



RZECZPOSPOLITA POLSKA

Ageing Working Group

**Polish country fiche
on pension projections 2014**

February 2014 r.

Contents

Contents.....	2
1 Overview of the pension system.....	3
1.1 General System	3
1.1.1 Description of the system.....	4
1.1.2 Recent reforms.....	5
1.2 Farmers' Pension System	7
1.2.1 Description of the system.....	7
1.2.2 Recent reforms.....	7
1.3 Security Provision Systems.....	8
1.3.1 Description of the system.....	8
1.3.2 Recent reforms.....	8
1.4 Description of the actual „constant policy“ assumptions.....	8
2 Overview of the demographic and labour forces projections	9
2.1 Demographic development	9
2.2 Labour force.....	10
3 Pension projection results	13
3.1 Extent of the coverage of the pension schemes in the projections.....	13
3.2 Overview of projection results	13
3.3 Description of main driving forces behind the projection results and their implications for main items from a pension questionnaire	16
3.4 Sensitivity analysis	23
3.5 Description of the changes in comparison with the previous projections.....	25
4 Description of the pension projection model and its base data.....	27
4.1 Institutional context	27
4.2 Assumptions and methodologies applied	27
4.2.1 General System (FUS model)	27
4.2.2 Farmers' pension system model	28
4.2.3 Security provision system model.....	28
4.3 Data used to run the models	28
4.4 Reforms incorporated in the model	28
5 References.....	28
6 Annex	29

1 Overview of the pension system

The Polish pension system consists of two major insurance systems: general pension system (for majority of employees, employers and self-employed) and farmers' pension system. Furthermore, there are also security provision systems for military forces, police and similar services as well as judges and prosecutors function separately without contributions. Each of those systems operates under separate rules and concerns another group of persons. The largest, general pension system pays old-age pensions for nearly 80% of all pensioners and this share is increasing steadily. Benefits for 16% of pensioners are paid from the agricultural system and consequently this share decreases. Other pensioners receive their benefits from the security provision systems. These systems are based on different rules for paying contributions and receiving benefits. The benefit indexation rules however are the same (with minor exception).

This document focuses on total public pension expenditure. As a result data presented in this document refer to the sum of the above mentioned systems. Some additional tables including data only for general pension system are added. This allows to better understand the results of the latest pension reform.

1.1 General 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 in 2013 covered 14.5 million people. From this system benefits have been paid to 5 million old-age pensioners and 2.3 million disabled and survivors (table 1).

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

		2010	2020	2030	2040	2050	2060
Men - with minimum 20 contribution years	statutory retirement age	65	67	67	67	67	67
	earliest retirement age	Strictly defined occupations with the right to early retirement (miners)					
	penalty in case of earliest retirement age						
Men - with minimum 40 contribution years	statutory retirement age	65	67	67	67	67	67
	earliest retirement age	Strictly defined occupations with the right to early retirement (miners)					
	penalty in case of earliest retirement age	In general system penalty due to actuarial adjustment. In case of partial retirement – pension equal to 50% of full pension (available at 65, required 40 year contributory period). This additionally entails a decrease in future pension.					
Women – with minimum 20 contribution years	statutory retirement age	60	62	64,8	67	67	67
	earliest retirement age	Strictly defined occupations with the right to early retirement (miners)					
	penalty in case of earliest retirement age						
Women – with minimum 40 contribution years	statutory retirement age	60	62	64,8	67	67	67
	earliest retirement age	Strictly defined occupations with the right to early retirement (miners)					
	penalty in case of earliest retirement age	In general system penalty due to actuarial adjustment. In case of partial retirement – pension equal to 50% of full pension (available at 62, required 35 year contributory period). This additionally entails a decrease in future pension.					

Source: Own elaboration

1.1.1 Description of the system

The reform launched on January 1st 1999 has fundamentally changed the system's construction. The basic reason for the reconstruction of the system was to adjust it to demographic changes and to accelerate the economic growth of the country. The pension system should be financially stable and encourage the participants to continue their professional activity.

The defined benefit system was transformed into a defined contribution 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. People born before 1949 remained in the old DB (defined benefit) system. People born 1949-1968 could choose if they want to join funded tier or stay in one pillar NDC (notional defined contribution) system. Due to subsequent reform participation in funded tier has been changed (detailed description in next chapter). The contribution rate is equal for all insured no matter in which pillar they are. Possibility for early retirement has been withdrawn and disability system has been tightened.

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 0.67% to 3.86%.

Health insurance is financed from separate fund. The ceiling to contributions and pensionable earnings is set at 2.5 times average monthly earnings in the economy. Old-age pension contribution amounts to 19.52 per cent of gross wage (table 1A) and is payable in equal parts by the employer and by the employee. 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.

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 from the last 5 years. 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.

Table 1A. Changes in the contributions to pillars in General Pension Scheme¹

	National scheme (NDC 1 st account)	Sub-account (NDC 2 nd 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%

Source: Own elaboration

The retirement age has been raised and will reach 67 years both for women and men. No option is foreseen for the persons covered by the new system to retire early (excluding miners), which should lead to a rise in the effective retirement age. In 2013, the average actual retirement age was 59.5 years (59.7 for men and 59.3 years for women).

From January 2009 the bridging pensions have been introduced but only people who started to work before 1999 in so called special conditions are entitled to these pensions. These benefits are calculated in a similar way as old-age pensions in the new system. Pension formula (equation 1) in the new system is presented below:

¹ This is additional table not included in the standard AWG country fiche list of tables.

$$pension = \frac{\text{collected and indexed pension contributions and the indexed initial capital}}{\text{average life expectancy for persons at the age of retire}} \quad (\text{Eq. 1})$$

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. 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. Assets of the Fund amounts to 0.1 % GDP and 15% of yearly old-age pension expenditures. Investment policy is regulated by law.

Minimum pension is guaranteed for men and women with at least 25 and 20 contributory years respectively (25/25 after the reform). 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 the same way as other pension benefits. In the projections, the minimum pension is calculated according to above mentioned rules. In the new pension system, the minimum pension guarantee is detached from contributory financing and moved to the state budget and general revenue financing. The changes of minimum pension level do not deviate much from the changes in subsistence minimum.

According to the ZUS data, in 2014 the minimum pension benefits were received by nearly 150 thousand pensioners (3% of all old age pensions). Analysis shows that the increase of retirement age could significantly reduce the coverage both for men and for women.

The first benefits from the new system have been paid from 2009 for women and from 2013 for men. For this reason, when analyzing projection results it should be taken into account that at the beginning of the projection period majority of pension benefits are calculated according to the old system formulas.

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 not developed as few people are covered. One of the reasons could be relatively high replacement rate from the old system. However new incentives were introduced by the last pension reform.

1.1.2 Recent reforms

Two major reforms were introduced in Poland in 2012:

- Increase in contribution rate for disability and survival system. This change will reduce deficit of the pension system without increasing expenditures.
- Increase of the retirement age both for men and women. This change is intended mostly to increase adequacy of the future benefits as in NDC system it has no substantial impact on financial sustainability in the long term.

Thereafter, updated projections were subject to peer review by AWG.

Another important pension reform concerning second pillar was introduced in 2014.

- In accordance with the provisions of the Act, 51.5% of the accounting units recorded in the individual account of each Open Pension Fund (OFE) member were cancelled (i.e. a part of the assets invested, among others in Treasury Securities and bonds guaranteed by the State Treasury), and their equivalent was registered on the sub-account in ZUS. The value of these assets cannot be lower than the value as of 3 September 2013. As a result the value of accounting units is maintained, and none of the insured persons will incur losses resulting from the transfer of assets.
- The new rate of pension contribution transferred to the open pension fund, selected by the insured person, equals to 2.92% of the basis of pension contribution, while the remaining part of the pension contribution under the second pillar of the pension system, amounting to 4.38% of the basis of

pension contribution, is registered in the sub-account in ZUS and indexed to the average annual growth rate of gross domestic product for the past 5 years.

- At the same time, OFE are not permitted to invest in Treasury Securities and in debt instruments guaranteed by the State Treasury. The investment limits for assets managed by OFE have also been changed, aiming at recovering the market (capital) nature of OFE.
- Each insured person had three months to make a decision and to submit a statement regarding the transfer of the future (only future) contributions to open pension funds. For the first time the opportunity to make such a decision took place in 2014, the next will be in 2016, and further opportunities for re-decision will take place every 4 years. The introduction of a voluntary transfer of the future contributions to the open pension funds will reduce the budgetary costs of the pension system. In case of persons who have not decided to stay in funded pillar their contributions are transferred to the sub-account in the first pillar. As result of the first choice, 15% of OFE members decided to remain in open funds. The maximum level of the fee charged by the OFE managing institutions was also reduced by a half, to 1.75%.
- People who decided not to stay in funded pillar still have their previous contributions in open pension funds as the reform concerns only new contributions. Persons who decided to stay in funded pillar will continue to accumulate contributions. Pension payments from funded tier after reaching the retirement age will be made integrally by ZUS (with the same pension formula as in 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 accumulated funds and will reduce the costs associated with their collection.

The funds transferred to the sub-account in ZUS will be subject to the current rules of indexation, applying the indicator equal to the average annual growth rate of GDP for a period of the last five years. It is expected that the growth rate of the nominal GDP in the nearest years will not be lower than the rate of return on the Polish treasury bonds, therefore it will be neutral for the level of the pension of a person insured. As a result, the replacement rates should reach the level similar to the status before the changes were introduced.

The changes in the pension system introduced by the aforementioned act will have a positive impact on the FUS balance. They will mainly arise from reduction of the contribution transferred to OFE (resulting from lower contribution rate and introduction of the choice over the transfer of the contributions to OFE), the mechanism of a gradual transfer of assets from OFE to ZUS over ten years before retirement and due to the proceeds from assets other than Treasury bonds, transferred by OFE to ZUS. For these reasons expenditures are going to increase but fund balance will be improved.

The cancellation of Treasury securities acquired by the Minister of Finance, who represents State Treasury, from the ZUS results in reduction of the face value of State Treasury debt by PLN 130,187.6 million (GDP 7.6%) and decrease of the general government debt (EU definition) by PLN 145,801.7 million (GDP 8.5%).

Taking into account both the impact of the transfer of the part of OPFs' assets to ZUS and other changes in the pension system (including voluntary mechanism and gradual transfer of assets of the insured with 10 years or less to the retirement age), changes in the pension system will result in reduction of public debt by more than 8% of GDP and of general government debt (EU methodology) by more than 9% of GDP.

1.2 Farmers' Pension System

Since 1977 farmers and their families are subject to compulsory social insurance. Until 1991 that system was managed by ZUS, and since 1991 – by the new established institution: Agricultural Social Insurance Fund (KRUS). At the end of 2013, there were less than 1.5 million people subject to insurance, while almost 1 million beneficiaries received old-age pension benefits.

1.2.1 Description of the system

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 (currently 60 years for a woman, 65 years for a man and 67/67 in the future).
- 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 an assumption of 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 95% and 85% 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 has low contributions and low benefits.

Since 2009 the contributions of owners of the farms larger than 50ha are 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.

1.2.2 Recent reforms

In line with increase of retirement age in general pension system, the farmers pension system has also been reformed. Moreover limitations to the regulations which entitle farmers (as well as judges and prosecutors) to early retirement have also been implemented. Currently farmers who have not reached the statutory retirement age are eligible for retirement at the age of 55 – women and 60 – men if they were insured for a period of minimum 30 years and ceased farmer activity.

The reform foresees that only farmers who reach the current retirement age till December 31. 2017 will be entitled to early retirement.

The result of this reform has been included in updated projections in 2013.

1.3 Security Provision Systems

1.3.1 Description of the system

Security provision systems are entirely financed by the state budget without any contributions from the persons employed. They include benefits for 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. In comparison with the general system, there are two distinguishable features:

- the acquisition of retirement rights depends on the work service period – one can retire as soon as after 15 years of service, which means that those systems have relatively the youngest retirees;
- the amount of benefit is determined on the basis of the amount of final salary or wage, thus in a different manner than in the general 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.

In 2014 a total of 280 thousand old-age pension benefits were paid from this systems.

1.3.2 Recent reforms

The Social Security Provision System has been reformed as well. It covers the following groups of professionals: the police, army, fire-fighters and other professionals being entirely financed by the state budget without any contributions from the persons employed.

According to the recent reform of 2012 the Social Security System for affected individuals will be retained (not incorporated into the general pension system).

All changes will affect new professionals coming into service starting from January 1, 2013. New persons will stay in a separate system and will not pay any contributions as it is now. The acquisition of retirement rights will not be possible as soon as after 15 years of service but after 25 years of service and under parallel condition of reaching the age of 55. Currently there is no minimum age. 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 (currently, the amount of benefit is determined on the basis of the amount of final salary or wage which increases significantly the replacement rate).

In case of judges and prosecutors, according to the current law, these professionals are allowed to retire at the age of 55 in case of woman who served as judge or prosecutor for at least 25 years and at the age of 60 in case of a man who served as judge or prosecutor for at least 30 years. The reform foresees that only judges and prosecutors who reach the current retirement age till December 31, 2017 will be entitled to early retirement. The retirement age has been increased in line with general system rules. Both reforms have been taken into account in 2013 projections.

1.4 Description of the actual „constant policy“ assumptions

The calculations were carried on under the assumption of constant policy regulations. The most important in that context is keeping constant the indexation of benefits rule „inflation plus 20% of real wage growth“. It is also assumed that the effective income tax rate on pensions will be stable in the whole projection period.

All reforms already approved by the government until November 2014 are taken into account in the projection.

2 Overview of the demographic and labour forces projections

2.1 Demographic development

According to EUROPOP2013 demographic projections Polish population is going to shrink by approximately 5 million persons (table 2). The main cause is very low fertility rate. The working-age population (aged 15-64 years) will also decline and share of older people in total population will increase. As a result old-age dependency ratio will increase from 20.5 to 61. It is also a result of a strong increase in life expectancy by 5.9 years for men at 65 and 5.3 for women. According to Eurostat assumptions in case of Poland migration changes will play only a minor role in the future population changes.

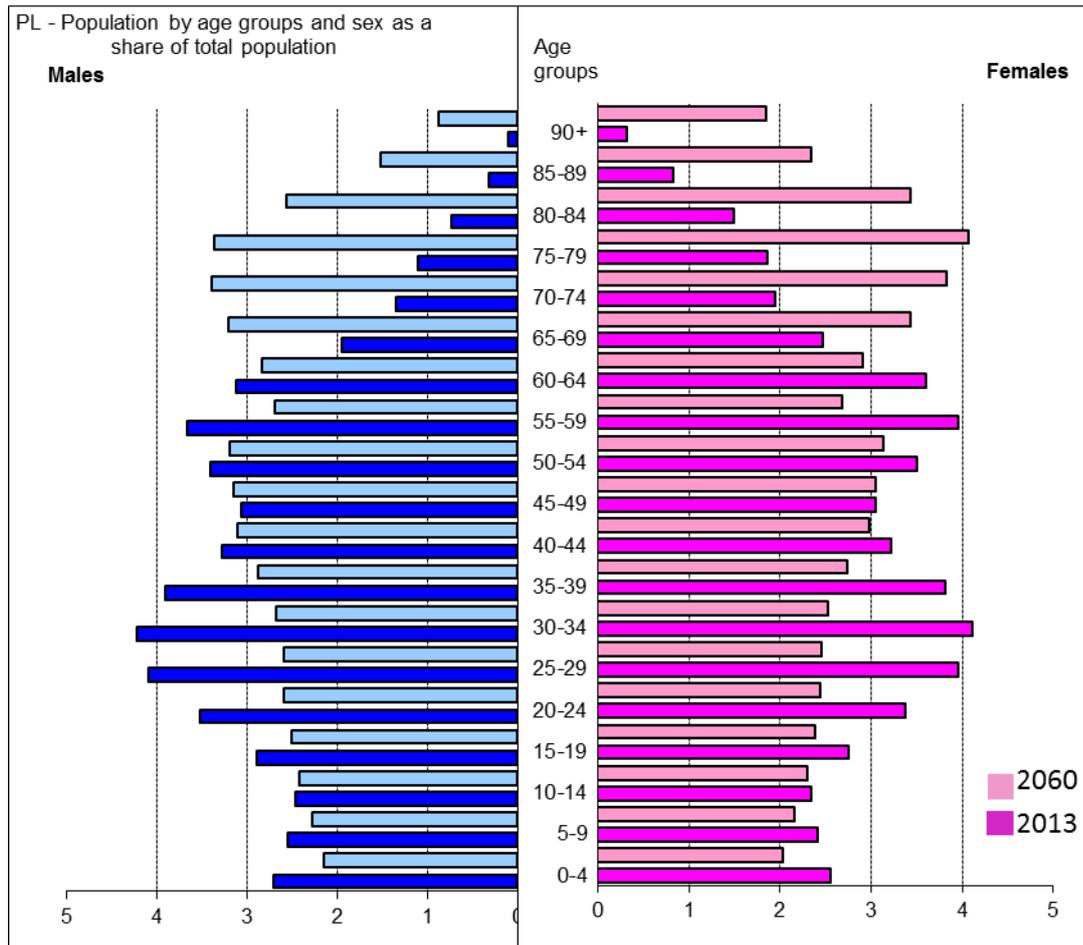
Table 2. Main demographic variables evolution

	2013	2020	2030	2040	2050	2060	Peak year*
Population (thousand)	38518	38368	37464	36174	34769	33210	2013
Population growth rate	0,0	-0,1	-0,3	-0,4	-0,4	-0,5	2015
Old-age dependency ratio (pop65/pop15-64)	20,5	27,7	35,6	40,4	52,6	61,0	2060
Ageing of the aged (pop80+/pop65+)	26,2	23,8	25,5	36,8	31,8	37,2	2060
Men - Life expectancy at birth	72,8	74,5	76,7	78,8	80,8	82,6	2060
Men - Life expectancy at 65	15,4	16,3	17,7	18,9	20,1	21,3	2060
Women - Life expectancy at birth	80,9	82,2	83,8	85,3	86,8	88,1	2060
Women - Life expectancy at 65	19,6	20,5	21,7	22,8	23,9	24,9	2060
Men - Survivor rate at 65+	74,0	77,2	81,2	84,5	87,3	89,5	2060
Men - Survivor rate at 80+	38,6	43,8	51,0	57,8	63,9	69,3	2060
Women - Survivor rate at 65+	88,8	90,1	91,8	93,1	94,2	95,2	2060
Women - Survivor rate at 80+	64,7	68,4	73,2	77,4	81,0	84,1	2060
Net migration	-15,6	2,9	-0,9	25,4	29,5	11,6	2048
Net migration over population change	0,9	-0,1	0,0	-0,2	-0,2	-0,1	2013

Source: Commission services

Figure 1 shows the proportions of age groups as shares of the total population or the age pyramid by gender for 2013 and 2060. Polish population is going to change significantly. The change is not only in number of inhabitants but the most important are changes in population structure. In 2060 baby boom generation will retire while the share of working age group will be the smallest.

Figure 1. Polish population by age and sex in 2013 and 2060



Source: Eurostat. EUROPOP 2013

2.2 Labour force

In order to project labour force participation rates the CSM was used by the European Commission. Beside the increasing trend of labour force participation that reflects cohort effects, labour force participation rates of persons in pre-retirement age are going to increase from relatively low level due to significant restrictions on early retirement and an increase of the retirement age up to 67 for both sexes.

After 2040 the factors that improve LFPR will have much lower impact than increasing share of persons aged 50+ in the labour force (table 3). That is why in the decade 2040-2050 LFPR are going to stabilise. As a result labour force participation rate will increase in the years 2013-2050 from 44.2 to 64,2 for aged 55-64 and from 7,6 to 20,8 for aged 65-74 and in the next decade there are no significant further changes. The projected increase in labour force participation rates after the increase of the retirement age seems plausible taking into account the significant and positive changes in LFPRs of persons in preretirement age after cancellation of early retirement benefits since the year 2009. There are also some recently introduced policy measures targeted to encourage elderly to remain active in the labour market.

Employment rates will also increase significantly following LFPRs. The changes of population structure together with effects of introduced reforms explain changes in the median age of the labour

force. It will increase during the projection period with a peak in 2035 caused by the aging of the baby-boom generation born in early 1980s. LFPR growth will compensate to some extent the negative labour force effects of unfavourable demographic changes.

Table 3. Participation rate, employment 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	44,2	50,0	59,4	63,7	64,2	64,3	2044
Employment rate for workers aged 55-64	40,8	46,8	55,6	60,2	60,8	60,9	2044
Share of workers aged 55-64 in the labour force 55-64	92,2	93,6	93,6	94,5	94,6	94,7	2060
Labour force participation rate 65-74	7,6	11,5	16,1	19,6	20,8	19,5	2050
Employment rate for workers aged 65-74	7,4	11,3	15,8	19,3	20,5	19,2	2050
Share of workers aged 65-74 in the labour force 65-74	97,9	98,1	98,2	98,4	98,4	98,5	2060
Median age of the labour force	38,0	39,0	43,0	44,0	43,0	43,0	2035

Source: Commission services

Labour market entry age (tables 4a, 4b) remains constant in the whole projection period both for women and men as a result of AWG assumptions. Increasing retirement age is the main factor of that determines labour market exit age and expected duration of life in retirement. However it is only partially reflected by the results of the CSM. The retirement age of men is increasing by 2 years up to 2020 while the average effective exit age from the labour market increases by 1,6 years (from 64,6 to 66 years). The statutory retirement age of women is going to increase by 7 years in the period 2013-2040. According to the CSM assumptions it should transform into increase of the average working career from 35,7 years to 41 years. Due to different factors (relatively high unemployment rate, shadow economy etc.) average contributory period is significantly lower than average working career.

The increasing duration of average retirement reflects the joined effect of raising the retirement age to 67 for men and increasing life expectancy. After 2020 for men and 2040 for women the changes in the average duration reflect only life expectancy improvements.

Stronger influence of the pension reform is visible in case of women. Average effective exit age will increase by 5.1 years. Duration of retirement will even decrease up to 2040 despite of increase in life expectancy. There will be no substantial increase in the projection period. This strongly determines stability of the pension system

TABLE 4a. Labour market entry age, exit age and expected duration of life in retirement – MEN

	2013	2020	2030	2040	2050	2060	Peak year
Average effective entry age (CSM) (I)	22,3	22,2	22,2	22,2	22,2	22,2	2013
Average effective exit age (CSM) (II)	64,6	66,0	66,0	66,0	66,0	66,0	2025
Average effective working career (CSM) (II)- (I)	42,3	43,7	43,7	43,7	43,7	43,7	2023
Contributory period*		36,5	37,7	38,7	38,2	38,2	2038
Contributory period/Average working career		0,83	0,86	0,88	0,87	0,87	2038
Duration of retirement	15,4	15,7	17,0	18,2	19,4	20,5	2060
Duration of retirement/average working career	36,4	35,9	38,9	41,6	44,3	46,9	2060
Percentage of adult life in retirement	24,8	24,7	26,2	27,5	28,8	29,9	2060
Early/late exit	5,2	2,2	1,3	1,6	1,2	0,9	2014

* Contributory period refers to the FUS scheme

Source: Commission services and own calculations

Table 4b. Labour market entry age, exit age and expected duration of life in retirement – WOMEN

	2013	2020	2030	2040	2050	2060	Peak year
Average effective entry age (CSM) (I)	25,0	24,8	24,8	24,8	24,8	24,8	2013
Average effective exit age (CSM) (II)	60,7	62,0	64,0	65,8	65,8	65,8	2041
Average effective working career (CSM) (II)- (I)	35,7	37,1	39,2	41,0	41,0	41,0	2041
Contributory period*		33,1	34,3	36,2	36,5	36,9	2060
Contributory period/Average working career		0,89	0,88	0,88	0,89	0,90	2060
Duration of retirement	22,9	22,9	22,5	21,9	23,0	24,0	2060
Duration of retirement/average working career	64,2	61,7	57,5	53,4	56,1	58,6	2014
Percentage of adult life in retirement	34,9	34,2	32,8	31,4	32,5	33,4	2014
Early/late exit	2,1	1,6	1,1	1,0	0,7	0,7	2014

* Contributory period refers to the FUS scheme

Source: Commission services and own calculations

3 Pension projection results

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

The AWG projection covers 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 ESPROSS database. In the current projection an effort has been made to better cover the expenditures for security provision system. The improvement was possible due to better data about the expenditures on pensions for prison guards. The efforts for better coverage of the expenditures resulted in narrowing gap between the data on pension expenditures in Eurostat and AWG projections from about 0,7 percentage points in 2007 to 0,3 percentage points of GDP in 2009 – the year for which more accurate data on security provision system are available (table 5).

Table 5. Eurostat (ESSPROS) vs. Ageing Working Group definition of pension expenditure (% GDP)

	2005	2006	2007	2008	2009	2010	2011	2012
1 Eurostat total pension expenditure	12,7	12,5	11,6	11,6	11,9	12,0	11,6	:
2 Eurostat public pension expenditure	12,7	12,5	11,6	11,6	11,9	12,0	11,6	:
3 Public pension expenditure (AWG)	12,1	12,1	10,9	11,1	11,6	11,7	11,3	11,3
4 Difference (2) - (3)	0,5	0,4	0,7	0,5	0,3	0,3	0,3	:
5 Expenditure categories not considered in the AWG definition, please specify:	:	:	:	:	:	:	:	:

*Estimate based on Eurostat data

Source: Commission services and own calculations

3.2 Overview of projection results

Gross public pension expenditure are projected to decrease from 11.5 % GDP to 10.8 % GDP with only moderate fluctuations (table 6). The decrease in the expenditures to GDP ratio in the next decades despite the ageing pressure is a result of more than one factor and is explained in detail below. The most important factors are: stronger relation between contributions and benefits of the generations covered by the NDC system and reduction of early retirement.

The evolution of net pension expenditures is similar to gross values. According to “no policy change” rule the effective tax rate² will be stable and amount to about 15,7% - the value observed in base year 2013. The models used for projections assume no policy change scenario but with the assumption of maintaining the similar effective tax rate on pensions

The main reason for the increase in expenditures at the end of the period is the reform introduced in 2014 according to which all expenditures in the pay-out phase of funded pillar are moved to public

² As effective tax rate we consider the tax revenues (difference between gross and net pension expenditures) related to gross expenditures.

sector (see chapter 1.1.2 for details). It increases both the amount of contributions to public system but on the other hand also public expenditure in comparison with previous round of projections due to increase in implicit liabilities. That is why the expenditures from the private mandatory system are no longer observed after 2014 and for the same reason the difference between total pension expenditure and public pension expenditure has vanished.

It should be underlined that an increase in expenditures is limited because the defined contribution principle remained as a method of calculation of future pensions in the pension system. What has been changed is the role of NDC and FDC parts of the system. Besides, the effect of increased public expenditures as a result of reform is neutralized by the increase of retirement age, which respectively leads to decrease in expenditure. What is also important is that the withdrawal of the possibility for early retirement in 2009 resulted in currently observed significant decrease of prevalence of early retirement and an increase of labour force participation rates of persons in pre-retirement age. This trend will also be visible in the future (see chapter 2.2 for more details). Increase of public pension contributions is determined mainly by the latest reform which reduced strongly effective contribution to the funded pillar and as result increased revenues of the first pillar. As a result despite of higher expenditure than in 2012 the balance of the system has improved.

Despite stable wage share in the projection the relation of public pension contributions to GDP is slightly increasing because due to newly introduced regulations in the general system capital accumulated in mandatory private pillar will be gradually transferred to the second NDC account within 10 years before retirement. This process was classified in the model as payment of contributions to the NDC system from the capital accumulated in the past.

Table 6. Projected gross and net pension spending and contributions (% of GDP)

Expenditure	2013	2020	2030	2040	2050	2060	Peak year*
Gross public pension expenditure	11,5	10,8	10,5	10,1	10,6	10,8	2013
Private occupational pensions	:	:	:	:	:	:	:
Private individual pensions	0,0	:	:	:	:	:	:
<i>Mandatory private</i>	0,0	:	:	:	:	:	:
<i>Non-mandatory private</i>	:	:	:	:	:	:	:
Gross total pension expenditure	11,5	10,8	10,5	10,1	10,6	10,8	2013
Net public pension expenditure	9,7	9,1	8,9	8,5	8,9	9,1	2013
Net total pension expenditure	9,7	9,1	8,9	8,5	8,9	9,1	2013
Contributions	2013	2020	2030	2040	2050	2060	Peak year*
Public pension contributions	6,9	7,4	7,6	7,8	7,8	7,8	2043
Total pension contributions	7,5	7,6	7,8	8,0	8,0	7,9	2043

Source: Commission services and own calculations

The main source of the changes in the pension expenditure are old age and early pensions (table 7). The reforms that increased retirement age and the shift of the full responsibility for the pay-out phase of the system to public NDC system resulted in the increase of the total expenditures in the last 20 years of the projection due to the increase of the total liabilities accumulated in the NDC system both from the contributions paid directly to that system and capital accumulated in FDC system that will be gradually moved to the NDC system.

The second source of the increase in the percentage of total contributions to GDP is the structural change in the Polish economy. The projection assumes that still relatively high share of agriculture

employment will decline but with the effect of increase of employment in non-farm sector covered by FUS system. Contribution rate in FUS system is much higher than in farmers system, so it should result in the increase of the total sum of contributions in all systems.

The fluctuations of expenditures on disability pensions and survivors pensions reflects the changes of the proportion of preretirement age persons to working age population. It is due to the fact that the probability of disability increases with age and that after reaching statutory retirement age all benefits are in principal transformed to old age pensions. The non-earnings related part of the pension system covers mainly farmers' pension system that was fully classified as this kind of system. The numbers of both farmers' pension system contributors and beneficiaries are declining 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 1.46 mln observed in 2013 to about 0.44 mln in 2060³. Shrinking number of contributors explains significant fall in the number of old-age pensions, disability pensions and survivors pensions.

The main assumption of the projection of security provision system is that in the future the probabilities of entry to the security provision system employment will constant. Thus the number of future pensioners will be determine by ageing of that persons and regulations regarding minimum eligible retirement age in that sector. The proportion of expenditures in security provision system to GDP will first slightly decrease as a result of the increase in minimum age of eligibility to old-age benefits. Then it should increase because relatively numerous generations of persons employed in such occupations will go into retirement⁴.

Table 7. Projected gross public pension spending by scheme (% of GDP)

Pension scheme	2013	2020	2030	2040	2050	2060	Peak year *
Total public pensions	11,5	10,8	10,5	10,1	10,6	10,8	2013
<i>of which earnings related:</i>							
Old age and early pensions	9,3	9,1	9,0	8,4	9,0	9,5	2059
Disability pensions	0,8	0,6	0,6	0,8	0,9	0,8	2048
Survivors' pensions	0,5	0,4	0,4	0,5	0,5	0,4	2013
Other pensions	:	:	:	:	:	:	:
<i>of which non-earnings related (including minimum pension and minimum income guarantee):</i>							
Old age and early pensions	0,72	0,55	0,44	0,35	0,25	0,16	2013
Disability pensions	0,15	0,11	0,07	0,05	0,03	0,02	2013
Other pensions	0,03	0,02	0,02	0,02	0,02	0,01	2013
<i>of which main subsystems:</i>							
General pension system	9,7	9,2	9,2	8,9	9,3	9,5	2013
Farmers pension system	0,9	0,7	0,5	0,4	0,3	0,2	2013
Security provision systems	0,9	0,9	0,9	0,8	1,0	1,1	2060

Source: Commission services and own calculations

³ The share of persons that pay contributions to farmers system is lower than classified as employed in agriculture due to LFS and heterogeneous by cohorts. For the purposes of AWG projection it was assumed that the differences in probabilities of being in farmers system under the condition that somebody is employed as farmer according to LFS will remain for older cohorts but for the new generations there will be one profile of probabilities constructed on the basis of currently observed participation of young farmers in the farmer's pension system.

⁴ For the purposes of the projection it was assumed that the proportion of persons employed in the occupations entitled to benefits from security provision systems to the entire population of working age persons in the same time will be constant.

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 (tables 8a and 8b) 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 (equations 2-4). 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.

$$\frac{\text{Pension Exp}}{\text{GDP}} = \frac{\overbrace{\text{Population 65+}}^{\text{DependencyRatio}}}{\text{Population 20-64}} \times \frac{\overbrace{\text{Number of Pensioners (Pensions)}}^{\text{CoverageRatio}}}{\text{Population 65+}} \times \frac{\overbrace{\text{Average income from pensions (Average Pension)}}^{\text{Benefit Ratio}}}{\text{GDP}} \times \frac{\overbrace{\text{Population 20-64}}^{\text{Labour Market / LabourIntensity}}}{\text{Hours Worked 20-74}} \quad (\text{Eq. 2})$$

$$= \frac{\overbrace{\text{Number of Pensioners 65+}}^{\text{CoverageRatio Old-Age}}}{\text{Population 65+}} + \left(\frac{\overbrace{\text{Number of Pensioners } \leq 65}^{\text{CoverageRatio Early-Age}}}{\text{Population 50-64}} \times \frac{\overbrace{\text{Population 50-64}}^{\text{Cohorteffect}}}{\text{Population 65+}} \right) \quad (\text{Eq. 3})$$

$$= \frac{\overbrace{\text{Population 20-64}}^{\text{Labour Market / LabourIntensity}}}{\text{Hours Worked 20-74}} = \frac{\overbrace{\text{Population 20-64}}^{\text{1/ Employment Rate}}}{\text{Working People 20-64}} \times \frac{\overbrace{\text{Working People 20-64}}^{\text{1/ Labourintensity}}}{\text{Hours Worked 20-64}} \times \frac{\overbrace{\text{Hours Worked 20-64}}^{\text{1/ Career prolongat\~{o}n}}}{\text{Hours Worked 20-74}} \quad (\text{Eq. 4})$$

As presented in table 5 pension expenditures in relation to GDP in Poland have declined during the last decade from the relatively high level induced by the pension reform in 1999. The shift from PAYG system to defined contribution system is the most important fact that influences also future pension expenditures despite ageing of the Polish population.

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 (2013-2060). The impact of this factor will be particularly strong in the first two decades of the projection and in the years 2040-2050 when baby boom generation born in early 1980s will reach the retirement age. The changes in dependency ratio up to 2030 are mainly due to the strong decrease of working age population.

The already introduced reforms limit the eligibility to early pensions and increase of statutory retirement age result in the huge decrease of the proportion of persons with pension benefits to population 65+. This factor explains completely the decrease of the relation of the number of pensioners to the elderly population (**coverage ratio effect**).

There are several factors that contribute to the continuous decrease of the relation of average pension to average GDP produced by one hour of work (**benefit ratio effect**): first the NDC system works on actuarial basis. At the time of retirement an annuity is calculated by dividing individual's account value by the expected life in/after retirement. It means that increasing longevity automatically decrease benefit ratio if the pension age is kept unchanged. However the increase of the retirement age improves in comparison to previous projections (see chapter 3.5) the benefit ratio because of increasing average accumulated capital and relative decrease in life expectancy on pension.

- Second factor is the decreasing with time share of pensioners whose pensions were calculated according to old DB formula.
- Third important reason is the assumption of keeping the rule of indexation of old benefits (inflation + 20% of real wage) that decreases the value of already granted benefits in relation to GDP.

Positive effects for GDP of increasing labour force participation rate and assumptions about slightly declining unemployment rate are the main factors that contribute to the negative influence of the **employment ratio effect** on the ratio of public expenditures to GDP. The main influence of that effect is projected until 2030. Slightly lower but more prolonged is the effect of the extended work career due to the increase of the retirement age (**career shift effect**).

There are no significant differences between calculations made for the number of pensions and number of pensioners. The answer for that is twofold. First, in reality the examples of persons that receive combinations of different pension benefits is not frequent because of law regulations. The second reason is that because of model simplifications pensions are equal to pensioners in the model that project farmers' pension system and security provision systems.

Table 8a. Factors behind the change in public pension expenditures between 2013 and 2060 using pension data (in percentage points of GDP) - pensions

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60	Average annual change
Public pensions to GDP	-0,7	-0,3	-0,4	0,5	0,3	-0,7	-0,009
Dependency ratio effect	3,6	3,1	1,3	2,9	1,8	12,6	0,256
Coverage ratio effect	-2,3	-1,6	-0,7	-0,6	-0,2	-5,4	-0,125
<i>Coverage ratio old-age*</i>	-0,3	-0,1	-0,4	-0,2	0,0	-1,0	-0,021
<i>Coverage ratio early-age*</i>	-2,7	-5,1	-2,5	-0,2	-0,7	-11,2	-0,265
<i>Cohort effect*</i>	-3,5	-1,7	0,6	-3,2	-2,4	-10,2	-0,237
Benefit ratio effect	-0,8	-1,1	-0,9	-1,2	-1,2	-5,2	-0,105
Labour Market/Labour intensity effect	-0,7	-0,3	-0,1	-0,3	0,0	-1,4	-0,030
<i>Employment ratio effect</i>	-0,5	-0,2	0,0	-0,1	-0,1	-0,9	-0,018
<i>Labour intensity effect</i>	0,0	0,0	0,0	0,0	0,0	0,0	0,001
<i>Career shift effect</i>	-0,2	-0,2	-0,1	-0,3	0,1	-0,6	-0,013
Residual	-0,5	-0,3	-0,1	-0,2	-0,1	-1,2	-0,006

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

Source: Commission services and own calculations

TABLE 8b. Factors behind the change in public pension expenditures between 2013 and 2060 using pensioners data (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	-0,7	-0,3	-0,4	0,5	0,3	-0,7	-0,009
Dependency ratio effect	3,6	3,1	1,3	2,9	1,8	12,6	0,256
Coverage ratio effect	-2,3	-1,5	-0,6	-0,6	-0,2	-5,3	-0,123
Coverage ratio old-age*	-0,3	0,0	-0,4	-0,2	0,0	-0,8	-0,018
Coverage ratio early-age*	-2,7	-5,0	-2,5	-0,2	-0,7	-11,2	-0,264
Cohort effect*	-3,5	-1,7	0,6	-3,2	-2,4	-10,2	-0,237
Benefit ratio effect	-0,8	-1,2	-0,9	-1,3	-1,2	-5,3	-0,107
Labour Market/Labour intensity effect	-0,7	-0,3	-0,1	-0,3	0,0	-1,4	-0,030
Employment ratio effect	-0,5	-0,2	0,0	-0,1	-0,1	-0,9	-0,018
Labour intensity effect	0,0	0,0	0,0	0,0	0,0	0,0	0,001
Career shift effect	-0,2	-0,2	-0,1	-0,3	0,1	-0,6	-0,013
Residual	-0,5	-0,3	-0,1	-0,2	-0,1	-1,2	-0,006

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

Source: Commission services and own calculations

Both benefit rates and replacement rates decline significantly in the projection period (table 9). The replacement rate (first pension of those who retire in a given year over an (economy-wide) average wage at retirement) increases from 53% to about 55% until the year 2020 that reflects the effects of increasing retirement age of males and females. The gains from extended work careers in NDC system are higher than increase in life expectancy at retirement age. In fact in case of women even slight decrease of life expectancy at retirement will be observed. However afterwards the increase in average length of career is stopped and the relation between number of years spent on retirement and years of work significantly increases (see chapter 2.2 for description).

The benefit rates (relation between average pension expenditure per retired person and average wage in the economy) decrease in the whole projection period because beside decreasing value of first pensions this measure also takes into account pensions already granted in the past and indexed significantly below wage growth. That is why also the initial value of benefit ratio is lower but on the other hand decrease of benefit ratio is lower than replacement rate in the future because after 2040 increase of life expectancy will again strongly decrease values of new pension while this changes will appear with delay in benefit ratios that takes into account levels of pensions granted to all persons alive in certain moment.

The calculations regarding pension system dependency ratio (table 10) show that even under the assumption of the increase in labour force participation rates and longer average careers due to increased retirement age the proportion of pensioners to employed persons will increase from 55,6 pensioners per 100 employed to 87,4 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 already made to avoid changes in the relation of persons retired to employed similar to increase of the old-age dependency ratio.

Table 9. Replacement rate at retirement (RR), benefit ratio (BR) and coverage by pension scheme (in %)

	2013	2020	2030	2040	2050	2060
Public scheme (BR)*	47,9	45,4	40,6	37,2	32,8	29,4
Public scheme (RR)*	53,0	53,8	47,9	39,4	31,2	28,7
Coverage	100,0	100,0	100,0	100,0	100,0	100,0
Public scheme old-age earnings related (BR)	:	:	:	:	:	:
Public scheme old-age earnings related (RR)	:	:	:	:	:	:
Coverage	70,9	75,6	78,4	77,6	82,7	87,2
Private occupational scheme (BR)	:	:	:	:	:	:
Private occupational scheme (RR)	:	:	:	:	:	:
Coverage	:	:	:	:	:	:
Private individual scheme (BR)	:	:	:	:	:	:
Private individual scheme (RR)	:	:	:	:	:	:
Coverage	:	:	:	:	:	:
Total (BR)*	47,9	45,4	40,6	37,2	32,8	29,4
Total (RR)*	53,0	53,8	47,9	39,4	31,2	28,7

Source: Commission services and own calculations

Table 10. System dependency ratio and old-age dependency ratio

	2013	2020	2030	2040	2050	2060
Number of pensioners (thousand) (I)	9218,1	9364,4	9749,5	9811,5	10591,1	10903,1
Employment (thousand) (II)	16589,0	16685,5	15937,2	15307,6	13913,1	12478,8
Pension System Dependency Ratio (SDR) (I)/(II)	55,6	56,1	61,2	64,1	76,1	87,4
Number of people aged 65+ (thousand) (III)	5577,5	7041,1	8499,6	9095,4	10409,8	10951,8
Working age population 15 - 64 (thousand) (IV)	27150,8	25455,4	23863,8	22511,1	19779,4	17950,6
Old-age Dependency Ratio (ODR) (III)/(IV)	20,5	27,7	35,6	40,4	52,6	61,0
System efficiency (SDR/ODR)	2,7	2,0	1,7	1,6	1,4	1,4

Source: Commission services and own calculations

Comparisons of the total number of pensioners to population and the number of inactive persons lead to the conclusion that recently introduced reforms and observed long term trend of increasing labour force participation of elderly are the main factors that will influence those proportions in the future (tables 11, 11b, 12, 12b).

The changes in the relation of the pensioners to population are mainly explained by: the reforms that restricted access to early retirement and increase of the statutory retirement age. The decrease of the persons with pensions 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 quite significant group of retirees who receive benefits and still work to increase their income. In the old pension scheme it is allowed if income from work is below certain level (otherwise the pension is suspended). Regarding the pensions from the new system there will be no such limitations and it can additionally increase popularity of work on pension. 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 Polish pensions⁵. 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 11a. Pensioners (public scheme) to inactive population ratio by age group (%)

	2013	2020	2030	2040	2050	2060
Age group -54	8,7	6,8	6,1	5,0	4,1	3,8
Age group 55-59	65,3	46,6	42,9	41,0	38,2	37,4
Age group 60-64	100,5	86,3	54,6	46,3	44,4	42,8
Age group 65-69	111,8	106,2	113,0	96,7	96,4	95,1
Age group 70-74	102,4	108,9	107,5	112,6	109,5	106,3
Age group 75+	100,2	101,0	102,2	101,1	101,7	99,4

Source: Commission services and own calculations

Table 11b. Pensioners (public schemes) to total population ratio by age group (%)

	2013	2020	2030	2040	2050	2060
Age group -54	3,5	2,6	2,4	1,8	1,6	1,5
Age group 55-59	26,0	17,8	13,8	11,8	11,1	10,8
Age group 60-64	74,3	51,9	27,7	20,6	18,6	18,1
Age group 65-69	100,9	88,5	85,5	70,1	67,6	67,3
Age group 70-74	97,7	103,9	98,2	101,6	98,0	95,1
Age group 75+	100,2	101,0	102,2	101,1	101,7	99,4

Source: Commission services and own calculations

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

	2013	2020	2030	2040	2050	2060
Age group -54	6,8	4,8	4,5	4,2	3,6	3,3
Age group 55-59	57,5	34,2	28,0	28,7	27,6	26,8
Age group 60-64	109,6	93,8	46,7	35,6	35,2	34,4
Age group 65-69	109,6	111,2	120,4	91,5	93,0	92,2
Age group 70-74	100,6	108,3	105,3	110,0	105,7	102,9
Age group 75+	100,0	101,3	103,0	101,7	101,6	98,7

Source: Commission services and own calculations

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

	2013	2020	2030	2040	2050	2060
Age group -54	3,1	2,1	2,0	1,8	1,5	1,5
Age group 55-59	28,3	17,1	11,3	9,6	9,2	8,9
Age group 60-64	93,9	68,5	29,9	18,7	16,6	16,4
Age group 65-69	102,6	97,4	97,0	69,6	66,1	66,0
Age group 70-74	97,4	105,3	97,5	101,2	96,0	92,9
Age group 75+	100,0	101,3	103,0	101,7	101,6	98,7

Source: Commission services and own calculations

⁵ Here we have in mind also pre EU accession emigration of persons who emigrated from Poland during communist regime – including a great wave of emigration in 1980s.

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 13a, 13b, 13c).

TABLE 13a. Projected and disaggregated new public pension expenditure -TOTAL

New pension	2015	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	729,0	846,0	1309,0	1576,0	2590,0	2479,0
II Number of new pensions (in 1000)	214,0	210,0	227,0	249,0	366,0	272,0
Average new pension	3,4	4,0	5,8	6,3	7,1	9,1
III Average contributory period (in years)	33,5	34,4	36,2	37,6	37,4	37,6
IV Average accrual rate (=c/A)	0,95%	0,98%	1,00%	1,00%	0,96%	0,91%
Notional-accounts contribution rate (c)	0,2	0,2	0,2	0,2	0,2	0,2
Annuity factor (A)	20,5	19,8	19,5	19,4	20,4	21,5
V Monthly average pensionable earning	1769,9	1974,4	2536,1	2665,8	3053,0	4094,6
VI Sustainability/adjustment factors						
VII Average number of months of pension paid the first year	6,1	6,0	6,3	6,3	6,5	6,5
Monthly average pensionable earnings / Monthly economy-wide average wage	1,9	1,7	1,4	1,0	0,8	0,7

Note: Data shown in the table refer to the FUS scheme

Source: Commission services and own calculations

The total number of new pensions is growing until 2050 because of the increasing size of the generations in the retirement age. This rise is delayed to some extent by increasing retirement age. That explains why the number of new pensions in case of men is decreasing until 2020 and in case of women almost until 2040. The decline after 2050 is a result of retirement of less numerous generations born in 1990s.

The changes in life expectancy together with increasing retirement age influence also annuity factor as life expectancy at retirement slightly decreases in the period of gradual increase of the retirement age. The average contributory period is increasing both for men and women as a result of the AWG employment assumptions that take into account increasing labour force participation in pre-retirement age and increasing retirement age.

The average accrual rate in Polish NDC system will increase slightly to the level close to 1% until 2040. Then it will decline as the life expectancy at retirement will start to increase.

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

New pension	2015	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	409,9	460,8	883,6	988,3	1379,8	1355,4
II Number of new pensions (in 1000)	90,0	82,0	127,0	143,0	185,0	141,0
Average new pension	4,6	5,6	7,0	6,9	7,5	9,6
III Average contributory period (in years)	35,3	36,5	37,7	38,7	38,2	38,2
IV Average accrual rate (=c/A)	0,99%	1,05%	1,03%	1,00%	0,95%	0,91%
Notional-accounts contribution rate (c)	0,2	0,2	0,2	0,2	0,2	0,2
Annuity factor (A)	19,7	18,6	18,9	19,5	20,5	21,5
V Monthly average pensionable earning	2132,0	2400,9	2750,0	2746,2	3148,7	4272,3
VI Sustainability/adjustment factors						
VII Average number of months of pension paid the first year	6,1	6,1	6,5	6,5	6,5	6,5
Monthly average pensionable earnings / Monthly economy-wide average wage	2,3	2,1	1,5	1,0	0,8	0,7

Note: Data shown in the table refer to the FUS scheme

Source: Commission services and own calculations

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

New pension	2015	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	318,7	387,8	428,1	589,9	1215,5	1118,2
II Number of new pensions (in 1000)	124,0	128,0	100,0	106,0	181,0	131,0
Average new pension	2,6	3,0	4,3	5,6	6,7	8,5
III Average contributory period (in years)	32,2	33,1	34,3	36,2	36,5	36,9
IV Average accrual rate (=c/A)	0,92%	0,95%	0,97%	1,01%	0,96%	0,91%
Notional-accounts contribution rate (c)	0,2	0,2	0,2	0,2	0,2	0,2
Annuity factor (A)	21,1	20,7	20,2	19,3	20,4	21,4
V Monthly average pensionable earning	1440,5	1614,4	2152,9	2535,3	2951,5	3898,4
VI Sustainability/adjustment factors						
VII Average number of months of pension paid the first year	6,0	6,0	6,0	6,0	6,5	6,5
Monthly average pensionable earnings / Monthly economy-wide average wage	1,6	1,4	1,2	0,9	0,7	0,7

Note: Data shown in the table refer to the FUS scheme

Source: Commission services and own calculations

The total contribution revenues (table 14) 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 a bit less than one due to the fact that LFS data contain persons that are employed but not pay contributions (example: shadow economy).

Tabele 14. Revenue from contributions (Millions), number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)

	2013	2020	2030	2040	2050	2060
Public contribution	26972,5	40637,9	63999,5	94045,3	125139,0	159866,7
<i>Employer contribution</i>	17750,5	24578,9	38455,5	55500,3	74591,0	96096,7
<i>Employee contribution</i>	8759,0	15128,0	24299,0	36665,0	47908,0	60302,0
<i>State contribution</i>	463,0	931,0	1245,0	1880,0	2640,0	3468,0
Number of contributors (I)	15980,4	16061,6	15332,2	14756,7	13435,6	12060,3
Employment (II)	16589,0	16685,5	15937,2	15307,6	13913,1	12478,8
Ratio of (I)/(II)	1,0	1,0	1,0	1,0	1,0	1,0

Source: Commission services and own calculations

3.4 Sensitivity analysis

The effects of different scenarios in sensitivity analysis remained within +/- 0.4 pp. GDP range around the baseline path (table 15). As mentioned in chapter 3.2 after the reforms introduced in 2014 future total pension expenditures from mandatory pillars are exactly equal to public pension expenditures. Scenarios assuming labour productivity changes cause the largest deviations from the baseline projection. Lower assumptions regarding productivity dynamics lead to the increase of the relation between pension expenditures and GDP. Higher productivity growth can contribute to the decrease of the expenditures in relation to GDP. The explanations of the possible mechanisms of influence of the sensitivity test on different subsystems of the Polish pension system are described below 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. Second 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) the 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, (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 decrease of the ratio of expenditures to GDP in the projection horizon.

Higher employment rate of older workers – the channels of influence of that scenario are similar to previous scenario but in this case the decrease of expenditures to GDP is the effect of lower probability of receiving pensions before retirement age.

Lower 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 initial migration assumed in EUROPOP 2014. The impact of +/- 10% migration on pension expenditure exceeds +/- 0,1pp. of GDP after 2030 mainly by decreasing GDP growth.

Policy scenario – in this scenario the increase of the retirement age is strictly connected with the increasing life expectancy in retirement. In the Polish case this scenario was modified in order to take into account already introduced retirement age reform in Poland. The increase of the retirement of women by 7 years (from 60 to 67) was higher than assumed in the baseline policy scenario. Significant part of the life expectancy increase of men was also covered by already introduced reform (increase by 2 years from 65 to 67). As a result the only difference between policy scenario and baseline scenario is the additional gradual increase of retirement age of men by 3 years between the years 2036 and 2060. The result of this modified policy scenario is the decrease of pension expenditure by -0,2pp. in 2036-2060. However it should be also mentioned that it leads to a corresponding accumulation of implicit liabilities as well.

Table 15. Public and total pension expenditure under different scenarios (p.p. deviation from the baseline)

	2013	2020	2030	2040	2050	2060
Public Pension Expenditure						
Baseline	11,5	10,8	10,5	10,1	10,6	10,8
Higher life expectancy (2 extra years)	0,0	0,0	0,1	0,1	0,2	0,3
Higher lab. productivity (+0.25 pp.)	0,0	0,0	-0,2	-0,3	-0,3	-0,4
Lower lab. productivity (-0.25 pp.)	0,0	0,0	0,2	0,3	0,4	0,4
Higher emp. rate (+2 pp.)	0,0	-0,1	-0,2	-0,1	-0,1	-0,1
Higher emp. of older workers (+10 pp.)	0,0	-0,3	-0,3	-0,3	-0,4	-0,4
Lower migration (-20%)	0,0	0,0	0,0	0,1	0,1	0,2
Risk scenario	0,0	0,0	0,1	0,2	0,3	0,4
Policy scenario: linking retirement age to increases in life expectancy	0,0	0,0	0,0	-0,1	-0,2	0,0
Total Pension Expenditure						
Baseline	11,5	10,8	10,5	10,1	10,6	10,8
Higher life expectancy (2 extra years)	0,0	0,0	0,1	0,1	0,2	0,3
Higher lab. productivity (+0.25 pp.)	0,0	0,0	-0,2	-0,3	-0,3	-0,4
Lower lab. productivity (-0.25 pp.)	0,0	0,0	0,2	0,3	0,4	0,4
Higher emp. rate (+2 pp.)	0,0	-0,1	-0,2	-0,1	-0,1	-0,1
Higher emp. of older workers (+10 pp.)	0,0	-0,3	-0,3	-0,3	-0,4	-0,4
Lower migration (-20%)	0,0	0,0	0,0	0,1	0,1	0,2
Risk scenario	0,0	0,0	0,1	0,2	0,3	0,4
Policy scenario: linking retirement age to increases in life expectancy	0,0	0,0	0,0	-0,1	-0,2	0,0

Source: Commission services and own calculations

3.5 Description of the changes in comparison with the previous projections

The comparison of the results of the current projection with previous projections (table 16) shows stable influence of factors both positively and negatively affecting the changes of pensions expenditures to GDP in the future. Dependency ratio (that reflects demographic changes) in current projection is slightly lower than in the projection of 2012 and 2013 (peer review after increase of retirement age) due to changes in the assumptions of population projections. The stronger decrease of the coverage ratio and employment after the reform (projections 2013 and 2015 compared to AR2012) result from extended statutory retirement age. It should lead also to the increase of statutory and effective retirement age.

The most significant change in the decomposition observed in recent projection is lower reduction of public expenditures due to decreasing benefit ratio. The decrease of the benefit rate will be still observed but due to increase of the retirement age. In the defined contribution system longer work experience and shorter expected life on retirement should lead to the slower decrease of the value of the new pensions and also to a relatively lower drop of the benefit ratios. This change is also the result of the retirement age reform.

Table16. Overall change in public pension expenditure to GDP under the2006, 2009, 2012 and 2015 projection exercises

	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
AR 2006 *	-5,71	10,36	-5,69	-3,18	-6,34	:	-0,86
AR 2009 **	-2,80	13,39	-6,33	-0,96	-7,08	:	-1,83
AR 2012 ***	-2,17	14,00	-5,03	-0,44	-8,71	-0,02	-1,98
Peer review 2013 ***	-1,96	13,49	-5,90	-0,95	-6,53	0,01	-2,07
AR 2015****	-0,66	12,60	-5,38	-0,86	-5,21	0,01	-1,82

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

Source: Commission services and own calculations

The changes in comparison to the previous projections are mostly due to the reforms of the pension systems introduced between projections (table 17). The reforms introduced between 2012 and 2015 projection can be divided into changes introduced prior to the additional peer review of the pension projections that was presented and endorsed by AWG during the meeting on 06.03.2013 and changes introduced after January 2013. The main reforms taken into account in the peer review of 2013 were as follows: (1) introduction of gradual increase of retirement age to 67 years for men and women, (2) increase of the minimum age of eligibility to pension benefits in security provision systems and (3) increase of the disability pension contribution. Projection was calculated on the basis of the same model and only slightly adjusted macroeconomic assumptions (only possible labour force effect of higher retirement age were different from 2012 projection).

Higher retirement age means longer careers in all systems and decrease of retirement expenditures until 2040 both due to two mechanisms: (1) higher labour input and GDP and (2) delay in transition to retirement. The increase of expenditures after 2040 was projected as a result of including in pensions additional liabilities arising from longer work careers mainly in NDC system.

The 2015 round of the projection includes additional changes in legislation (see chapter 1.1.2) but it is also based on new AWG assumptions. What is also important is that the parameters of the pension model were updated taking into account additional period 2011-2013 and the coverage of the projection of security provision systems was slightly improved. First, the macroeconomic assumptions prepared for 2012 projection appeared relatively optimistic in comparison with the observed GDP growth, wage growth etc. On the other hand long run macro assumptions regarding GDP growth in the long run from the CSM method were improved due to the significant increasing trend in labour supply observed in

Poland since 2008 (this trend was less observed in the data used in 2012 projection assumptions). That can explain the relatively negative impact of assumptions on the difference between 2015 and 2012 projection. Secondly, the coverage of projection was slightly improved because of the more reliable data on pensions of persons who had worked in prison service (security provision systems) used in the projection. Third and the most important factor is the influence of pension reforms introduced since the beginning of 2013. These reforms will have positive influence on the revenue side of public finance in the coming decades but increases also implicit liabilities in the NDC system.

To summarize - the expenditures are initially higher than projected in AR 2012 and peer review 2013. Then substantial decrease is expected until 2040 similar to projected in peer review 2013. Finally the relation of expenditures to GDP will increase gradually from 10.1% to 10.8% at the end of the projection period, which was not observed in the previous projections and it is the result of the higher accumulation of implicit liabilities in the system due to recently introduced reforms.

Table 17. Decomposition of the difference between 2012 and the new public pension projection (% of GDP)

	2013	2020	2030	2040	2050	2060
Ageing report 2012	10.9	10.9	10.9	10.3	10.0	9.6
<i>Policy related changes before 01.01.2013</i>	0.0	-0.6	-0.6	-0.7	-0.4	0.2
Peer review 2013	10.9	10.3	10.3	9.6	9.7	9.8
<i>Change in assumptions (macro and structural)</i>	0.6	0.3	-0.2	-0.2	-0.2	-0.3
<i>Improvement in the coverage or in the modelling</i>	0.1	0.1	0.1	0.1	0.1	0.1
<i>Change in the interpretation of constant policy</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Policy related changes after 01.01.2013</i>	0.0	0.1	0.3	0.6	1.0	1.2
New projection 2015	11.5	10.8	10.5	10.1	10.6	10.8

Source: Commission services and own calculations

4 Description of the pension projection model and its base data

4.1 Institutional context

The forecasts concerning the General Pension System have been prepared using the actuarial model of Social Insurance Institution⁶. (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 project expenditures of the mandatory private part of the general pension system. The remaining pension systems: farmers' pension system, security provision system and pre-retirement benefits have been modelled using tools based on ILO methodology.

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 because of the introduction of numerous changes model used in current projection should be treated as a new tool.

The expenditures of the remaining parts of the Polish pension system: farmers' pension system, security provision systems and pre-retirements benefits were modelled using additional small cohort based simulation models.

Models used in the projections do not cover voluntary savings and the minimum⁷ pension in the new system.

As far as voluntary savings are concerned, the introduction of a system of special incentives and preferences allows Poland to support voluntary savings for retirement pension in the form of occupational pension schemes and individual pension accounts. First occupational pension schemes were established in 1999 and individual pension accounts in 2004.

1.019 occupational pension schemes including 312.000 employees had been functioning till the end of 2007. Individual pension account is an account that allows additional savings for retirement, that are

⁶ The Social Insurance Institution (ZUS) plays a major role in the Polish social security system. ZUS manages the Social Insurance Fund (FUS), collects contributions and pays out benefits, which are not solely social security ones by nature, but also some state budget financed payments..

⁷ The projection of the expenditures on minimum pension require model that enable projection of the distribution of future pensions. Simulations prepared on the basis of currently observed distribution of contributory periods and wages of persons that applied for pension benefit (Chlon-Dominczak and Strzelecki 2013) show that the increase of the retirement age reduces the future coverage of minimum pensions. According to such simplified simulations even under the assumption of the indexation of the value of minimum pension to wage growth the supplementary expenditures on minimum pension should amount in 2060 to about 0,6% of GDP. Under the assumption that reflects "no policy change" rule these expenditures will amount to about 0.1% GDP.

excluded from capital income tax. Individual pension account savings allow accumulation of funds that will supplement retirement pension income from state system. Till the end of December 2007 over 915.4 thousand of accounts were operating.

The minimum retirement guarantee shall apply to persons who will have insurance period (20 years for women and 25 years for men) In the old retirement pension scheme (including persons born before 1949) and in the agricultural system this pension is directly financed within insurance. In the new retirement pension scheme the minimum retirement guarantee 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 cohort-component actuarial model that transforms the exogenous projection of the employment in agriculture sector into the number of contributors and then into the numbers of beneficiaries of different benefits. The basic unit of analysis is „same-sex-and-age” cohort. Calculations were made using MS Excel and Visual Basic software.

4.2.3 Security provision system model

Benefits in the security provision system were modelled on the basis of relations between the number of benefits in different age and sex groups and the population of these groups and changes of these relations in different cohorts. The main problem in this projection was the lack of exact information about the employment (because of confidentiality reasons) and thus the potential number of future beneficiaries. The solution adopted here assumes in the long run constant relation between beneficiaries and population in age and sex groups. In the short run differences between cohorts influence the results.

4.3 Data used to run the models

All models used in the projection used common macroeconomic and demographic projection sent by AWG. The only addition was the projection of the number of farmers prepared using methodology similar to CSM but related to employment in agriculture sector .

4.4 Reforms incorporated in the model

The model incorporates all reforms implemented up to the August 2014 that were mentioned in the chapter 1.2. It is important that the gradual increase in the retirement age in all pension models was simulated in integer numbers. It means that the first effects of the reforms appear in simulation results in 2016 (increase of retirement age by 1 year for women and for men) while in the real world the first effects should be noticed in 2013 when the retirement age will increase by 4 month. This simplification of the reform in the simulation was necessary due to the construction of the simulation models but it should not have significant effect on the long term results of the simulation.

5 References

Chlon-Dominczak, Agnieszka, and Pawel Strzelecki. 2013. “The Minimum Pension as an Instrument of Poverty Protection in the Defined Contribution Pension System – an Example of Poland.” *Journal of Pension Economics and Finance* 3 (12): 326–50.

6 Annex

TABLE A1 Factors behind the change in public pension expenditures between 2013 and 2060 using pension data (in percentage points of GDP) - pensions

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60
Public pensions to GDP	-0,7	-0,3	-0,4	0,5	0,3	-0,7
Dependency ratio effect	3,8	4,7	2,5	6,9	5,1	23,0
Coverage ratio effect	-2,3	-1,3	-0,5	-0,4	-0,2	-4,6
<i>Coverage ratio old-age*</i>	-0,3	-0,1	-0,4	-0,2	0,0	-1,0
<i>Coverage ratio early-age*</i>	-2,6	-3,7	-1,2	-0,1	-0,2	-7,8
<i>Cohort effect*</i>	-3,4	-1,3	0,4	-2,1	-1,1	-7,5
Benefit ratio effect	-0,8	-1,1	-0,8	-1,0	-0,8	-4,6
Labour Market/Labour intensity effect	-0,7	-0,3	-0,1	-0,4	0,0	-1,5
<i>Employment ratio effect</i>	-0,5	-0,2	0,0	-0,1	-0,1	-0,9
<i>Labour intensity effect</i>	0,0	0,0	0,0	0,0	0,0	0,0
<i>Career shift effect</i>	-0,2	-0,2	-0,1	-0,3	0,1	-0,6
Residual	-0,8	-2,2	-1,6	-4,6	-3,8	-13,0

TABLE A2 Factors behind the change in public pension expenditures between 2013 and 2060 using pensioners data (in percentage points of GDP) - pensioners

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60
Public pensions to GDP	-0,7	-0,3	-0,4	0,5	0,3	-0,7
Dependency ratio effect	3,8	4,7	2,5	6,9	5,1	23,0
Coverage ratio effect	-2,2	-1,3	-0,5	-0,4	-0,2	-4,6
<i>Coverage ratio old-age*</i>	-0,3	0,0	-0,4	-0,2	0,0	-0,9
<i>Coverage ratio early-age*</i>	-2,6	-3,7	-1,2	-0,1	-0,2	-7,8
<i>Cohort effect*</i>	-3,4	-1,3	0,4	-2,1	-1,1	-7,5
Benefit ratio effect	-0,8	-1,1	-0,8	-1,0	-0,8	-4,6
Labour Market/Labour intensity effect	-0,7	-0,3	-0,1	-0,4	0,0	-1,5
<i>Employment ratio effect</i>	-0,5	-0,2	0,0	-0,1	-0,1	-0,9
<i>Labour intensity effect</i>	0,0	0,0	0,0	0,0	0,0	0,0
<i>Career shift effect</i>	-0,2	-0,2	-0,1	-0,3	0,1	-0,6
Residual	-0,8	-2,2	-1,6	-4,6	-3,8	-13,0