



**RZECZPOSPOLITA POLSKA**

**Ageing Working Group**

**Polish country fiche  
on pension projections 2018**

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# 1. Overview of the pension system

The Polish pension system consists of three major social insurance systems:

- general pension system for majority of employees and self-employed and
- farmers' pension system.
- security provision systems for military forces, police and similar services as well as judges and prosecutors function separately without contributions and are financed from State Budget.

Each of these systems operates under separate rules and concerns another group of persons. The largest, general pension system pays old-age pensions for nearly 83% of all pensioners and this share is increasing steadily. Benefits for 13% of pensioners are paid from the agricultural system and this share has been decreasing constantly in the past and the declining trend will continue. Other pensioners receive their benefits from various security provision systems. These systems have different regulations regarding eligibility and formulas for calculation of the benefits. The benefit indexation rules however are the same (with a minor exception).

The aim of this country fiche is to explain the factors that according to the projection will influence the total public pension expenditure. For this reason the results presented in this document concern in general the sum of the above mentioned systems. The detailed results by each system are only a supplement to the total results and are presented only in some selected tables in this document. However the calculations have been done for each of the three parts of the Polish pension system separately. This allows a better understanding of the results of the latest pension reform. There are only a few general conditions that permit retiring in the Polish pension system. They are presented in the Table 1.

<b>Table 1 - Qualifying condition for retiring*</b>
Contributory period is not required in the general pension system
There is only statutory retirement age to the end of the projected period – 60 for women and 65 for men. Until October 2017 it was 61,2 for women and 66,2 for men.
Early retirement is not possible excluding miners

\*The reduced form of the table presented here for clarity reasons. In the original table majority of fields would be left blank because Polish pension system is described by only a few parameters.

**Source:** Polish Ministry of Finance (MF)

Tables below (Table 2a, Table 2b, Table 2c) present the age and sex distribution of new entrants into the different schemes. Early retirement is not possible in the general pension scheme with the exception of miners. Outflow to retirement before the general statutory retirement age is possible mainly in security provision systems. Persons employed in security provision systems before 2013 were able to retire at an age significantly lower than the general statutory retirement age. However new generations can move to retirement at the age of 55, so the number of relatively young old-age pensionaries should decline with time.

**Table 2a - Number of new pensioners by age group - administrative data (MEN)**

Age group	All	Old age	Disability	Survivor	Other (including minimum)
15 - 49	23,853	9,015	9,071	5,767	0
50 - 54	9,349	3,411	5,251	687	0
55 - 59	12,970	1,275	10,341	1,354	0
60 - 64	45,045	35,138	8,586	1,321	0
65 - 69	80,963	80,425	308	230	0
70 - 74	2,487	2,418	1	68	0

*Source: MF, Commission Services*

**Table 2b - Number of new pensioners by age group - administrative data (WOMEN)**

Age group	All	Old age	Disability	Survivor	Other (including minimum)
15 - 49	15,014	249	6,603	8,162	0
50 - 54	9,739	356	4,225	5,158	0
55 - 59	27,577	14,416	6,174	6,987	0
60 - 64	138,612	135,226	352	3,034	0
65 - 69	13,118	10,327	5	2,786	0
70 - 74	3,023	474	4	2,545	0

*Source: MF, Commission Services*

**Table 2c - Number of new pensioners by age group - administrative data (TOTAL)**

Age group	All	Old age	Disability	Survivor	Other (including minimum)
15 - 49	38,867	9,264	15,674	13,929	0
50 - 54	19,088	3,767	9,476	5,845	0
55 - 59	40,547	15,691	16,515	8,341	0
60 - 64	183,657	170,364	8,938	4,355	0
65 - 69	94,081	90,752	313	3,016	0
70 - 74	5,510	2,892	5	2,613	0

*Source: MF, Commission Services*

## 1.1 Description

### 1.1.1 Description of the General Pension System

Social insurance in Poland includes insurance against old age, inability to work, loss of the person who supported the family, work injury and professional diseases, illness, and maternity. The general social insurance system covered in 2016 over 15 million people (91% of all employees according to LFS data). From this system benefits have been paid to 7,6 million of beneficiaries, including 83% of all pensioners.

The reform implemented on January 1st 1999 has fundamentally changed the system's construction. The defined benefit (DB) system was transformed into a defined contribution (DC) system. The mandatory part of the system was divided into two parts: non-financial and financial. The former is managed by a public institution – Social Insurance Institution (ZUS), the latter by private institutions.

The first benefits from the new system were paid in 2009 for women and in 2013 for men. For this reason, when analysing projection results one should remember that at the beginning of the period most benefits are paid from the old system.

After 1999, due to subsequent reform participation in funded pillar has been changed.

Currently, under general pension system there are several groups of insured with different elements of the system:

- People born before 1949 remained in the old DB system.
- People born 1949-1968 had a right to choose if they wanted to join funded pillar or stay in one pillar NDC (notional defined contribution) system. Their pension rights were recalculated into the new system as an initial capital. If they had chosen one pillar system they have one account NDC.
- People born 1949-1968 who hadn't chosen one pillar system and have joined funded tier and people born after 1968 who were obliged to join funded pillar. Their pension rights were recalculated into new system as an initial capital. They have two accounts (account and subaccount) NDC and:
  - FDC account active - if they decided to stay in funded pillar after 2013 reform and still pay contributions to this pillar.
  - FDC account non-active - if they decided to pay all contributions to NDC accounts but part of funds stayed accumulated in funded system.
- People who entered the labour market after 2013 reform and didn't choose the funded pillar. They have two accounts (account and subaccount) NDC.
- Miners.

### **Contributions**

The contribution rate in the general system is equal for all insured no matter in which pillar they are. However, there are three patterns of splitting old-age pension contributions (Table A):

**Table A\* - The split of the old age pension contributions in the general pension system**

	National scheme (NDC 1 <sup>st</sup> account)	Sub-account (NDC 2nd account)	Pension fund (FDC)	Total pension contribution
Funded pillar member	12.22%	4.38%	2.92%	19.52%
Insured without funded pillar	12.22%	7.3%	-	19.52%
Insured without funded pillar who never choose funded tier	19.52%	-	-	19.52%

\*Tables supplementary to the obligatory description of the pension systems are labelled with letters.

*Source: MF*

Pension contributions in Poland are paid to four different funds: old-age contribution 19.52%, disability and survival 8%, sickness 2.45%, work accident from 0.4% to 3.6%. See Table B.

Contributions paid in general system:

**Table B - The contribution rates to various social security funds (parts of the tax wedge)**

	Employees	employer
Old-age	9.76%	9.76%
Disability and survival	1,5%	6%
Sickness	2.45%	
Work accident		0.4-3.6%

*Source: MF*

In the case of a member of an open pension fund, part of the contribution equal to 2,92 per cent of the wage is transferred by ZUS to the fund of member's choice. The remaining part is left in ZUS. Due to the reform of May 2011 the new, additional NDC subaccount in ZUS has been established (it is subject to inheritance), however the total amount of old-age pension contribution is still equal to 19.52 per cent. The ceiling to contributions and pensionable earnings is set at 2.5 times average monthly earnings in the economy.

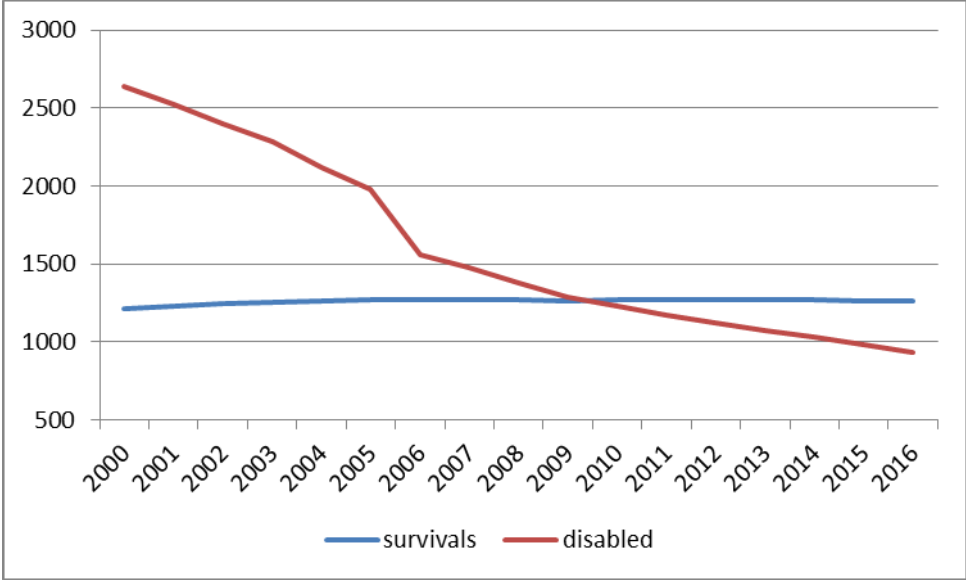
The general pension system covers also self-employed. These persons pay the same contribution rates but the base is different than for employees. The base is equal for all self-employed and amounts to 60 % of average wage in the economy.

### Valorisation

NDC accounts are maintained by ZUS. The first one is indexed to the growth of the covered wage bill and no less than price inflation. The subaccount is indexed annually by the average annual GDP growth rate in current prices for the last 5 years.

Possibility for early retirement has been withdrawn with the exception of miners. Disability system has been tightened and as a result the number of disabled pensions has been declining in recent years.

**Graph A\* - The changes in the number of benefits paid in the years 2000-2016**



\*Graphs supplementary to the obligatory description of the pension systems are labelled with letters.

**Source: MF**

**Payments from funded pillar**

Pension payments from the funded pillar after reaching the retirement age will be made integrally by ZUS (with the same pension formula as in the first pillar). For this purpose, the so-called “safety slider” was introduced, the funds accumulated in the open pension fund will be gradually transferred to ZUS, over 10 years preceding the retirement age of the insured person. Such a solution will enhance stability and security of the accumulated funds and will reduce the costs associated with their collection. The old age pension benefits in the general pension system after the 1999 can be calculated according to the following formula:

$$Old - age\ pension = \frac{valorised\ funds\ from\ pension\ accounts + initial\ capital}{life\ expectancy\ (unisex\ tables)\ at\ the\ age\ of\ retirement} \quad (Eq. 1)$$

**Indexation**

Pensions are indexed annually to Consumer Price Index for pensioners in the preceding calendar year and increased by 20 % of real growth of average monthly earnings in the preceding calendar year.

## **Demographic Reserve Fund**

Regarding the reserves of public pension fund - there is Demographic Reserve Fund in the general pension system. ZUS manages this fund and as a result the fund is classified as a public fund. Investment policy is regulated by law.

## **Minimum pension**

Minimum pension is guaranteed for men and women with at least 25 and 20 contributory years respectively. If the total pension - a sum of NDC and FDC pension - is below minimum level, then the pension is supplemented by the minimum pension guarantee, which is financed from the state budget and general revenue financing. The minimum pension is specified as amount of money and indexed in the same way as other pension benefits. In the projections, the minimum pension is calculated according to agreed methodology – in line with law for the first 10 years and then according to wage growth.

It should be also pointed out that there is no minimum contributory period in the general pension system. It means that even extremely low benefits are paid out. On the other hand all people who receive pensions are covered by health insurance. As a result even very low pension gives right to this insurance. There is a discussion about possibility of introducing minimum contributory period. Such period existed in old DB system.

From analytical point of view it results in lower average pension from new system also due to inclusion of low level benefits.

## **Third pillar**

The mandatory system should be supplemented with voluntary savings in the framework of Employee Pension Plans, Individual Retirement Accounts and Individual Pension Security Accounts. Unfortunately this pillar is still of limited importance not developed as relatively few people contribute.

Poland plans to develop additional occupational plans with auto-enrolment.

There is a possibility to combine pension with earnings after reaching retirement age. Additional contributions are recalculated and increase the benefit. Prior to achieving retirement age there are some restrictions regarding work/earnings.

### **1.1.2 Description of the Farmers' pension system**

Since 1977 farmers and their families are subject to compulsory social insurance. Until 1991 this system was managed by ZUS, and since 1991 – by the new established institution: Agricultural Social Insurance Fund (KRUS). In 2016, there were less than 1.3 million people covered by insurance, while 1.2 million beneficiaries received pension benefits.

Pension insurance for farmers is financed from the Farmers Pension Fund. The contribution for old-age, disability and survivor pension insurance is payable quarterly and amounts to 30% of minimum old-age pension. The proceeds from old-age and disability pension insurance contributions cover approximately



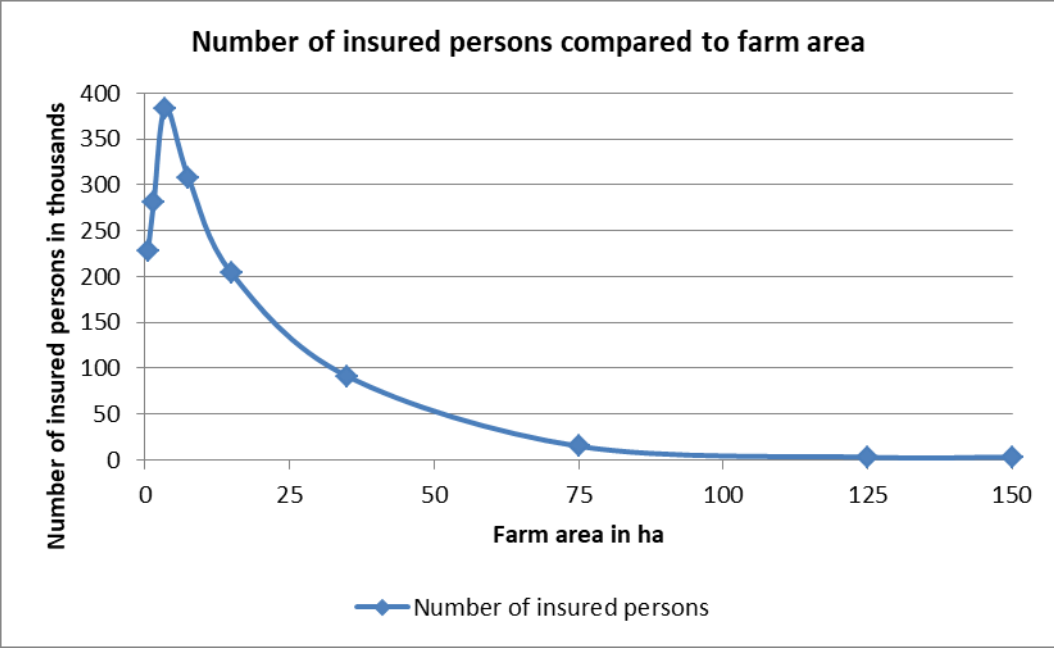
10% of the expenses for the old-age and disability pension insurance. An insured farmer is entitled to a farmer's old-age pension upon meeting the following conditions:

He/she attained retirement age 60 years for a woman, 65 years for a man.

He/she was subject to the old-age and disability pension insurance for at least 25 years.

A farmer's old-age pension is calculated in relation to the amount of minimum old-age pension and consists of a contribution part and a supplementary part. The contribution part depends on how long the farmer was subject to insurance and it is determined by as 1% of the minimum old-age pension for each year of being subject to old-age and disability pension insurance. This part of the farmer's old-age pension is paid out regardless of cessation of agricultural activities, i.e. transfer of the farm. The supplementary part amounts to between 85% and 95% of the minimum old-age pension and decreases with the period of insurance. The supplementary part of the benefit is payable after the transfer of the farm. The farmers' security system has been a subject of wide discussion. The need for the reform is still underlined. The two main points which are taken into account are: sustainability of the system and adequacy of the benefits from the system which in comparison to others is distinguished by low contributions and low benefits. It should be also taken into account that the farms in Poland tend to be small (see Graph B). Most of the insured, about 92.2 %, work in farms of up to 20 ha, and 58.7% in farms smaller than 5 ha. As a result farmers' incomes are also relatively low. See graph below.

**Graph B\* - The changes in the number of benefits paid in the years 2000-2016**



\*Graphs supplementary to the obligatory description of the pension systems are labelled with letters.

**Source: MF**

Since 2009 owners of farms larger than 50 ha pay contributions twice to almost six times higher than base contribution but this group includes only about 1.3% of contributors. The rest of contributors pay the flat contributions not divided into parts.

### **1.1.3 The description of the pension systems for security provision forces**

Security provision systems are entirely financed by the state budget without any contributions from the persons employed. These are DB systems. They cover the police, army, fire-fighters, officers of the Government Protection Bureau, Internal Security Agency, Foreign Intelligence Agency, Polish Border Guard, prison guards, judges and prosecutors – approximately 268 thousand people. This is not one coherent system but several systems which differ from each other. Moreover new reform divided employed into two groups – those who were in service before 2013 and new professionals coming into service starting from January 1, 2013.

In the old system the amount of benefit is determined on the basis of the amount of final salary or wage. One can retire after as little as 15 years of service and receive 40% of the last wage. Maximum amount of benefit is 75% of the last wage. There is no minimum retirement age. After the reform of the system, the acquisition of retirement rights will be possible only after 25 years of service and under parallel condition of reaching the age of 55. The amount of benefit will be determined on the basis of the average amount of salary or wage in ten calendar years selected by the employee and will not exceed 75% of the last wage as in the old system.

Judges and prosecutors are allowed to retire at the age of 60 in case of woman who served as judge or prosecutor for at least 25 years and at the age of 65 in case of a man who served as judge or prosecutor for at least 30 years. This is in line with the retirement age in the General Pension System.

It should be added that the indexation rule of old benefits in that system is in general the same as in general system with one exception - the system for judges and prosecutors. In this system full wage indexation is used.

## **1.2 Recent reforms of the pension system included in the projections**

In 2016, Polish Parliament passed a law that lowered the statutory retirement age to 60 for women and to 65 for men. The law came into force on 1 October 2017 and restored the statutory retirement age applicable to the general pension system (for majority of employees, employers and self-employed) and farmer's pension system prior to 1 January 2013. According to the law passed in 2012 the statutory retirement was being increased to 67 years for men (in 2020) and for women (in 2040) by one month every 4 months.

Other solutions contained in the Act of 2016 provide, inter alia:

- - abolition of partial pensions; due to the restoration of the previous statutory retirement age, the entitlement to partial pension upon reaching the retirement age of at least 62 years for women and at least 65 years for men has become redundant,

- - minimum pension is guaranteed for men and women who have contributed for at least 25 or 20 years for men and women respectively; this solution was in force until the end of 2012;,
- - the statutory retirement age for judges and prosecutors from 1 January 2018 is set at 65 years for both men and women.

### **1.3 Description of the actual "constant policy" assumptions used in the projection**

According to Polish law indexation of minimum pension is in line with indexation of other benefits – CPI plus 20% of real growth of average monthly earnings. Assumptions used in this projections are in line with common agreed methodology, It means in line with law for the first 10 years and then according to wage growth.

It also should be stressed that expenditure is not the same as expenditure presented in Polish statistics. Classification especially of old age and disability or survivals is also coherent with AWG methodology.

## 2. Demographic and labour forces projections

This chapter presents the assumptions of demographic and labour force projections which are crucial for understanding the main determinants of the projections of the population ageing and labour force changes in the next decades. All assumptions base on the commonly agreed methodology for all EU member states (European Commission, 2017).

### 2.1 Demographic development

According to EUROPOP2017 demographic projections Polish population is going to decline by approximately 7 million persons (Table 3) until the year 2070 (Eurostat, 2017). The main cause of this change is observed after 1990 decline of the fertility rate (TFR) to a very low level. According to EUROSTAT projections it will probably increase in the future but will remain below the replacement level. The old-age dependency ratio is going to increase from about 24% in 2016 to 65% in 2060 and then a minor decrease should be observed because of the dying out of the generations of the 1980s baby-boom.

The second important driver of the population ageing in Poland is increasing life expectancy which should result from the changes in the lifestyle and the application of new medical technologies. In this respect the changes in life expectancy in Poland follows the advances observed in the countries with currently highest life expectancy.

According to the assumptions of the EUROPOP2017 population projections life expectancy at birth in Poland should increase in the years 2016-2070 by more than 10 years for men and 8 years for women. This increase will be also a challenge for the pension system as the life expectancy in the age of 65 will increase by about 7 years for men and by 6 years for women. As in the previous projections the Eurostat assumptions show that immigration should play only a minor role in the future population changes of Poland and close to zero annual net migration will be observed until 2040).

**Table 3 - Main demographic variables evolution**

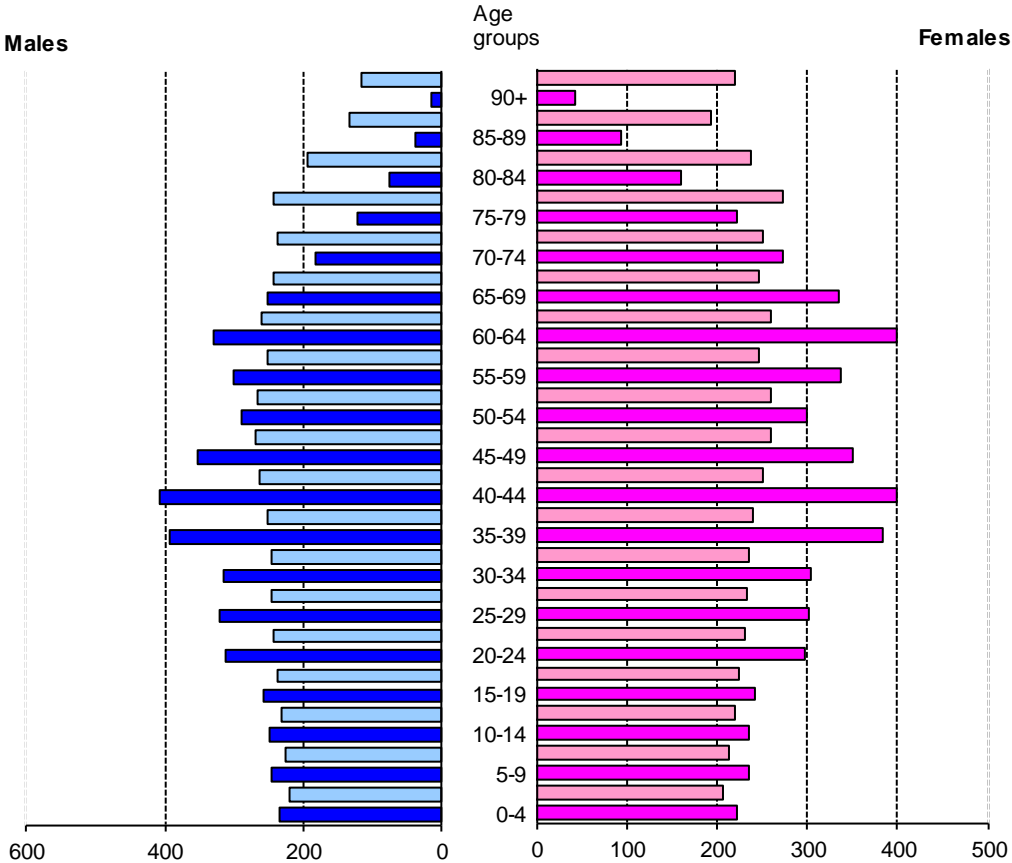
	2016	2020	2030	2040	2050	2060	2070	Peak year*
Population (thousand)	37,966	37,917	37,156	35,767	34,300	32,764	30,865	2017
Population growth rate	-0.1	-0.1	-0.3	-0.4	-0.4	-0.5	-0.7	2017
Old-age dependency ratio (pop65/pop15-64)	23.7	28.4	37.3	42.6	55.3	64.9	62.2	2062
Ageing of the aged (pop80+/pop65+)	25.7	24.1	25.9	37.3	32.8	37.6	48.7	2070
Men - Life expectancy at birth	73.9	74.9	77.1	79.2	81.1	82.8	84.4	2070
Men - Life expectancy at 65	16.0	16.6	17.9	19.1	20.3	21.5	22.6	2070
Women - Life expectancy at birth	81.6	82.4	84.0	85.6	87.0	88.3	89.5	2070
Women - Life expectancy at 65	20.2	20.7	21.9	23.0	24.1	25.1	26.1	2070
Men - Survivor rate at 65+	76.3	78.1	81.9	85.1	87.7	89.8	91.6	2070
Men - Survivor rate at 80+	41.6	44.8	51.9	58.5	64.4	69.8	74.4	2070
Women - Survivor rate at 65+	89.5	90.3	91.9	93.2	94.3	95.2	96.0	2070
Women - Survivor rate at 80+	66.7	68.9	73.6	77.7	81.3	84.3	86.9	2070
Net migration	4.9	0.0	-2.4	16.2	29.7	11.6	7.3	2048
Net migration over population change	-0.2	0.0	0.0	-0.1	-0.2	-0.1	0.0	2017

*Source: EUROSTAT and Commission Services*

*Explanatory note: \*This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2016 to 2070.)*

The results of the pension projection for Poland (Graph 1) show that currently age structure of the Polish population is shaped by the two baby boom generations: persons born after the IIWW in 1950s and its echo – persons born in the beginning of 1980s. After about 50 years this kind of fluctuations in the age structure will disappear and the persons in the age 75+ will constitute a much higher percent of the total population than it is observed now.

**Graph 1: Age pyramid comparison: 2016 vs 2070**



*Source: EUROSTAT*

## 2.2 Labour forces

The potential growth of the economies as well as the number of contributors in the pension systems depend on the labour supply. The labour supply projection for Poland is based on the population projection and the labour force participation rates for each age and sex group. Labour force participation rates (LFPRs) are predicted using the cohort simulation model (CSM) which takes into account the initial profiles of LFPRs, cohort effects and potential influence of already introduced pension reforms on the exit age from the labour market of persons in pre-retirement age.

According to the labour supply projection (Table 4) the LFPR of persons aged 55-64 and their employment rates will increase due to the convergence of labour force participation of persons in pre-retirement age (55-59/64) to the average values predicted for the EU. On the other hand further growth of the LFPRs in this age group will be limited by the retirement age (60/65). The same limitations are the reason for relatively low LFPRs of persons in the age group 65-74. However some increase of LFPRs here is expected as a result of the cohort effects (higher human capital and labour force participation rates of the younger generations). The positive cohort effects have been already observed. In the years 2007-2015 there was a significant increase in the LFPR in Poland mainly due to the cohort effects observed among the generation that entered preretirement age. This increase was only to some extent explained by the cancelation of early pensions (Strzelecki & Tyrowicz, 2015). On the other hand the population ageing process will have an influence on the median age of the labour force which will increase from 38 years to 43 years in 2040. In the next decades the further growth will be restrained as baby-boom generation of early 1980s will exit the labour market and retirement age will remain constant.

**Table 4 - Participation rate, employment 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	48.5	50.6	53.6	52.5	52.0	52.4	53.0	2066
Employment rate for workers aged 55-64	46.4	48.9	51.3	50.3	49.8	50.2	50.8	2066
Share of workers aged 55-64 on the labour force 55-64	95.6	96.6	95.8	95.8	95.8	95.9	95.9	2019
Labour force participation rate 65-74	8.0	9.5	12.6	14.0	13.6	13.0	13.1	2043
Employment rate for workers aged 65-74	7.9	9.4	12.5	14.0	13.5	13.0	13.1	2043
Share of workers aged 65-74 on the labour force 65-74	99.0	99.4	99.5	99.4	99.4	99.5	99.5	2028
Median age of the labour force	38.0	39.0	42.0	43.0	41.0	41.0	42.0	2032

**Source:** MF, Commission Services

(Explanatory note: \*This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2016 to 2070.)

According to the CSM simulations the effective exit age from the labour market should be close to the statutory retirement age both in case of women and men (Table 5a, Table 5b). The statutory retirement age after the changes introduced in 2017 will remain constant. As an implication the average contributory periods for men and women will be relatively stable but the duration of retirement will increase steadily reflecting the increasing life expectancy at retirement. Due to the differences in the

retirement age of men (65) and women (60) and differences in life expectancy the indicators of the number of years spent at retirement are significantly different.

**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)	64.0	64.5	64.5	64.5	64.5	64.5	64.5	2023
Contributory period	37.3	36.8	37.3	38.3	37.6	37.9	37.9	2038
Duration of retirement	16.8	16.6	17.9	19.1	20.3	21.5	22.6	2070
Duration of retirement/contributory period	0.5	0.5	0.5	0.5	0.5	0.6	0.6	2070
Percentage of adult life spent at retirement	26.7	26.3	27.8	29.1	30.4	31.6	32.7	2070
Early/late exit	3.6	4.4	2.3	3.2	2.4	1.8	2.8	2018

*Source: MF, Commission Services*

**Table 5b - Labour market effective exit age and expected duration of life spent at retirement - WOMEN**

	2017	2020	2030	2040	2050	2060	2070	Peak year
Average effective exit age (CSM) (II)	61.3	61.3	61.3	61.3	61.3	61.3	61.3	2038
Contributory period	33.3	33.3	33.7	33.3	32.8	33.6	33.6	2029
Duration of retirement	23.6	24.0	25.3	26.5	27.7	28.8	29.8	2070
Duration of retirement/contributory period	0.7	0.7	0.8	0.8	0.8	0.9	0.9	2070
Percentage of adult life spent at retirement	35.3	35.6	36.9	37.9	39.0	39.9	40.7	2070
Early/late exit	1.0	2.8	2.1	3.9	2.8	2.1	2.4	2018

*Source: MF, Commission Services*

### 3. Pension projection results

The aim of this chapter is the presentation of the results of the pension projections for Poland and the description of the main driving forces behind these results.

#### 3.1 Extent of the coverage of the pension schemes in the projections

The pension projections prepared for the purposes of the AWG cover all main pension systems in Poland: General pension system, farmers' pension system and provision security systems. The projection takes into account: public expenditures on old-age and other kind of old-age early pensions, disability and survivals benefits in all type of pension system. The third pillar has not been included because of relatively marginal importance of this scheme.

The calculations made for the purposes of the AWG projections cover almost all pension expenditures included in the Eurostat ESSPROS database (Table 6). Since the 2012 projection some efforts have been made to cover as many expenditures from the pension system as are covered in the ESSPROS database. However some differences can still remain due to the differences in the definitions and delays in data collection for farmers and military services. It should be also mentioned that the data for the last years are frequently revised.

**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	11.5	11.5	12.2	11.8	11.3	11.5	11.9	11.8
2 Eurostat public pension expenditure	11.5	11.5	12.2	11.8	11.3	11.5	11.9	11.8
3 Public pension expenditure (AWG)	10.9	11.1	11.6	11.7	11.3	11.3	11.5	11.3
4 Difference (2) - (3)	0.6	0.4	0.7	0.1	0.0	0.2	0.4	0.4

*Source: EUROSTAT, MF*

#### 3.2 Overview of projection results

Gross public pension expenditures are projected to decrease in the period 2016-2070 from 11.2 % GDP to 10.2 % GDP (Table 7). It should be mentioned that the until 2060 the fluctuations of the level of expenditures will be rather minor and the decline in the last decade of the projection would be a result of the dying out of the baby-boom generation born in the early 1980s.

The evolution of net pension expenditures is similar. According to "no policy change" assumption the effective tax rate will be stable and amount to about 15,5% - the value observed in base year 2016. The models used for projections assume no policy change scenario but with the assumption of maintaining the similar effective tax rate on pensions



The relation of the pension expenditures to GDP is relative stable which is a result of the joint influence of the changes in the pension system introduced in the past. In general these changes have increased the responsibility of the state for the future pension expenditures. In 2014 all expenditures in the pay-out phase of funded pillar has been moved to public sector (reform included in the AR 2015 projections). Due to the reform introduced in 2014 the private mandatory part of the pension system is going to play only a marginal role in the entire pension system. The total pension expenditures are also influenced by the consequences of the return to the constant retirement age at the level 60 for women and 65 for men. The reform of the retirement age was introduced in 2017.

**Table 7 - Projected gross and net pension spending and contributions (% of GDP)**

<b>Expenditure</b>	2016	2020	2030	2040	2050	2060	2070	Peak year*
Gross public pension expenditure	11.2	11.1	11.0	10.8	11.2	11.1	10.2	2055
Private occupational pensions	:	:	:	:	:	:	:	:
Private individual pensions	:	:	:	:	:	:	:	:
<i>Mandatory private</i>	:	:	:	:	:	:	:	:
<i>Non-mandatory private</i>	:	:	:	:	:	:	:	:
Gross total pension expenditure	11.2	11.1	11.0	10.8	11.2	11.1	10.2	2055
Net public pension expenditure	7.9	8.1	8.2	8.0	8.1	8.1	7.5	2025
Net total pension expenditure	7.9	8.1	8.2	8.0	8.1	8.1	7.5	2025
<b>Contributions</b>	2016	2020	2030	2040	2050	2060	:	Peak year*
Public pension contributions	7.9	8.1	8.3	8.4	8.3	8.3	8.3	2040
Total pension contributions	8.1	8.3	8.4	8.5	8.4	8.3	8.3	2038

*Source: MF, Commission Services*

The main sources of the changes in the pension expenditure are old-age pensions (Table 8). Their relation to GDP is going to increase by the year 2056. In this projection round due to the improvement of the modelling procedure it was possible to divide the old age pension expenditure into earnings-related component and component related to minimum pension. The increase of the minimum pension expenditures is caused by the two phenomena: the increase of the relation of the retirement period to the contributory period that leads to the on average lower pension benefits in the NDC system and the “constant policy” assumption that prevents the relation of the minimum pension to average wage from declining. According to the projections the level of expenditures on survivors and disability pensions to GDP will decline. It reflects the changes of the proportion of preretirement age persons to working age population.

The pension expenditures of the general system in 2016 represent 84% of the total pension expenditures. Each of the remaining pensions systems: farmers’ pension system and security provision systems accounted for 8% of the total pension expenditures. The further evolution of the expenditures in those systems reflect mainly the assumptions about the number of persons eligible to benefits in the future. In the case of the farmers’ pension system it is due to structural changes in the agriculture sector. In order to project the future number of persons employed in agriculture according to LFS we have used CSM method similar to method used by AWG in labour force projections. The results show that the number of farmers’ system contributors should gradually decrease from 1.2 million observed in 2016 to about 0.7 million in 2070. It should be mentioned that the projection of the pension expenditures in the farmers’ system is higher than in the AR 2015 due to the agreed limitation on the minimum

indexation of pensions in the long term. The proportion of expenditures in security provision system to GDP is going to decrease gradually reflecting the assumptions about the age structure changes of persons employed in these forces and the reform of these systems introduced in 2013 which should increase the tenure required to be eligible for the pension.

**Table 8 - Projected gross public pension spending by scheme (% of GDP)**

Pension scheme	2016	2020	2030	2040	2050	2060	2070	Peak year *
Total public pensions	11.2	11.1	11.0	10.8	11.2	11.1	10.2	2055
of which								
Old age and early pensions:	9.9	10.1	10.2	10.0	10.4	10.4	9.5	2056
<i>Flat component</i>	:	:	:	:	:	:	:	:
<i>Earnings related</i>	8.5	9.0	9.2	8.9	9.1	9.1	8.4	2025
<i>Minimum pensions (non-contributory) i.e. minimum income guarantee for people above 65</i>	0.1	0.1	0.2	0.7	1.5	2.1	2.4	2070
Disability pensions	0.80	0.58	0.52	0.59	0.56	0.48	0.47	2016
Survivor pensions	0.48	0.34	0.28	0.25	0.22	0.19	0.17	2016
Other pensions	:	:	:	:	:	:	:	:
of which								
<i>General pension system</i>	9.4	9.6	9.7	9.5	9.6	9.5	8.8	2025
<i>Farmers pension system</i>	0.9	0.7	0.6	0.5	0.5	0.5	0.4	2016
<i>Security provision systems</i>	0.9	0.8	0.7	0.8	1.0	1.0	0.9	2055

*Source: MF, Commission Services*

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

This part provides more details about the development of public pension expenditures according first to the decomposition proposed by AWG (Table 9a and Table 9b) that uses a standard arithmetic decomposition of a ratio of pension expenditures to GDP into the dependency, coverage, benefit ratio, employment rate and labour intensity. Further tables in this chapter provide additional indicators that describe the changes in the level of pension benefits and coverage of the old-age population by pensions.

The shift from PAYG system to defined contribution system in 1999 introduced the possibility of the automatic adjustment of the pension system to population ageing. The channels of this adjustment are explained in the decomposition.

According to decomposition **population aging (increasing dependency ratio)** is in absolute terms the main driving force behind the changes of pension expenditures in the period 2016-2060. However the extension of the projection horizon shows that the influence of this factor after 2060 should become insignificant as the majority of the baby boom generation will pass away by this date. The impact of population ageing will be particularly strong in the periods 2020-2030 and 2040-2050 reflecting the ageing process of the echoes of the baby boom generations.

Due to already introduced reforms, the proportion of persons with pension benefits to population 65+ (**coverage ratio effect**) is not going to be a major way of adjustment to population ageing. The negative

contribution of this effect will reflect mainly the shift in the effective retirement age while the statutory retirement age will remain constant.

The main way of adjustment will be the decrease in the relation of the average pension to average GDP produced by one hour of work (**benefit ratio effect**).

The overall influence of the effects of the labour market factors will be slightly negative which reflects on one hand the effects of the increasing exit age from the labour force in pre-retirement age but on the other hand the increase of the average age of persons in the labour force.

**Table 9a - Factors behind the change in public pension expenditures between 2013 and 2070 (in percentage points of GDP) - pensions**

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70	Average annual change
Public pensions to GDP	-0.1	-0.1	-0.1	0.3	-0.1	-0.9	-1.0	-0.019
Dependency ratio effect	2.2	3.4	1.5	3.0	2.0	-0.4	11.7	20.4%
Coverage ratio effect	-0.7	-1.3	0.1	-0.6	-0.6	0.1	-3.1	-5.8%
Coverage ratio old-age*	0.2	-0.1	0.0	0.0	-0.1	-0.1	-0.1	-0.1%
Coverage ratio early-age*	-0.6	-3.2	-0.3	0.3	-1.1	0.1	-4.8	-9.4%
Cohort effect*	-2.1	-1.8	0.5	-3.3	-2.8	1.1	-8.5	-17.2%
Benefit ratio effect	-0.8	-1.7	-1.8	-1.6	-1.1	-0.8	-8.0	-15.2%
Labour Market/Labour intensity effect	-0.5	-0.1	0.3	-0.2	-0.2	0.2	-0.4	-0.8%
Employment ratio effect	-0.4	0.1	0.3	0.0	-0.2	0.1	-0.2	-0.3%
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	0.0	-0.2	0.0	0.1	-0.3	-0.5%
Residual	-0.3	-0.4	-0.1	-0.3	-0.1	0.0	-1.2	-0.5%

*Source: MF, Commission Services*

**Table 9b - Factors behind the change in public pension expenditures between 2013 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	-0.1	-0.1	-0.1	0.3	-0.1	-0.9	-1.0	-0.019
Dependency ratio effect	2.2	3.4	1.5	3.0	2.0	-0.4	11.7	20.4%
Coverage ratio effect	-0.7	-1.2	0.1	-0.5	-0.6	0.1	-3.0	-5.6%
Coverage ratio old-age*	0.3	-0.1	0.1	0.0	-0.1	-0.1	0.1	0.2%
Coverage ratio early-age*	-0.6	-3.2	-0.3	0.3	-1.1	0.1	-4.8	-9.3%
Cohort effect*	-2.1	-1.8	0.5	-3.3	-2.8	1.1	-8.5	-17.2%
Benefit ratio effect	-0.9	-1.8	-1.9	-1.7	-1.1	-0.8	-8.1	-15.4%
Labour Market/Labour intensity effect	-0.5	-0.1	0.3	-0.2	-0.2	0.2	-0.4	-0.8%
Employment ratio effect	-0.4	0.1	0.3	0.0	-0.2	0.1	-0.2	-0.3%
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	0.0	-0.2	0.0	0.1	-0.3	-0.5%
Residual	-0.3	-0.4	-0.1	-0.3	-0.1	0.0	-1.2	-0.5%

*Source: MF, Commission Services*

Both benefit ratios and replacement rates decline significantly in the projection period (Table 10). The replacement rate (first pension of those who retire in a given year over an (economy-wide) average wage at retirement) decreases from 55% in 2016 to about 26% in the year 2060 and 25% in 2070. The main reason of this decline is the adjustment due to the pension formulas in the NDC system and the assumptions about the increasing life expectancy. In principle, the path of the replacement rates in this projection is close to the projection just before the introduction of the gradual increase of the retirement age (see AR 2012). In comparison to the AR 2015 projection there is a significant impact of the return to constant 60/65 retirement age from the previous regulations that assumed gradual increase to 67. The lower retirement age influences replacement rates in two ways in DC pension systems. First, it leads to on average shorter labour market careers and lower accumulated pension liabilities. Second, the average length of retirement increases. In the case of Poland the difference is important for women (after 2040 the difference between previous and new retirement age equals to 7 years). Another factor that should be taken into account is so called "initial capital" – the calculation of capital earned before the introduction of the pension reform in 1999 plus its indexation. These calculations are added to the NDC accounts of persons who worked before 1999 just before calculation of the pension level. Before 1999 unemployment rate was relatively lower than in the early 2000s. Before 1989 the phenomenon of unemployment was officially not observed (full employment in the centrally planned economy). This can explain why the projected replacement rate drops significantly after 2030 for generations who experienced unemployment, inactivity due to discouraged worker effect and increasing number of not standard work agreements connected with low contributions to pension system (civil law contracts, self-employment).

The benefit ratios (relation between average pension expenditure per retired person and average wage in the economy) decrease in the whole projection period because in addition to amounts of first pensions this measure also takes into account pensions already granted in the past and indexed significantly below wage growth. The changes in the next decades are mainly due to the assumptions about the labour market careers of the generations that enter the retirement age and the indexation of benefits reflecting "constant policy" limitation. In AR 2018 the indexation rules of the pension benefits already granted are higher than assumed in the previous projections because of the change in understanding of the "constant policy". That explains why BR remains lower than RR in the first decades of the projection. After 2030 the main source of the adjustment of the benefit ratios are the developments of the replacement rate.

**Table 10 - Replacement rate at retirement (RR) and coverage by pension scheme (in %)**

	2016	2020	2030	2040	2050	2060	2070
Public scheme (BR)	48%	45%	38%	32%	27%	25%	23%
Public scheme (RR)	55%	54%	41%	30%	27%	26%	25%
Coverage	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Public scheme old-age earnings related (BR)	52%	48%	40%	32%	27%	24%	22%
Public scheme old-age earnings related (RR)	61%	58%	41%	28%	24%	24%	23%
Coverage	70.2	75.8	79.5	81.3	83.8	86.0	87.0
Private occupational scheme (BR)	:	:	:	:	:	:	:
Private occupational scheme (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Private individual scheme (BR)	:	:	:	:	:	:	:
Private individual scheme (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Total (BR)	48%	45%	38%	32%	27%	25%	23%
Total (RR)	55%	54%	41%	30%	27%	26%	25%

*Source: MF, Commission Services*

The calculations regarding pension system dependency ratio (Table 11) show that even under the assumption of the increase in labour force participation rates the proportion of pensioners to employed persons will increase from 53,8 pensioners per 100 employed to 104,8 pensioners per 100 employed persons. This increase is much lower than the increase in old-age dependency ratio and the ratio of SDR/ODR show the scale of adjustments that will be made to balance the changes in the relation of persons retired to persons employed similar to increase of the old-age dependency ratio.

**Table 11 - System Dependency Ratio and Old-age Dependency Ratio**

	2016	2020	2030	2040	2050	2060	2070
Number of pensioners (thousand) (I)	9233.3	9948.9	10798.7	11705.5	12650.3	12608.7	11687.9
Employment (thousand) (II)	17166.0	17247.8	15977.8	14673.5	13120.7	11866.1	11152.1
Pension System Dependency Ratio (SDR) (I)/(II)	53.8	57.7	67.6	79.8	96.4	106.3	104.8
Number of people aged 65+ (thousand) (III)	6178.6	7109.0	8669.2	9324.2	10592.7	11173.4	10287.0
Working age population 15 - 64 (thousand) (IV)	26075.4	25016.7	23271.0	21867.7	19159.7	17214.3	16532.9
Old-age Dependency Ratio (ODR) (III)/(IV)	23.7	28.4	37.3	42.6	55.3	64.9	62.2
System efficiency (SDR/ODR)	2.3	2.0	1.8	1.9	1.7	1.6	1.7

*Source: MF, Commission Services*

The changes in the ratios of number of pensioners to population and the number of pensionaries to the number of inactive persons are driven mainly by recently introduced reforms and observed long-term trend of increasing labour force participation of elderly (tables 12a, 12b, 13a, 13b).

The changes in the relation of the pensioners to population are mainly explained by: the reforms that restricted access to early retirement. The decrease of the ratio of retired persons to population is consistent with the increasing labour force participation of persons in pre-retirement age.

The coverage exceeding 100% in case of the groups above the pension age (60 years for women, 65 for men) can reflect three factors. First, there is a quite significant group of retirees who receive benefits and still work to increase their income. After changes introduced in the last years the simulations work and receiving pension benefits is allowed without any limitations if persons exceeded retirement age. Some limitations regarding the level of possible salary remained for persons that receive benefits before statutory retirement age. Second, it is possible (but on a very limited scale) to have simultaneous rights to benefits from different systems. Third factor is possible entitlement of emigrants from Poland to pensions from the Polish systems<sup>1</sup>. Those pensioners add to the number of total pensions despite not being included in the population of Poland.

The second and third reason can explain cohort specific phenomenon of persons that reach the age of 70-74 in 2020. According to the Social Insurance Institution data the number of persons eligible for pensions in that cohort is particularly high in comparison to population and together with pensions from other systems can exceed the number of persons in that age in Poland.

**Table 12a - Pensioners (public schemes) to inactive population ratio by age group (%)**

	2016	2020	2030	2040	2050	2060	2070
Age group -54	7.1	6.0	5.1	4.2	3.4	3.3	3.2
Age group 55-59	60.0	45.8	39.1	31.6	27.3	26.6	26.2
Age group 60-64	94.1	102.9	94.1	92.5	87.6	84.8	87.7
Age group 65-69	107.2	115.8	118.8	124.3	121.4	116.7	119.7
Age group 70-74	106.8	108.4	106.5	108.0	108.7	105.1	102.7
Age group 75+	100.3	101.3	104.5	103.1	104.2	104.2	102.2

*Source: MF, Commission Services*

**Table 12b - Pensioners (public schemes) to total population ratio by age group (%)**

	2016	2020	2030	2040	2050	2060	2070
Age group -54	2.9	2.5	2.1	1.8	1.5	1.4	1.4
Age group 55-59	21.1	16.4	13.2	11.0	9.2	8.9	8.8
Age group 60-64	63.9	62.9	57.9	56.7	53.3	51.4	52.7
Age group 65-69	96.2	99.2	95.8	99.2	97.2	93.1	95.3
Age group 70-74	102.7	105.2	99.6	101.0	101.7	98.3	96.2
Age group 75+	100.3	101.3	104.5	103.1	104.2	104.2	102.2

*Source: MF, Commission Services*

<sup>1</sup> Here we have in mind also pre-accession emigration of persons who emigrated from Poland during communist regime – including a great wave of emigration in 1980s.

**Table 13a - Female pensioners (public schemes) to inactive population ratio by age group (%)**

	2016	2020	2030	2040	2050	2060	2070
Age group -54	5.5	4.7	4.3	3.7	3.1	3.0	2.9
Age group 55-59	52.3	35.7	27.0	22.9	21.4	20.8	19.8
Age group 60-64	102.3	122.6	117.6	117.5	115.4	114.9	119.1
Age group 65-69	107.2	108.9	111.3	115.1	112.9	110.0	112.9
Age group 70-74	104.8	106.9	102.6	103.0	103.6	100.9	100.4
Age group 75+	100.1	101.3	104.0	102.1	102.3	102.3	101.1

*Source: MF, Commission Services*

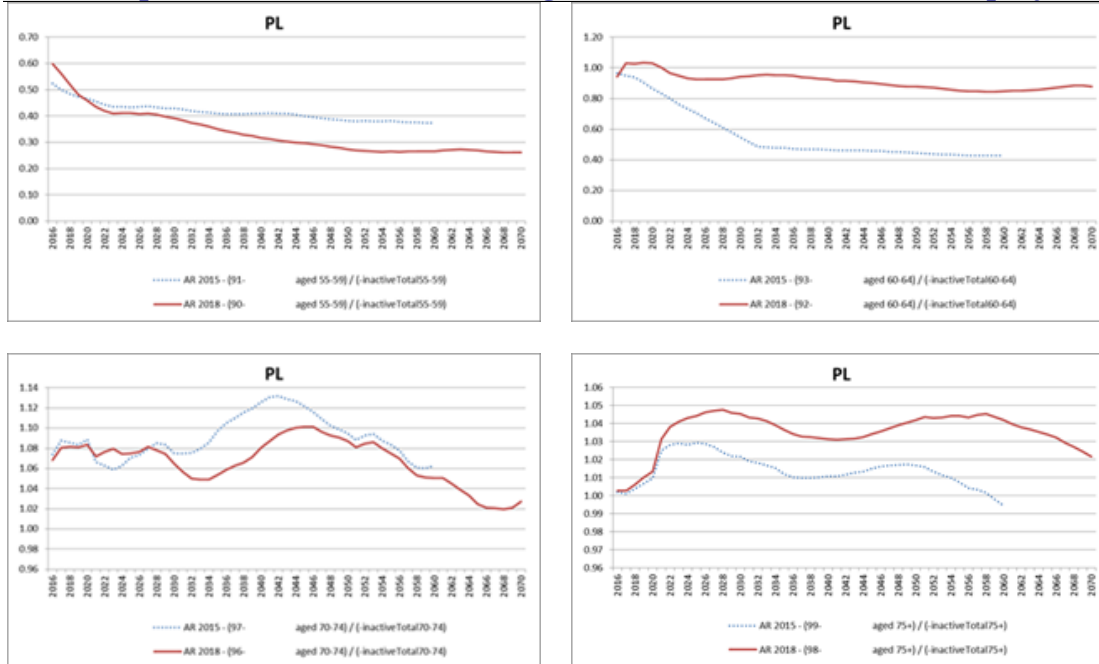
**Table 13b - female pensioners (public schemes) to population ratio by age group (%)**

	2016	2020	2030	2040	2050	2060	2070
Age group -54	2.5	2.2	2.0	1.7	1.5	1.4	1.4
Age group 55-59	21.8	15.3	11.3	9.7	9.0	8.7	8.2
Age group 60-64	81.4	90.4	90.6	91.3	89.3	88.9	91.8
Age group 65-69	100.8	98.5	94.0	96.8	95.2	92.6	94.9
Age group 70-74	102.6	105.0	97.1	97.8	98.6	96.1	95.6
Age group 75+	100.1	101.3	104.0	102.1	102.3	102.3	101.1

*Source: MF, Commission Services*

In comparison to the AR 2015 there are some changes in the coverage ratios (Graph C ). First, the number of persons with benefits before the retirement age (55-59 years) will be lower due to the further tightening of the eligibility criteria for access to benefits before the retirement age. This trend was visible in the past and the recent observations show that the number of such persons is declining faster than expected in the AR2015. On the other hand the number of inactive persons was lower in 2016 but after 2026 it will be higher than in AR 2015 due to slower increase of the labour force participation rate after the return to the statutory retirement age of 60/65. The change in the coverage rates of persons aged 60-64 is mainly due to this reform that results in the increasing number of inactive persons with pensions in that age. The changes in the over 70 age bracket can be explained mainly by the adjustment of the parameters of the pension projection models together with the changes in assumptions regarding labour force participation rate after the reform. In case of the 70-74 years old cohort the number of pensioners was much higher than that of inactive persons who live in Poland (indicator over 1,1) because of the assumptions about the persons who will work in the retirement age and the expected large number of emigrants eligible for pension. According to the recent data this phenomena should not be as strong as expected in AR2015, but the relatively stable positive difference between the number of pensioners and inactive population aged 75+ should remain until the end of prediction horizon.

**Graph C: Evolution of the coverage rates in AR2015 and AR2018 projections**



*Source: Commission Services*

The decomposition of the factors influencing the expenditures on new pensions provides the insight into the mechanisms of NDC general pension system in Poland (tables 14a, 14b, 14c). This table provides components for the decomposition that illustrates the drivers behind the changes of the expenditures on new pensions. In the case of Polish pension system this decomposition was prepared only for the general system based on the define contribution (DC) principle. In this kind of systems the expenditures on new pensions ( $P_{new}$ ) can be calculated as follows:

$$P_{new} = \bar{C}_{new} \bar{A}_{new} \bar{P} \bar{E}_{new} N_{new} \quad (\text{Eq. 2})$$

where  $\bar{C}_{new}$  is an average contributory period,  $\bar{A}_{new}$  average accrual rate of the new pensions (equal to relation of the contribution rate  $c$  to the annuity factor  $A$ ),  $N_{new}$  is the number of new pensioners, and  $\bar{P} \bar{E}_{new}$  is monthly pensionable earning multiplied by average number of months paid the in the first year. The expenditures on new pensions (in absolute terms) are growing until 2060 and then there is a small decline. The main driving forces behind these changes are: (1) the increasing value of the average pensionable wage in the whole projection horizon and (2) the number of new pensions which increases sharply until 2040 reflecting the ageing of the baby boom generation. After 2050 the number of new pensions is expected to decline. The evolution of the monthly pensionable earnings in relation to average wage reflects the labour market background of the generations. The generations that retire at the beginning of the projection spent a large part of the work career in the environment of no unemployment or relatively low unemployment (before 1999). It is reflected in the so called "initial capital" calculated for persons in the DB system, who worked before the introduction of the pension reform in the 1999. The labour market entry of the younger generations who started their careers after 1999 coincided with relatively very high unemployment rate. It is also important that large part of these



generations used options to reduce pensionable income (civil law contracts, self-employment). These factors explain why the average pensionable income in the cohorts that move to retirement after 2040 is much lower than the cohorts that retire now

**Table 14a - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) - Total**

New pension	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	716.0	1224.0	1319.0	1750.0	2284.0	2339.0	3210.0
II. Average contributory period	34.8	34.8	35.4	35.6	35.3	35.9	35.6
III. Monthly average pensionable earnings	1592.3	1848.2	2213.9	2404.0	3287.8	4790.6	7138.4
IV. Average accrual rates (%)	1.0	0.9	0.9	0.8	0.8	0.8	0.7
Notional-accounts contribution rate (c)	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Annuity factor (A)	20.3	21.1	22.2	23.3	24.2	25.3	26.6
V. Sustainability/Adjustment factor	:	:	:	:	:	:	:
VI. Number of new pensions ('000)	221.0	316.0	295.0	376.0	376.0	271.0	265.0
VII Average number of months paid the first year	6.1	6.5	6.5	6.5	6.5	6.5	6.5
Monthly average pensionable earnings / Monthly economy-wide average wage	1.8	1.7	1.2	0.9	0.8	0.8	0.8

*Source: MF, Commission Services*

The total number of new pensions is growing until 2050 because of the increasing size of the generations in the retirement age. The differences in the retirement age between men and women explain why the number of new pensions in case of men is increasing until 2050 while in the case of women the increase is observed until 2040. The generations of women retire earlier.

The changes in the life expectancy together with constant retirement age are reflected in the constantly increasing annuity factor for both sexes. The average contributory period is increasing only slightly reflecting the increasing labour force participation rate in pre-retirement age. The average accrual rate in Polish NDC system will decrease over the whole projection horizon.

In the short run (years 2016, 2017) the results are also influenced by fluctuations due to the introduction of the lower retirement age 60/65 from the October 2017. Slightly more persons reached retirement age in the second half of the year 2016 and in particular a wave of new pensions is expected at the end of 2017.

**Table 14b - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) - Male**

New pension	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	375.7	738.3	805.2	982.4	1332.6	1375.6	1668.1
II. Average contributory period	36.8	36.8	37.3	38.4	37.6	37.9	37.9
III. Monthly average pensionable earnings	1922.5	2145.7	2561.8	2535.9	3229.1	4659.3	6921.4
IV. Average accrual rates (%)	1.0	1.0	1.0	0.9	0.9	0.8	0.8
Notional-accounts contribution rate (c)	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Annuity factor (A)	19.1	19.6	20.5	21.1	22.2	23.3	24.3
V. Sustainability/Adjustment factor	:	:	:	:	:	:	:
VI. Number of new pensions ('000)	84.0	144.0	136.0	168.0	192.0	143.0	122.0
VII Average number of months paid the first year	6.2	6.5	6.5	6.5	6.5	6.5	6.5
Monthly average pensionable earnings / Monthly economy-wide average wage	2.2	2.0	1.4	0.9	0.8	0.8	0.8

*Source: Commission Services*

**Table 14c - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) - Female**

New pension	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	340.3	485.7	513.8	767.6	951.4	963.4	1539.5
II. Average contributory period	33.6	33.3	33.7	33.4	32.8	33.6	33.6
III. Monthly average pensionable earnings	1329.5	1502.7	1792.1	2192.6	3268.8	4847.9	7213.9
IV. Average accrual rates (%)	0.9	0.9	0.8	0.8	0.7	0.7	0.7
Notional-accounts contribution rate (c)	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Annuity factor (A)	21.0	22.4	23.7	25.1	26.3	27.5	28.6
V. Sustainability/Adjustment factor	:	:	:	:	:	:	:
VI. Number of new pensions ('000)	137.0	171.0	159.0	207.0	184.0	128.0	143.0
VII Average number of months paid the first year	6.0	6.5	6.5	6.5	6.5	6.5	6.5
Monthly average pensionable earnings / Monthly economy-wide average wage	1.5	1.4	1.0	0.8	0.8	0.8	0.8

*Source: Commission Services*

### 3.4 Financing of the pension system

The level of pension contributions depends on the pension system. The level of contributions in the general system is described in Table 15. The contributions in the farmers' system depend on the size of a farm and are relatively low in comparison with the contributions paid in the general system. There are no pension contributions in the security provision systems as these pensions are financed directly from the budget.

**Table 15 - Financing of the system**

	Public employees	Private employees	Self-employed
Contribution base	0	0	0
Contribution rate/contribution			
<i>Employer</i>	9.8%	9.8%	19.5%
<i>Employee</i>	9.8%	9.8%	
<i>State</i>	-	-	-
<i>Other revenues</i>	Demographic Reserve Fund.	Demographic Reserve Fund.	Demographic Reserve Fund.
Maximum contribution	0	0	0
Minimum contribution	0	0	0

*Source: MF, Commission Services*

The total contribution revenues (Table 16) are influenced mainly by macroeconomic and demographic assumptions (employment, wage growth, inflation). The relation between the number of contributors and number of employed persons is slightly less than one due to the fact that LFS data contain persons that are employed but do not pay contributions (example: shadow economy).

**Table 16 - Revenue from contribution (million), number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)**

	2016	2020	2030	2040	2050	2060	2070
Public contribution	33689.4	43138.7	66273.9	95516.0	125799.0	165435.4	222426.1
Employer contribution	20215.4	25633.7	39109.9	55965.0	74902.0	98932.4	133043.1
Employee contribution	11981.0	15311.0	23841.0	34926.0	46993.0	62119.0	83663.0
State contribution	688.0	922.0	1254.0	1909.0	2814.0	3737.0	4849.0
Other revenues	805.0	1272.0	2069.0	2716.0	1090.0	647.0	871.0
Number of contributors (I)	16524.6	16608.1	15488.5	14249.0	12691.2	11426.0	10645.2
Employment (II)	17166.0	17247.8	15977.8	14673.5	13120.7	11866.1	11152.1
Ratio of (I)/(II)	1.0	1.0	1.0	1.0	1.0	1.0	1.0

*Source: MF, Commission Services*

### 3.5 Sensitivity analysis

The effects of different scenarios in sensitivity analysis are presented in the table Table 17. After the reforms introduced in 2014 the total pension expenditures from mandatory pillars are exactly equal to public pension expenditures. The lowest pension expenditures are expected in the scenario of the higher total factor productivity growth. The most pronounced growth of the pension expenditures is expected in the scenario of the lower fertility and the lower TFP growth. The explanations of the possible mechanisms of influence of the sensitivity test on different subsystems of the Polish pension system are described further in this chapter.

**Higher life expectancy scenario** – rising life expectancy is compensated by the construction of general system (pure NDC in the long run) but the persisting positive influence on the pension expenditure can be explained firstly by the method of pension benefit calculation that rely on life tables from the moment of retirement. Secondly, the level of pensions is influenced negatively by the life expectancy. Lower pensions lead to higher expenditures on minimum pension. The third reason is that longer life expectancy influences also expenditures through a longer period of indexation of benefits. The longer life expectancy affects directly expenditures in farmers' pension system (defined benefit system) and security provision system.

**Higher/lower labour productivity and risk scenarios** – Higher productivity has an influence on all systems through higher wage growth in the economy. In general system it results in higher accumulation of contributions (new pensions) and higher indexation (old benefits). *Higher labour productivity* accelerates also GDP growth proportionally more than benefits because of the indexation rule of already granted benefits. The same mechanism explains the changes in security provision systems, while in case of farmers' pension system even new benefits are indexed lower than wage growth which additionally decreases the proportion of expenditures to GDP. At the end higher labour productivity growth scenario results in decrease of the ratio of expenditures to GDP over the whole projection period. *Lower labour productivity scenario* has the opposite effect. *Risk scenario* is also based on assumption of a lower than baseline productivity growth and it leads to similar final results (public expenditures higher by +0,4pp.). However in *risk scenario* the increase of expenditures is delayed in comparison to permanently lower productivity scenario.

**Higher employment rate of all persons in the working age** – affects the future expenditures in three ways: (1) it directly influences the total sum of contributions and thus also the capital accumulated

in DC system by generations. It results in higher future liabilities of the public sector and higher calculated new pension benefits but they are then indexed below wage growth, (2) higher employment rates increase the speed of accumulation of contributory period by employees and decrease the share of persons that were not able to meet the minimum contributory period requirement to receive pension benefits after reaching the pension age (including minimum pension), (3) increased labour force participation of persons in pre-retirement age means also lower take-up of early benefits. Higher employment directly increases GDP growth. As a result higher employment means the increase of the ratio of expenditures to GDP if future pensions are indexed to maintain their relation to wages.

**Higher employment rate of older workers** – the channels of influence of that scenario are similar to the previous scenario but in this case the increase of the expenditures to GDP results from higher labour force participation rate before the retirement age and longer contributory period that enables higher percentage of persons to be eligible to minimum pension just after retirement age.

**Lower/higher net migration** – the projection of migration changes has relatively limited impact on the changes of the total population due to the relatively low level of net migration assumed in EUROPOP 2017. The impact of +/- 33% migration on pension expenditure influence the results in two different ways. In the beginning higher/lower migration increases/decreases labour supply and contributions without significant influence on pension expenditures. With time immigrants move to retirement and it leads to the increase / decrease of pension expenditures to GDP.

**Policy scenario** – in this scenario the increase of the retirement age is strictly connected with the increasing life expectancy in retirement. In this scenario the pension expenditures are lower than in the baseline scenario but the influence is mitigated by the corresponding accumulation of the implicit liabilities in the system.

**Table 17 - Public and total pension expenditures under different scenarios (deviation from the baseline)**

	2016	2020	2030	2040	2050	2060	2070
<b>Public Pension Expenditure</b>							
Baseline	11.2	11.1	11.0	10.8	11.2	11.1	10.2
Higher life expectancy (2 extra years)	0.0	0.0	0.0	0.1	0.2	0.2	0.3
Higher Total Factor Productivity Growth (+0.4 pp.)	0.0	0.0	0.0	-0.2	-0.5	-0.7	-0.7
Lower Total Factor Productivity Growth (-0.4 pp.)	0.0	0.0	0.0	0.3	0.7	0.9	0.9
Higher emp. rate (+2 pp.)	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Lower emp. rate (-2 pp.)	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1
Higher emp. of older workers (+10 pp.)	0.0	0.1	0.2	0.3	0.0	0.1	1.0
Higher migration (+33%)	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
Lower migration (-33%)	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Lower fertility	0.0	0.0	0.0	0.2	0.6	1.1	1.6
Risk scenario	0.0	0.1	0.6	0.8	0.7	0.6	0.5
Policy scenario: linking retirement age to increases in life expectancy	0.0	-0.7	-0.6	-0.8	-0.7	-0.3	-0.4
<b>Total Pension Expenditure</b>							
Baseline	11.2	11.1	11.0	10.8	11.2	11.1	10.2
Higher life expectancy (2 extra years)	0.0	0.0	0.0	0.1	0.2	0.2	0.3
Higher Total Factor Productivity Growth (+0.4 pp.)	0.0	0.0	0.0	-0.2	-0.5	-0.7	-0.7
Lower Total Factor Productivity Growth (-0.4 pp.)	0.0	0.0	0.0	0.3	0.7	0.9	0.9
Higher emp. rate (+2 pp.)	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Lower emp. rate (-2 pp.)	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1
Higher emp. of older workers (+10 pp.)	0.0	0.1	0.2	0.3	0.0	0.1	1.0
Higher migration (+33%)	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
Lower migration (-33%)	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Lower fertility	0.0	0.0	0.0	0.2	0.6	1.1	1.6
Risk scenario	0.0	0.1	0.6	0.8	0.7	0.6	0.5
Policy scenario: linking retirement age to increases in life expectancy*	0.0	-0.7	-0.6	-0.8	-0.7	-0.3	-0.4

*Source: MF, Commission Services*

### 3.6 Description of the changes in comparison with the 2006, 2009, 2012 and 2015 projections

The comparison of the results of the current projection with the previous projections (Table 18) shows that the potential influence on the ageing process on the pension expenditures is decreasing as the ageing has already materialized to some extent in the current age structure of Polish population and in the current projection for the first time the horizon is more distant than the life expectancy of the last baby boom generation of the 1980s which determines the rapid changes of the indicators in the first decades of the projection. The return to the retirement age 60/65 means that the gains from the increase in coverage ratio and increase of the employment rates are relatively small in comparison to previous projection. The potential for increase of the effective retirement age and exit age from the labour market is also smaller than in the previous projections prepared before the introduction of the gradual increase of the retirement age. As a result the main way of the adjustment to ageing in the horizon 2016-2070 is the decrease of the level of pension benefits.

**Table 18 - Average annual change in public pension expenditure to GDP during the projection period 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 *	-5.71	10.36	-5.69	-3.18	-6.34	:	-0.86
2009 **	-2.80	13.39	-6.33	-0.96	-7.08	:	-1.83
2012 ***	-1.96	13.49	-5.90	-0.95	-6.53	0.01	-2.07
2015****	-0.65	12.40	-5.30	-0.85	-5.13	0.01	-1.79
2018*****	-1.02	11.67	-3.08	-0.18	-8.00	0.00	-1.44

(Explanatory note: The Table presents the average annual change of pension expenditure and the contributions of the underlying component to that change, whereas Table shows, for different intervals of time, the decomposition, in percentage points, of the factors behind the change in public pension expenditures. \* 2004 - 2050, \*\* 2007 - 2060, \*\*\* 2010 - 2060, \*\*\*\* 2013 - 2060. \*\*\*\*\* 2016 - 2070. Please note that the four components do not add up because of a residual component.)

**Source: MF, Commission Services**

After the economic crisis of the 2008 the assumptions of the AWG projections for all countries (including Poland) have been improved. In Poland in addition the stable increasing trend in labour force participation rate is observed which also raised the LFPRs projections. That is why the changes in the assumptions between projections affect negatively the predicted relation of the pension expenditures to GDP. On the other hand there were slight changes in the modelling of farmers' pensions and security provision systems that changes the projections a bit.

However the most important are the changes in legislation – the return to the retirement age 60/65 while in the previous projection the gradual increase to 67 for both sexes was assumed. This factor together with the limitations on “constant policy” rule in indexation contributed to the increase of the annual pension expenditures up to 1% of GDP in the years 2030-2040. This difference is lower afterwards as the pension rights collected in the NDC system by the baby boom generation of 1980s will be much lower than in the projection with increased life expectancy.

**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	11.1	10.8	10.5	10.1	10.6	10.8	:
<i>Change in assumptions</i>	0.0	-0.4	-0.4	-0.3	-0.2	-0.2	:
<i>Improvement in the coverage or in the modelling</i>	0.1	-0.1	-0.1	0.0	0.1	0.1	:
<i>Change in the interpretation of constant policy</i>	:	:	:	:	:	:	:
<i>Policy related changes</i>	0.0	0.8	1.0	1.0	0.7	0.4	:
New projection	11.2	11.1	11.0	10.8	11.2	11.1	10.2

**Source: MF**

## **4. Description of the pension projection model and its base data**

The aim of this chapter is to describe the basic features of the models used in the projections. In case of Poland the three main models are used: actuarial model of Social Insurance Institution for projections of the general system and two separate models used by Ministry of Finance to prepare the projections of the farmers' system and to prepare the projection of the security provision system.

### **4.1 Institutional context in which those projections are made**

The forecasts concerning the General Pension System have been prepared using the actuarial model of Social Insurance Institution (ZUS). This institution manages Social Insurance Fund (FUS) and collects contributions. ZUS is required by the Social Security System Act to provide every three years a long term projection, which must be presented to the government and the public. Actuarial model used by ZUS has been tailored to its specific revenue-expenditure structure. In order to meet the requirements of the AWG projection this model has been extended to better reflect labour market assumptions and potential transitions between general pension system and farmer's pension system.

The remaining pension systems: farmers' pension system and security provision system have been modelled by Ministry of Finance using PROST model. The results of these models have been peer reviewed by the representatives of the World Bank.

### **4.2 Assumptions and methodologies applied**

#### **4.2.1 General System (FUS model)**

The main part of the Polish pension system has been modelled using the current version of ZUS's pension model. Its kernel is a classical multiple decrement cohort-component actuarial model. Elemental calculation unit is "same-sex-and-age" cohort. The kernel is boosted with complementary modular sub-models projecting other benefit expenditures. The contribution revenue forecast is derived from past experience and projected changes in demographics and the labour market. The deterministic actuarial calculations were performed with an Excel and Visual Basic software. The model is updated on an annual basis. It covers four social insurance schemes: old-age, disability, survivors, sickness and accident insurance. The tool distinguishes between different mortality rates of certain types of benefit recipients. Main outputs of the model include the standard fiscal indicators (expenditures, revenues, surplus/debt of the Social Insurance Fund) and various standard ratios (e.g. benefit ratio). Previous version of the model have served as a tool for the AWG pension projections in 2006 but due to introduction of numerous changes the model used in current projection should be treated as a new tool. The minimum retirement guarantee was modelled by ZUS using the results of the microsimulation model. These benefits shall apply to persons who will have insurance period (20 years for women and

25 years for men) and it shall be financed by state budget and paid when total compulsory retirement pension scheme is lower than the minimum.

#### **4.2.2 Farmers' pension system model**

Farmers' pension system was modelled using the PROST model developed by World Bank. The AWG assumptions have been adjusted to create an input to this model.

#### **4.2.3 Security provision system model**

Security provision pension system was modelled using a PROST methodology developed by World Bank. The separate models were prepared to model the systems with different regulations regarding pension formulas and minimum retirement age. The AWG assumptions have been adjusted to create an input to these models.

### **4.3 Data used to run the model**

Different models used assumptions prepared by AWG. As a supplement to assumptions the new long term projection of the employment in agriculture sector was prepared using the methodology similar to applied in the CSM projections of the LFPRs. The parameters of the models were estimated using the currently observed data from the pension institutions.

### **4.4 Reforms incorporated in the model**

All reforms legislated until June 2017 have been incorporated in the models (Please see chapter 1.2. for the detailed description of the reforms).



## 5. References

European Commission. 2017. *The 2018 Ageing Report. Underlying Assumptions & Projection Methodologies*. European Economy Institutional Paper 065.

Eurostat. 2017. *Population projections at national level (2015-2080)*. <http://ec.europa.eu/eurostat/data/database>

Strzelecki, P. Tyrowicz, J. 2015. *Crowding (out) the retirees? RDD application to raising effective retirement age in Poland*. Faculty of Economic Sciences, University of Warsaw Working Paper No. 2015-10

**Table A120 - Factors behind the change in public pension expenditures between 2013 and 2070 (in percentage points of GDP) - pensions**

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70
Public pensions to GDP	-0.1	-0.1	-0.1	0.3	-0.1	-0.9	-1.0
Dependency ratio effect	2.2	4.3	2.5	6.0	4.9	-1.3	18.7
Coverage ratio effect	-0.7	-1.2	0.0	-0.5	-0.5	0.1	-2.8
Coverage ratio old-age*	0.2	-0.1	0.0	0.0	-0.1	-0.1	-0.1
Coverage ratio early-age*	-0.6	-2.8	-0.2	0.2	-0.8	0.1	-4.1
Cohort effect*	-2.1	-1.5	0.3	-2.2	-1.4	0.5	-6.4
Benefit ratio effect	-0.8	-1.6	-1.4	-1.1	-0.6	-0.4	-5.9
Labour Market/Labour intensity effect	-0.5	-0.1	0.3	-0.2	-0.2	0.2	-0.4
Employment ratio effect	-0.4	0.1	0.3	0.0	-0.2	0.1	-0.2
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Career shift effect	-0.1	-0.1	0.0	-0.2	0.0	0.1	-0.3
Residual	-0.3	-1.6	-1.6	-3.9	-3.7	0.5	-10.6

*Source: MF, Commission Services*

**Table A2 - Factors behind the change in public pension expenditures between 2013 and 2070 (in percentage points of GDP) - pensioners**

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70
Public pensions to GDP	-0.1	-0.1	-0.1	0.3	-0.1	-0.9	-1.0
Dependency ratio effect	2.2	4.3	2.5	6.0	4.9	-1.3	18.7
Coverage ratio effect	-0.7	-1.2	0.1	-0.5	-0.5	0.1	-2.7
Coverage ratio old-age*	0.3	-0.1	0.1	0.0	-0.1	-0.1	0.1
Coverage ratio early-age*	-0.6	-2.8	-0.2	0.2	-0.8	0.1	-4.1
Cohort effect*	-2.1	-1.5	0.3	-2.2	-1.4	0.5	-6.4
Benefit ratio effect	-0.9	-1.6	-1.4	-1.1	-0.6	-0.4	-6.0
Labour Market/Labour intensity effect	-0.5	-0.1	0.3	-0.2	-0.2	0.2	-0.4
Employment ratio effect	-0.4	0.1	0.3	0.0	-0.2	0.1	-0.2
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Career shift effect	-0.1	-0.1	0.0	-0.2	0.0	0.1	-0.3
Residual	-0.3	-1.6	-1.6	-3.9	-3.7	0.5	-10.6

*Source: MF, Commission Services*