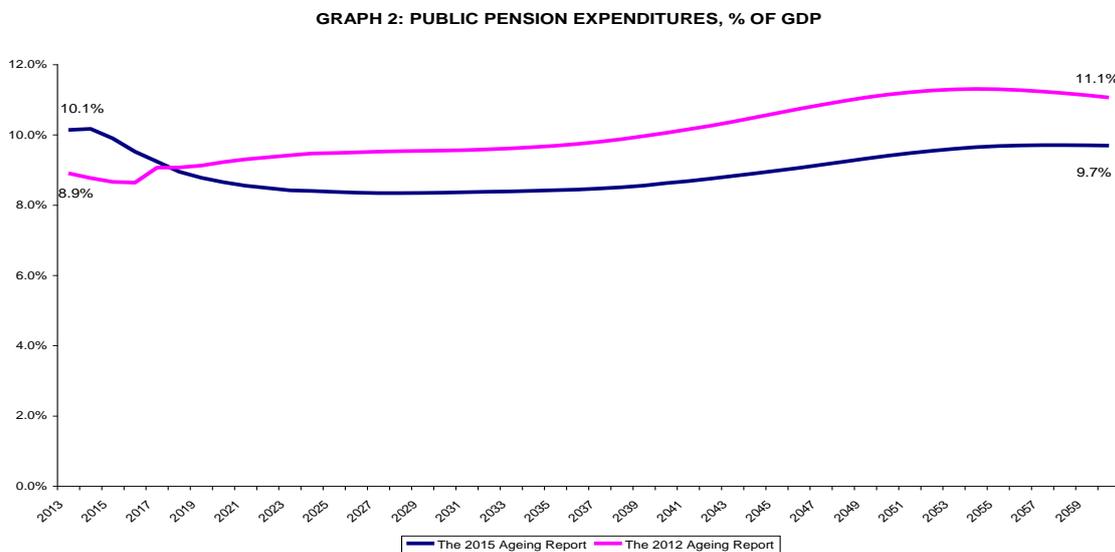
The difference with 2012 results is not only due to the change in assumptions – population, macroeconomic and labour force, but also due to some policy changes, namely:

➢ Pensions' indexation with 9.3% on average in April 2013 is the reason for the higher pension expenditures for the period 2013 – 2017 in the new projection.

➢ The accrual rate increase from 1.1 to 1.2 in 2017 is now applied only for the new pensions whereas in the 2012 Ageing report it was envisaged for all pensions, which is the main reason for the lower pension expenditures for the period after 2020 in the new projection.

➢ The retirement age increase in the new projection starts as of 2012 whereas in the 2012 Ageing report it was envisaged for 2021 onwards.

Until 2030 the projected public pension expenditures to GDP ratio shows a decreasing trend which is 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. The expenditure for disability pensions (Table 7) increases due to expected higher number of disability pensions as an alternative of the introduction of stronger eligibility conditions for acquiring old-age pensions. The development of survivors' pension expenditures remains relatively stable over the projection period, slightly decreasing over the last two decades. The expenditures for non-earnings related minimum pensions are projected to be between 0.3 and 0.4% of GDP.

Table 7 - Projected gross public pension spending by schemes (% of GDP)							
Pension Scheme	**2013**	**2020**	**2030**	**2040**	**2050**	**2060**	**Peak year ***
Total public pensions	10.1	8.7	8.4	8.6	9.4	9.7	2014
of which earnings related:							
Old age and early pensions	8.1	6.5	6.0	6.1	6.9	7.5	2013
Disability pensions	1.3	1.5	1.7	1.9	1.9	1.6	2043
Survivors' pensions	0.3	0.4	0.3	0.3	0.2	0.2	2021
Other pensions							
of which non-earnings related (including minimum pension and minimum income guarantee):							
Old age and early pensions	0.01	0.01	0.01	0.02	0.04	0.05	2060
Disability pensions	0.34	0.30	0.29	0.31	0.32	0.31	2014
Other pensions	:	:	:	:	:	:	:

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 2013 and 2060. Following the approach used in the previous round of projections, the pension expenditures as 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, the pensions-to-GDP ratio shows an increasing trend after 2030, reflecting the ageing of Bulgarian population. The sharper growth in 2040-2050 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 (2013–2060) is **the dependency ratio**, which contributes 6.9 percentage points reflecting the ageing of the Bulgarian population.

The coverage ratio has a negative contribution (- 3.2 p.p.) due to gradual shift of the early retirement towards 2nd pillar, as well as due to the increase of the required years of service and of the statutory retirement age.

The benefit ratio has a negative contribution (- 2.5 p.p.) due to the fact that the generations born after 31.12.1959 (for whom a part of contribution is transferred to the second pension pillar) will receive proportionally reduced pensions from the first pillar. Another reason for the projected decline in benefit ratio is that since 1997 the reference period for pension calculation has been gradually extended from the best 3 years to entire working life, thus lowering the pension amounts. The indexation rule also contributes to some extent due to the fact that it gives lower percentage increase of pensions than the projected wage growth.

The labour market developments have also a decreasing effect (-1.2 p.p.) on the pension costs mainly as a result of the higher participation rates of older workers.

Table 8 - Factors behind the change in public pension expenditures between 2013 and 2060 (in percentage points of GDP) - pensioners							
	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60	Average annual change
Public pensions to GDP	-1.5	-0.3	0.3	0.8	0.3	-0.4	0.009
Dependency ratio effect	1.7	1.4	1.4	1.6	0.8	6.9	0.142
Coverage ratio effect	-1.2	-0.7	-0.7	-0.5	-0.2	-3.2	-0.071
*Coverage ratio old-age**	*-0.1*	*-0.6*	*-0.6*	*0.2*	*0.5*	*-0.7*	*-0.017*
*Coverage ratio early-age**	*-2.0*	*-0.8*	*-0.1*	*0.0*	*-1.7*	*-4.6*	*-0.100*
*Cohort effect**	*-1.4*	*-0.2*	*-0.9*	*-2.4*	*-1.5*	*-6.4*	*-0.146*
Benefit ratio effect	-1.3	-0.5	-0.3	-0.3	-0.2	-2.5	-0.034
Labour Market/Labour intensity effect	-0.6	-0.3	-0.1	0.0	-0.1	-1.2	-0.027
Employment ratio effect	*-0.5*	*-0.3*	*0.0*	*0.0*	*-0.2*	*-0.9*	*-0.021*
Labour intensity effect	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.001*
Career shift effect	*-0.2*	*-0.1*	*-0.1*	*0.0*	*0.1*	*-0.3*	*-0.007*
Residual	-0.1	-0.1	-0.1	-0.1	0.0	-0.4	-0.002

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

Source: Commission services

Table 9 shows the evolution of replacement rate at retirement (RR) and benefit ratio (BR) over time. Replacement rate at retirement is calculated as the ratio between the average newly granted pension and average gross wage at the age of retirement whereas the benefit ratio is the ratio between average pension in payment and economy–wide average wage. According to statistical information available in the NSSI, the average gross wage at the age of retirement is about 4.5% higher than economy–wide average wage. The benefit ratio, both in total and for old age pensions, shows constantly decreasing trend. Similar is the situation with the replacement rate at retirement.

The replacement rate for old age pensions increases from 35.8 to 41.2 in 2020 due to legislated increase in accrual rate (from 1.1 to 1.2) in 2017 which will affect all newly granted pensions. After 2020 the old age replacement rate decreases due to the fact that since 1997 the reference period for pension calculation has been gradually extended from

the best 3 years to entire period of insurance. Another reason for the observed decline is that for persons born after 1959 the pension amounts from the first pillar will be proportionally reduced in compliance with the average percentage of the contribution transferred to the second pillar. It is expected that the supplementary pension which these persons will receive from the second pillar will fully or at least partially compensate this reduction. With respect to the observed decreasing trend in benefit ratio, in addition to the above mentioned factors, an important role plays also the indexation rule (50%*CPI + 50%*Insurable income growth).

Table 9 - Replacement rate at retirement (RR), Benefit ratio (BR) and coverage by pension scheme (in %)						
	2013	2020	2030	2040	2050	2060
Public Scheme (RR)	29.5	32.1	30.2	30.7	31.8	31.9
Public Scheme (BR)	34.2	30.7	29.0	28.4	27.8	27.5
Coverage	100.0	100.0	100.0	100.0	100.0	100.0
Public scheme old-age earnings related (RR)	35.8	41.2	37.9	37.1	36.8	36.7
Public scheme old-age earnings related (BR)	36.8	34.9	34.7	34.5	32.8	31.6
Coverage	74.8	66.5	60.7	60.2	64.6	67.8
Private occupational scheme (RR)						
Private occupational scheme (BR)						
Coverage						
Private individual scheme (RR)						
Private individual scheme (BR)						
Coverage						
Total (RR)	29.5	32.1	30.2	30.7	31.8	31.9
Total (BR)	34.2	30.7	29.0	28.4	27.8	27.5

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

In Table 10 two important indicators concerning the financial sustainability of the public pension system - 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) are presented. 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 a decrease during the first decade from 74.6% in 2013 to 73% in 2020 (as a result of the increasing retirement age and required years of service). The ratio gradually increases afterwards due to the ageing of the Bulgarian population, reaching more than 94 pensioners per 100 employed persons in 2060.

The ratio between number of people aged 65+ and working age population (Old-age Dependency Ratio) constantly increases reflecting the process of ageing of Bulgarian population. Starting from 29% in 2013 it doubles in 2060 reaching the level of 58% which means 58 people aged 65+ per 100 people at working age.

Table 10 - System Dependency Ratio and Old Age Dependency Ratio (%)						
	2013	2020	2030	2040	2050	2060
Number of pensioners (thousand) (I)	2 195.8	2 089.8	1 994.1	1 930.9	1 930.4	1 880.5
Employment (thousand) (II)	2 945.0	2 863.9	2 658.3	2 417.1	2 148.7	1 994.0
Pension System Dependency Ratio (SDR) (I)/(II)	74.6	73.0	75.0	79.9	89.8	94.3
Number of people aged 65+ (thousand) (III)	1 405.9	1 507.4	1 571.1	1 654.0	1 743.2	1 731.1
Working age population 15 - 64 (thousand) (IV)	4 865.6	4 452.8	4 021.0	3 612.6	3 211.6	2 961.8
Old-age Dependency Ratio (ODR) (III)/(IV)	28.9	33.9	39.1	45.8	54.3	58.4
System efficiency (SDR/ODR)	2.6	2.2	1.9	1.7	1.7	1.6

Source: NSSI and Commission services

In Tables 11a and 11b the total number of pensioners by age groups is divided by the inactive population in the same groups and by the total population by age groups. The younger age groups 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.

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 11b - Pensioners (public schemes) to total population ratio by age group (%)						
	2013	2020	2030	2040	2050	2060
Age group -54	4.6	4.9	5.1	4.5	3.3	2.9
Age group 55-59	30.8	23.2	23.6	24.1	21.3	19.0
Age group 60-64	70.6	49.9	45.2	46.3	45.5	42.5
Age group 65-69	100.4	81.6	65.0	66.7	69.2	67.9
Age group 70-74	103.0	111.5	89.1	88.3	95.2	97.6
Age group 75+	104.4	108.9	111.6	98.4	95.1	100.0

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 to inactive population ratio by age group (%)						
	2013	2020	2030	2040	2050	2060
Age group -54	9.4	9.2	9.0	7.4	5.3	4.9
Age group 55-59	75.4	72.5	84.5	80.6	74.3	69.4
Age group 60-64	104.6	79.9	82.8	83.6	82.1	80.2
Age group 65-69	105.1	90.9	80.6	84.4	85.7	84.7
Age group 70-74	101.7	110.4	91.4	94.5	99.8	101.1
Age group 75+	100.3	103.8	103.8	93.3	92.6	97.2

Table 12b - Female pensioners to total population ratio by age group (%)						
	2013	2020	2030	2040	2050	2060
Age group -54	4.2	4.1	4.2	3.5	2.6	2.4
Age group 55-59	21.4	23.6	26.0	25.2	23.8	21.6
Age group 60-64	75.3	52.0	52.7	53.8	53.0	51.6
Age group 65-69	98.8	76.6	66.5	69.2	70.4	69.8
Age group 70-74	100.3	106.6	85.1	87.6	92.9	94.1
Age group 75+	100.3	103.8	103.8	93.3	92.6	97.2

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 pension 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 pension) - Total

	2013	2020	2030	2040	2050	2060
Projected new pension expenditure (millions EUR)	51.3	84.0	124.6	206.9	312.4	395.3
I. Average contributory period	34.6	36.6	38.3	38.0	37.8	37.6
II. Monthly average pensionable earnings (EUR)	438.9	592.1	807.9	1216.0	1834.2	2670.7
III. Average accrual rates (%)	1.1	1.2	1.2	1.2	1.2	1.2
IV. Number of new pensioners ('000)	47.3	49.7	51.6	57.4	57.8	50.5
V. Average number of months paid the first year	6.5	6.5	6.5	6.5	6.5	6.5
VI. Sustainability/Adjustment factor	:	:	:	:	:	:
Monthly average pensionable earnings/Monthly economy-wide average wage	0.98	0.98	0.86	0.85	0.85	0.85

Source: NSSI

Two main differences between tables 13b and 13c 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 observed decreasing trend in the values of this indicator after 2030 for both genders is 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 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 contributions. This refers primarily to people whose working career has begun about 1990's.

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 of people contributing to the second pillar (born after 1959). Contributions to the second pillar are being paid since 2002 and the longer the period of contributions, the greater the reduction of the pension from the first pillar. According to the current legislation, for all people with full contribution period in the second pillar, who will retire after 2040, about 83% of the actual pensionable earnings will be taken into account.

Table 13b - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pension) - Male

	2013	2020	2030	2040	2050	2060
Projected new pension expenditure (millions EUR)	26.3	40.7	60.9	108.7	166.3	219.3
I. Average contributory period	35.5	37.6	39.7	39.5	39.2	38.8
II. Monthly average pensionable earnings (EUR)	483.1	654.9	888.5	1303.1	1950.9	2832.5
III. Average accrual rates (%)	1.1	1.2	1.2	1.2	1.2	1.2
IV. Number of new pensioners ('000)	21.4	21.2	22.1	27.0	27.9	25.6
V. Average number of months paid the first year	6.5	6.5	6.5	6.5	6.5	6.5
VI. Sustainability/Adjustment factor	:	:	:	:	:	:
Monthly average pensionable earnings/Monthly economy-wide average wage	1.08	1.08	0.95	0.91	0.90	0.90

Table 13c - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pension) - Female						
	2013	2020	2030	2040	2050	2060
Projected new pension expenditure (millions EUR)	25.0	43.3	63.7	98.2	146.1	176.0
I. Average contributory period	33.6	35.7	37.1	36.4	36.3	36.2
II. Monthly average pensionable earnings (EUR)	402.4	545.6	747.4	1138.6	1725.6	2504.6
III. Average accrual rates (%)	1.1	1.2	1.2	1.2	1.2	1.2
IV. Number of new pensioners ('000)	25.9	28.5	29.5	30.4	29.9	24.9
V. Average number of months paid the first year	6.5	6.5	6.5	6.5	6.5	6.5
VI. Sustainability/Adjustment factor	:	:	:	:	:	:
Monthly average pensionable earnings/Monthly economy-wide average wage	0.90	0.90	0.80	0.80	0.80	0.80

Source: NSSI

3.4 Financing of the pension system

Pension contributions to the public pension system in Bulgaria are distributed between employer, employee and the State. The total 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. Since 2009 the State has become a "third insurer" and pays contributions equal to 12% of the total insurance income of all insured persons. In addition, the State has the obligation to cover any remaining financing gaps and deficits of the public pension system.

Revenue from contributions is calculated using a contribution rate, which is weighted average of the rates for people born before 1960 and after 1959. As the share of those born after 1959 and paying lower contributions increases, the average contribution rate gradually decreases from the current 15.0% to 14.0% in 2030 and remains constant afterwards. 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 2013, the number of contributors in Bulgarian pension system is around 2.7 million people and represents 93.0% of employment (Table 14). Starting from this level, the number of contributors is projected as a progressively increasing proportion of the employment (close to 100% in 2060), assuming that the share of informal employment will be significantly reduced. Although this assumption could be considered as very optimistic, the results show 27% decrease in number of contributors and 32% decrease in employment over the projection period, as the main reason for this is the declining population in working age.

Table 14 - Revenue from contributions (in million), number of contributors in public scheme (in 1000), total employment (in 1000) and related ratios						
	2013	2020	2030	2040	2050	2060
Public contribution	3 013.8	3 926.1	5 623.4	7 871.4	10 714.8	14 759.1
Employer contribution	940.5	1 197.6	1 693.6	2 370.6	3 227.0	4 445.0
Employee contribution	769.5	979.8	1 385.7	1 939.6	2 640.3	3 636.8
State contribution	1 303.9	1 748.7	2 544.1	3 561.1	4 847.5	6 677.2
Number of contributors (I)	2 729.8	2 700.6	2 533.4	2 327.7	2 090.7	1 984.0
Employment (II)	2 935.0	2 863.9	2 658.3	2 417.1	2 148.7	1 994.0
Ratio of (I)/(II)	0.9	0.9	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 projections results. Comparing to the 2012 Ageing Report two additional scenarios are included – 'risk scenario' where Total Factor Productivity (TFP) is lower than in the base case and 'policy scenario' which considers adoption of automatic mechanism that revises the retirement age (both early and statutory) in line with the evolution of life expectancy at retirement (See Table 15):

— **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 0.6 percentage points higher ratio of pension expenditures to GDP in 2060 in comparison with the baseline scenario.

— **Higher labour productivity** in comparison with the baseline scenario implies higher GDP and higher contributions revenue in the public pension scheme. Pension expenditure is also higher than in baseline scenario due to higher amounts of the average wage and higher amounts of the newly granted pensions respectively. The percent of pension expenditures 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 obvious than in the baseline scenario and the difference is approximately 0.2 percentage points lower ratio of pension expenditures to GDP in comparison with the baseline scenario.

— **Lower labour productivity** in comparison with the baseline scenario 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 0.2 p.p. higher pension expenditures as a percent of GDP in comparison with the baseline scenario.

— **Higher employment rate** in comparison with the baseline scenario implies higher number of insured people and lower number of pensioners and has a positive impact on pension expenditures as in 2040 they are by 0.2 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 which leads to higher pensions. The cumulative effect amounts to 0.1 p.p. lower ratio of pension expenditure to GDP in 2060 compared to the baseline scenario.

— **Higher employment rate of older workers** significantly lowers the pension expenditures compared to the baseline. The effect amounts to 0.5 p.p. lower ratio of pension expenditure to GDP in 2060 in comparison with the baseline scenario.

— **Lower migration** scenario has negligible impact and creates slightly different results than the baseline scenario. Under the assumption of 20% lower migration the effect on pension expenditure is very limited amounting to 0.1 p.p. higher ratio of pension expenditure to GDP in 2060 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 2060 in comparison with the baseline scenario.

- **Policy scenario** leads to 0.7 percentage points lower ratio of pension expenditure to GDP in 2060 in comparison with the baseline scenario.

Table 15 - Public and total pension expenditures under different scenarios (p.p. deviation from the baseline)						
	2013	2020	2030	2040	2050	2060
Public Pension Expenditure						
Baseline	10.1	8.7	8.4	8.6	9.4	9.7
Higher life expectancy (2 extra years)	0.0	0.0	0.1	0.3	0.4	0.6
Higher lab. productivity (+0.25 pp.)	0.0	0.0	-0.1	-0.1	-0.2	-0.2
Lower lab. productivity (-0.25 pp.)	0.0	0.0	0.1	0.1	0.2	0.2
Higher emp. rate (+2 pp.)	0.0	-0.1	-0.2	-0.2	-0.1	-0.1
Higher emp. of older workers (+10 pp.)	0.0	-0.5	-0.7	-0.7	-0.7	-0.5
Lower migration (-20%)	0.0	0.0	0.0	0.0	0.0	0.1
Risk scenario	0.0	0.0	0.1	0.1	0.2	0.3
Policy scenario: linking retirement age to increases in life expectancy	0.0	0.0	-0.4	-0.7	-0.9	-0.7
Total Pension Expenditure						
Baseline	10.1	8.7	8.4	8.6	9.4	9.7
Higher life expectancy (2 extra years)	0.0	0.0	0.1	0.3	0.4	0.6
Higher lab. productivity (+0.25 pp.)	0.0	0.0	-0.1	-0.1	-0.2	-0.2
Lower lab. productivity (-0.25 pp.)	0.0	0.0	0.1	0.1	0.2	0.2
Higher emp. rate (+2 pp.)	0.0	-0.1	-0.2	-0.2	-0.1	-0.1
Higher emp. of older workers (+10 pp.)	0.0	-0.5	-0.7	-0.7	-0.7	-0.5
Lower migration (-20%)	0.0	0.0	0.0	0.0	0.0	0.1
Risk scenario	0.0	0.0	0.1	0.1	0.2	0.3
Policy scenario: linking retirement age to increases in life expectancy	0.0	0.0	-0.4	-0.7	-0.9	-0.7

Source: NSSI and Commission services

3.6 Description of the changes in comparison with the 2009 and 2012 projections

The comparison between 2012 and 2009 projection exercises shows insignificant differences due to following factors:

- Difference in macro-economic and labour market assumptions;

- Change in the interpretation of constant policy – includes cancellation of pensions indexation in 2010, 2011, 2012 due to budget restrictions following the adverse effects of the global financial and economic crisis;

- Policy related changes in Public pension insurance with regard to accrual rate in pension formula and eligibility conditions for retirement (length of service and statutory retirement age increase).

Differences between 2015 and 2012 projection results are due to:

- Difference in macro-economic and labour market assumptions reflecting the new pension reform measures;

- Change in the interpretation of constant policy – includes pensions indexation in April 2013 with 9.3% on average;

- Policy related changes in Public pension insurance with regard to eligibility conditions for retirement (statutory retirement age increase) and accrual rate in pension formula.

Table 16 - Overall change in public pension expenditure to GDP under the 2006, 2009, 2012 and 2015 projection exercises						
	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
2006 *	:	:	:	:	:	:	:
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****	-0.44	6.87	-2.95	-0.91	-2.78	0.00	-0.67

* 2004-2050; ** 2007-2060; *** 2010-2060; **** 2013-2060

Source: Commission services

Table 17 shows the decomposition of the difference between the new public pension projection and the 2012 Ageing report. The main difference is due to change in assumptions – demography, economic and labour market assumptions, leading to 0.9 p.p. lower pensions to GDP ratio at the end of the period. The latest measures for stabilization of the Bulgarian pension system will lead to certain improvement of the financial status of the public pension insurance reducing the pension costs by approximately 0.5 p.p. of GDP.

Table 17 - Decomposition of the difference between 2012 and the new public pension projection (% of GDP)							
	2010	2013	2020	2030	2040	2050	2060
Ageing Report 2012	9.9	8.9	9.2	9.6	10.1	11.1	11.1
Change in assumptions		0.8	- 0.1	- 0.8	- 1.1	- 1.3	- 0.9
Imrpovement in the coverage or in the modelling							
Change in the interpretation of constant policy		0.4					
Policy related changes			- 0.5	- 0.4	- 0.4	- 0.4	- 0.5
New projection	9.9	10.1	8.7	8.4	8.6	9.4	9.7

Source: NSSI

Description of the pension projection model and its base data

3.7 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.

3.8 Assumptions and methodologies applied

a) Demographic assumptions (from EUROPOP 2013)

— Mortality rates (by gender and age)

— Fertility rates (by age)

— Net-migration (by gender and age)

b) Labour market assumptions (from DG ECFIN Long-term forecast)

— Labour Force Participation rates (by gender and age)

— Unemployment rates (by gender and age)

c) Macroeconomic assumptions (from DG ECFIN Macroeconomic assumptions)

— 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.

3.9 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.

3.10 Reforms incorporated in the model

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

— Gradual increase in length of service and in the statutory retirement age;

— Implementation of the 'Golden Swiss Rule' pension indexation as of 2014;

— Increasing the accrual rate from 1.1 to 1.2 as of 01.01.2017.

3.11 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.
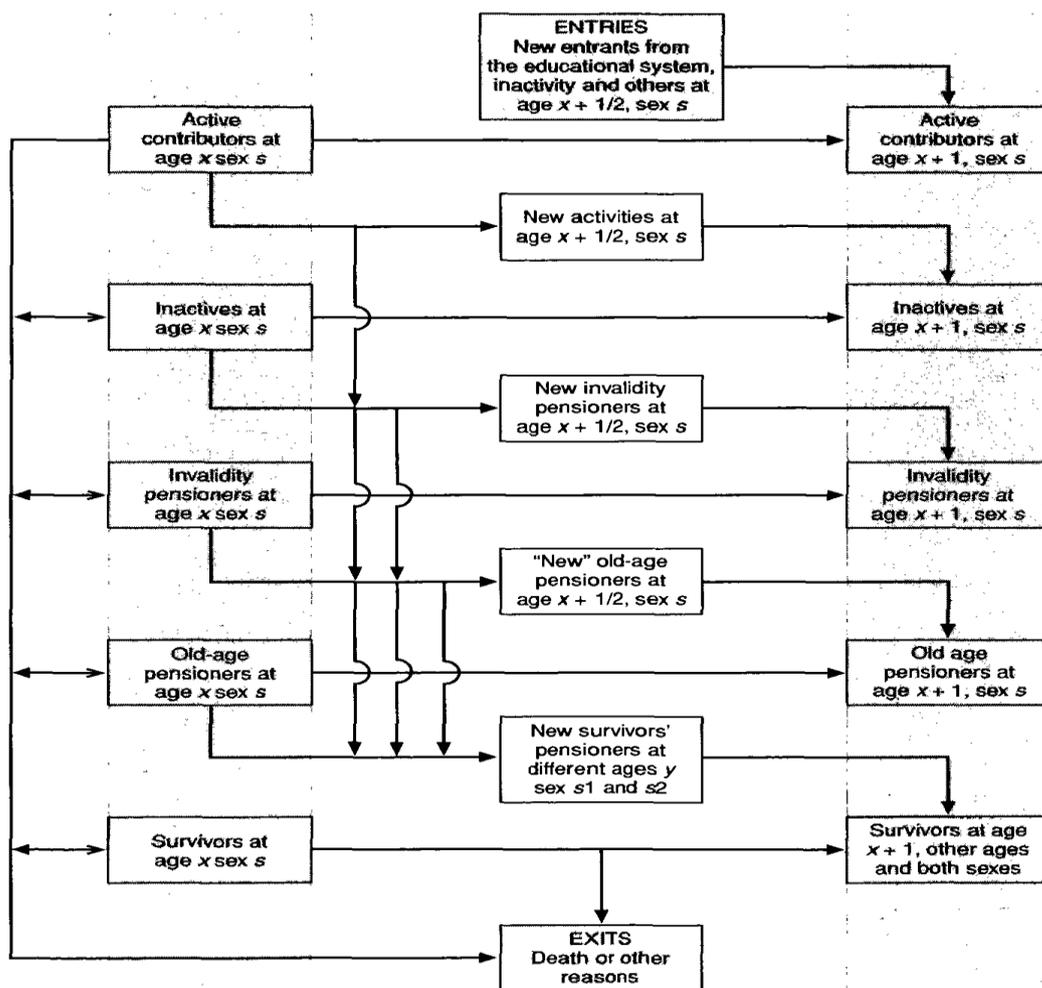

Figure 1: Demographic transformation from *t* to t+1 for age x and gender s

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

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

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
$INS_{tx,s}$	- 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. After 2013, the annual adjustments in July are applied in line with the development of the consumer price index for the previous year.

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

For pensions granted

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

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

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

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

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

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*

3.12 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 2013 the ratio between the average insurable income at the effective age of retirement and total average insurable income for the country is 1.045. 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 age at retirement evolution (in thousands euro)						
	2013	2020	2030	2040	2050	2060
Economy-wide average wage	5.35	7.25	11.25	17.13	25.96	37.69
Economy-wide average wage at retirement	5.59	7.58	11.75	17.90	27.13	39.38

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 (%)						
	2013	2020	2030	2040	2050	2060
Age group -54	0.7	0.4	0.4	0.4	0.3	0.3
Age group 55-59	2.4	1.6	1.4	1.4	1.2	1.1
Age group 60-64	2.9	2.5	2.2	2.3	2.0	1.7
Age group 65-69	0.8	1.3	1.0	1.3	1.1	0.9
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 2015 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 Pensions (including farmers and military officials) ***Public pensions: other*** 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 Pensions not related to employment – social pensions, special merits pensions, pensions by Decree	***Supplementary mandatory pension schemes:*** Supplementary life-long old-age pensions - Universal Pension Funds (UPF) Early retirement pensions for a limited period of time for persons working in hazardous conditions - Professional Pension Funds (PPF) ***Supplementary voluntary pension schemes – individual private and occupational pensions*** ***Teachers Pension Fund***