



RZECZPOSPOLITA POLSKA

Ageing Working Group

**Polish country fiche
on pension projections 2021**

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1. Overview of the pension system

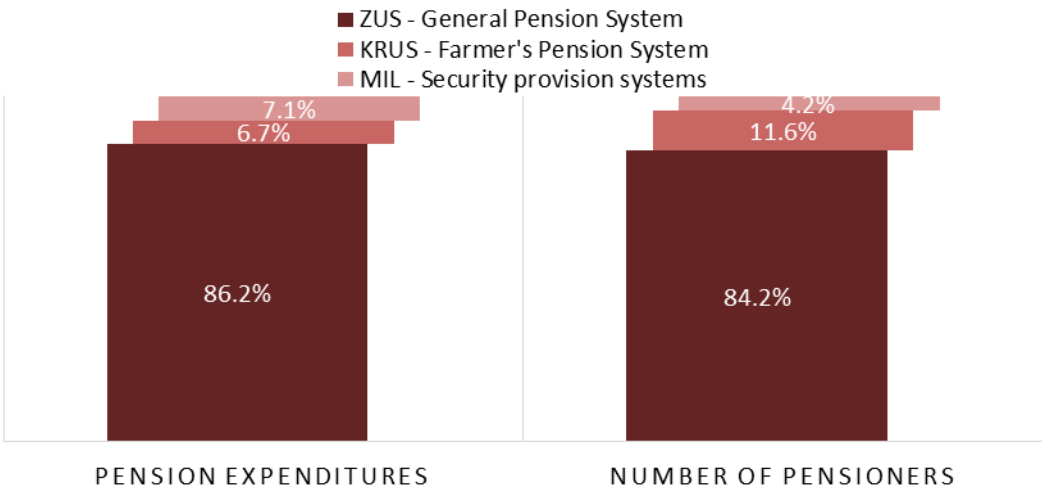
1.1 Description

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

- general pension system for the majority of employees and self-employed,
- farmers' pension system,
- pension schemes for security provision systems (for officers of the Police and other security services, professional soldiers as well as judges and prosecutors) function separately without contributions and are financed from the State Budget.

Each of these systems operates under separate rules and concerns different group of persons. In 2019, the general pension system (administrated by the Social Insurance Institution - ZUS) covered 86% of the pension expenditures and 84% of the pensioners (Figure A¹). In 2019, the farmers' scheme (Agricultural Social Insurance Fund - KRUS) covered almost 12% of pensioners but only 7% of the total pension expenditures. Due to a gradual restructuring of farm production there is a constant shift from KRUS to ZUS in terms of the number of pensioners and expenditures. A steady decline of the number of pensioners in KRUS and an increase in ZUS is assumed to continue in the future. This is due to economic changes, as the share of people employed in agriculture decreases with the development of the economy, but also due to changes in the labour market, as discussed further in the document. Other pensioners receive their benefits from various security provision systems. The characteristic feature of these systems is lack of contributions and the same benefit indexation rules as in the general system (with a minor exception, see below). However, these systems have different regulations regarding eligibility and formulas for calculation of the benefits, as described in the next chapters.

Figure A* – The structure of the Polish Pension System



Source: Polish Ministry of Finance * Tables and figure supplementary to the obligatory description tables and figures of the pension systems are labelled with letters.

The aim of this country fiche is to present the new long-term pension projections and to discuss factors that influence the total public pension expenditure. However, since the three subsystems have different rules,

¹ In order to keep the same table numbers as in the documents provided by other member states the Tables supplementary to the obligatory description tables of the pension systems are labelled with letters.

they have been modelled separately. Detailed results for each system are only a supplement to the total results and are presented only in selected tables in this document.

1.1.1 Detailed 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, accidents at work and occupational diseases, illness, and maternity. The general social insurance system covered in 2019 about 16.2 million contributors (96% of all employees according to LFS data assumed in the projection). The system paid benefits to 8.1 million beneficiaries in 2019.

The structure of the general pension system

The overall shape of the pension system is the result of the 1999 reform, which fundamentally changed the system's construction. The defined benefit (DB) system was transformed into a defined contribution (DC) system. Currently, the mandatory part of the system is divided into two parts: non-financial (NDC) and financial (FDC). The former is managed by a public institution – Social Insurance Institution (ZUS) – the latter by private institutions. The first benefits under the new system were paid in 2009 to women and in 2013 to men. For this reason, when analysing projection results one should remember that at the beginning of the period most benefits stem from the old system. Detailed regulations concerning the funded pillar of the system (FDC) have been a target of reforms until recently. For example, due to the reform introduced in 2014 the participation in the individual, capital pillar in the system (OFE) is no longer obligatory. According to the Polish government declarations some changes will still be required in the future to improve adequacy of the Polish system (see Box 1 for more information).

Currently, the general pension system covers different groups of insured as follows:

- People born before 1949 remained in the old DB system. These cohorts are now retired and in the future they will constitute an ever smaller share of all pensioners.
- People born in the period 1949-1968 had a right to choose if they wanted to join the 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 chose the one pillar system, they have one account NDC.
- People born in 1949-1968 who did not opt for the one pillar system and thus joined the funded tier as well as people born after 1968 who were obliged to join the funded pillar - their pension rights were recalculated into the new system as an initial capital. They have two accounts (one account and one subaccount) NDC and:
 - an active FDC account - if they decided to stay in the funded pillar after the 2013 reform and still pay contributions to this pillar.
 - a non-active FDC account - if they decided to pay all contributions to NDC accounts but part of the funds accumulated in funded system.
 - People who entered the labour market after 2013 reform and didn't choose the funded pillar. They have two accounts (one account and one subaccount) NDC.
- Occupations included in the general system but following some additional regulations:
 - Miners.
 - Teachers

The statutory retirement age in the Polish system is 60 years for women and 65 years for men (Table 1). It is possible to retire up to five years earlier in the case of work in specific conditions (limited list of occupations) which is called bridging pensions but only if additional conditions are fulfilled (minimum contributory period is 20 years for women and 25 years for men). The bridging pension system is being phased out as it was established as a temporary solution instead of early retirement. In 2019, the bridging pension was paid to about 30 thousands persons.

In principle there is no requirement regarding contributory period in the general system. However, in order to have access to the minimum pension guarantee a minimum number of years of paying contributions is required. That is why the minimum contributory period has been mentioned in the Table 1 but it is possible to retire without having completed minimum contributory period after reaching statutory retirement age.

In order to be eligible, the minimum contributory period for men is 25 years and 20 for women. As the pension benefits are calculated on the basis of the accumulated capital and life tables, there are no other regulations regarding retirement without a full pension.

Table 1 – Qualifying conditions for retirement in the general system*

		2019	2030	2040	2050	2060	2070	
Qualifying condition for retiring with a full pension	Statutory retirement age - men	65	65	65	65	65	65	
	Statutory retirement age - women	60	60	60	60	60	60	
	Minimum requirements	Contributory period – men**	(25)	(25)	(25)	(25)	(25)	(25)
		Retirement age – men	65	65	65	65	65	65
		Contributory period – women**	(20)	(20)	(20)	(20)	(20)	(20)
		Retirement age – women	60	60	60	60	60	60
Qualifying condition for retirement without a full pension	Early retirement age – men***	60	60	60	60	60	60	
	Early retirement age – women***	55	55	55	55	55	55	
	Penalty in case of earliest retirement age	-	-	-	-	-	-	
	Bonus in case of late retirement	-	-	-	-	-	-	
	Minimum contributory period – men**	25	25	25	25	25	25	
	Minimum contributory period – women**	20	20	20	20	20	20	
	Minimum residence period – men	-	-	-	-	-	-	
	Minimum residence period – women	-	-	-	-	-	-	

Source: Polish Ministry of Finance, *information on the general system, detailed requirements for special systems described in specific chapters, **in principle for persons born after 31.12.1948 the minimum contributory period is not specified, in the table we report the minimum contributory period for persons who were born until 31.12.1948 and for minimum pension eligibility for persons born after 31.12.1948, ***The possibility of the 5 years lower retirement age is limited only to persons who can prove 15 years of work in special conditions until 1.01.1999 or after 31.12.2008 and teachers. This is called “bridging pensions” and is strictly limited. In 2019 these pensions has been paid to about 30 thousand persons.

Contributions paid in the general system:

The contribution rate² 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 st account)	Sub-account (NDC 2 nd account)	Pension fund (FDC)	Total pension contribution
Insured with funded pillar	12.22%	4.38%	2.92%	19.52%
Insured without funded pillar	12.22%	7.3%	-	19.52%
Insured without funded pillar who never chose funded tier	19.52%	-	-	19.52%

Source: Polish Ministry of Finance *Tables and figure supplementary to the obligatory description tables and figures of the pension systems are labelled with letters.

Social contributions in Poland are paid to four different funds (Table B) : old-age contribution (19.52% of the gross wage), disability and survival (8%), sickness (2.45%), work accident (from 0.67% to 3.06%). Regarding the old-age pensions the payment of the contribution is split into two halves between employee and employer.

Table B – The contribution rates to various social security funds by contribution payers

	Employee	Employer
Old-age	9.76%	9.76%
Disability	1,5%	6,5%
Sickness	2.45%	-
Work accident	-	0.67-3.06%

Source: Polish Ministry of Finance

In case of a member of an open pension fund, part of the contribution – 2.92% of the wage – is transferred by ZUS to the fund of the 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 the average monthly earnings. The general pension system covers also self-employed. These persons pay in principle the same contribution rates but some detailed regulations and the base are different than for employees. The base is equal for all self-employed and amounts to 60% of the average wage. However, there are some which are aimed to support small entrepreneurs at the initial stage of business development.

Valorization

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.

² The contributions are calculated in relation to so called "contribution basis" which is with small exceptions equal to gross wage in case of the employees.

Payments from funded pillar

Pension payments under the funded pillar to persons having reached the retirement age are made integrally by ZUS (with the same pension formula as in the first pillar). For this purpose, a so-called “safety slider” was introduced: the funds accumulated in the open pension fund are gradually transferred to ZUS, over 10 years preceding the retirement age of the insured person. This should enhance stability and security of accumulated funds and reduce costs associated with their collection.

The old-age pension benefits in the general pension system after the 1999 reform can be calculated according to the following formula:

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

Indexation

Pensions are indexed annually to the Consumer Price Index 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 the public pension fund, there is the 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 - the sum of NDC and FDC pensions - is below the minimum level, the pension is supplemented by the minimum pension guarantee, which is financed through the state budget. The minimum pension is specified as an amount of money and indexed in the same way as other pension benefits. In the projections, the minimum pension is calculated according to the agreed methodology – in line with the current law for the first 10 years and then indexed to wage growth.

It should be 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 pensions give right to this insurance. The possibility of introducing a minimum contributory period is being discussed. Such period existed in the old DB system. From an analytical point of view, it results in lower average pensions under the new system, i.a. due to the inclusion of low level benefits.

Third pillar – current situation

In this part the current situation of the third pillar is described. The reform of this pillar is planned in the next years (see Box 1 for details). The mandatory system should be supplemented with voluntary savings in the framework of Occupational Pension Schemes (PPE), Employee Capital Plans (PPK, with auto-enrolment), Individual Pension Account (IKE) and Individual Pension Security Accounts (IKZE). The current coverage of these systems is presented in [table C](#).

Table C - Basic data on pension products (as of December 31, 2019)

Product	Number of fund management institutions	Value of accumulated assets (in PLN million)	Number of participants (in thousands)
PPE	30	14 547,6	612,9
IKE	63	10 167,4	950,8
IKZE	45	3 283,8	654,6
PPK	20	84,7	328,9

Source: Polish Ministry of Finance, Polish Financial Supervision Authority data

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

1.1.2 Detailed 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 newly established institution: Agricultural Social Insurance Fund (KRUS). In 2019, there were 1.2 million people covered by KRUS, while 1.1 million beneficiaries received pension benefits. The statutory retirement age is the same as in the general system but the minimum contributory period is also obligatory to receive benefit (Table 1a).

Table 1a – Qualifying conditions for retirement in the farmer's pension system

		2019	2030	2040	2050	2060	2070
Qualifying condition for retiring with a full pension	Statutory retirement age - men	65	65	65	65	65	65
	Statutory retirement age - women	60	60	60	60	60	60
	Minimum requirements						
	Contributory period – men	25	25	25	25	25	25
	Retirement age – men						
	Contributory period – women	25	25	25	25	25	25
	Retirement age – women						

Source: Polish Ministry of Finance

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 the 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 the retirement age: 60 years for women, 65 years for men
- 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. It is determined 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 the subject of intense discussion in the past but without wider changes of the special treatment of the individual farms it is relatively hard to introduce. The two main points which are debated: sustainability of the system and adequacy of the benefits from the system characterised by low contributions and low benefits. It should also be taken into account that Polish farms tend to be small. Most of the insured, about 89.9%, work on farms of up to 20 ha, and 57.1% in farms smaller than 5 ha. As a result, farmers' incomes are also relatively low and in case of the smallest farms not reported in detail. Since 2009, owners of farms larger than 50 ha pay contributions two to almost six times higher than the base contribution but this group includes only about 2% of all contributors. The other contributors pay the flat contributions not divided into parts.

1.1.3 Detailed 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. This category is not one coherent system but it comprises several different DB systems. These systems 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. In total the benefits from these systems have been paid to 404 thousand persons in 2019 including 294 thousands of old-age pensions. Moreover, the reform introduced in 2012 divided the employed into two groups – those who were in service before 2013 and new professionals coming into service starting from January 1, 2013

Under 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. The maximum 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 (Table 1b). In comparison to the AWG 2018 projection, the retirement age of 55 years is not binding now but persons who want to apply for retirement still need to have completed at least 25 years of service. 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.

Table 1b – Qualifying conditions for retirement in special pension systems for security provision forces

		2019	2030	2040	2050	2060	2070
Qualifying condition for retiring with a full pension	Statutory retirement age – men*	65 (55)	65 (55)	65 (55)	65 (55)	65 (55)	65 (55)
	Statutory retirement age – women*	60 (55)	60 (55)	60 (55)	60 (55)	60 (55)	60 (55)
	Minimum requirements						
	Contributory period – men	25	25	25	25	25	25
	Retirement age – men***	-	-	-	-	-	-
	Contributory period – women	25	25	25	25	25	25
	Retirement age – women***	-	-	-	-	-	-

Source: Polish Ministry of Finance, *statutory retirement age differs for different services (e.g. in the army, police etc.); it amounted to 55 years while in the justice system it is the same as in general system (60 / 65). The minimum required age for military services is not defined but a minimum contributory period of 25 years is required.

Female judges and prosecutors with a career of at least 25 years are allowed to retire at the age of 60 and at the age of 65 in case of men 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 this system is in general the same as in the 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

Since the previous projection, there were no major changes in the regulations regarding public pension systems. However, some changes in the regulations listed below aim to improve the adequacy of future benefits, though without a significant impact on the projection results:

Employee Capital Plans (PPK)

In January 2019, the act introducing Employee Capital Plans (PPK) entered into force. The full implementation of the system was spread over three years. PPK is a private system of long-term savings, available to all employees. It is created by the employee, the employer and the state. PPK have been developed in order to:

- increase the financial security of Poles;
- affect the development of the economy, enterprises and jobs;
- multiply employees' private retirement savings.

There is an automatic enrolment for employees aged 18 to 54 (from the age of 55 to 70, the employee independently applies to join the plan).

13th pension

For the first time, in May 2019, a one-off cash benefit was paid to pensioners for an amount of PLN 1100 (EUR 245). Then, the Act of 9 January 2020 on the additional annual cash benefit for pensioners introduced an additional annual cash benefit for all pensioners (the so-called 13th pension) equal to the lowest old-age pension on 1 March. In 2020, the lowest pension was PLN 1,200 gross (about EUR 270).

Tax reduction from 18% to 17%

As of October 1, 2019, the pension tax has been reduced from 18% to 17%, resulting in an automatic monthly net increase in benefits.

The additional pensions “Mothers 4+”

The “Mothers 4+” programme was launched by the Act of 31 January 2019 on supplementary parental benefit. The parental supplementary benefit is granted to persons who, in order to bring up at least four children in large families, did not take up employment or resigned from employment and, for this reason, did not acquire the right to an old-age pension or did not earn minimum pension. In the case of a person who is not entitled to any benefit, the amount of parental supplementary benefit corresponds to the lowest pension. If the entitled person already receives a benefit, but it is lower than the lowest old-age pension, it is supplemented up to the amount of the minimum pension. In 2019, 52.5 thousand benefits were granted under the general system and 927 benefits under the agricultural system.

Indexation with a guarantee of a minimum indexation amount

Old-age and disability pensions are indexed in accordance with the Act on old-age and disability pensions from the Social Insurance Fund. According to percentage indexation mechanism the minimum indexation rate is determined as the average annual consumer price index in the previous calendar year, increased by

20% of the real increase in the average wage in the previous calendar year. In the past, the minimum rate of indexation was a common practice, but in the few recent years governments have regularly chosen mixed indexation: the higher pension benefits have been indexed proportionally to the amounts but below the certain level the constant amount indexation has been applied. It created a need for more precise regulation regarding higher pensions in order to maintain minimum indexation rate guarantee. From March 2019 there is a formal regulation that, the indexation of the amount-percentage model is paid in accordance with the principle that the increase must be higher than the determined amount - always higher than that resulting from the percentage indexation mechanism. For example in the years 2019-2020, the monthly increase could not have been lower than PLN 70 for pensioners and PLN 52.50 for pensioners due to partial inability to work.

A supplementary benefit for dependent persons for old-age and disability pensioners

From October 1, 2019, persons incapable of independent existence, including retirees and pensioners, receive a supplementary benefit of maximum PLN 500 per month. The supplementary benefit and the old-age / disability pension may not exceed the amount of PLN 1,700 gross per month in 2020 (EUR 379; PLN 1,600 in 2019). The supplementary benefit is intended to provide additional financial support to people with disabilities due to increased costs related to nursing, rehabilitation and medical care.

1.3 Description of the actual ‘constant policy’ assumptions used in the projection

According to Polish law, indexation of minimum pensions is in line with indexation of other benefits – CPI plus 20% of the real growth of average monthly earnings. Assumptions used in these projections are in line with the common agreed methodology, namely in line with the law for the first 10 years and then indexed to wage growth. The projections have been prepared under the assumption that no additional policy changes regarding the funded pillar will happen. In fact, according to government announcements, one should expect a further reform in order to allow transformation of the assets of the OFE pension funds into voluntary FDC third pillar assets of first pillar NDC contributions. In addition, the government is also introducing regulations to make third pillar pensions more widespread as a way to improve the adequacy of the total future pensions (See Box 1).

Box 1. Recent and planned changes in order to stimulate the development of the third pillar pensions (as of November 2020)

This box summarises the changes in regulations aimed at making the third pillar pensions an attractive and widespread option for pension saving outside the public pension funds.

Employee Capital Plans

The first employers have been enabled by the regulations introduced in 2019 (with employees who will agree to participate) to join to a new pension saving funds (under the third pillar system). This new savings product is called employee capital plans (PPK). The full implementation of the system is planned to be spread over several years, but the largest employers (employing over 250 people) were included in the system already in mid-2019. The stages of implementing the PPK depend on the number of employees employed by individual employers. For companies employing over 50 people, the provisions of the PPK Act began to apply from January 1, 2020 (the date was postponed to July 1, 2020 due to the COVID-19 epidemic).

“Employee Capital Plans” is a long-term saving programme. Their main aim is the provision of additional savings that can be used after reaching the age of 60 and earlier in exceptional situations. Payments for PPK accounts come from three sources: from employer, employee and state. Employer: basic payment - 1.5% gross remuneration; voluntary additional payment – maximum 2.5% gross remuneration. Employee: basic payment - 2% gross remuneration; voluntary additional payment – maximum 2% gross remuneration. There are also additional incentive payments from the State: the single welcome payment of PLN 250 and annual surcharge of PLN 240. At the end of December 2019, 20 institutions offered PPK, covering about 328.9 thousand people and PLN 84.7 million in assets under management. In the following years, PPK will continue to develop due to the next stages of employers joining the system.

Shutdown of the second pillar, expansion of the third pillar, i.e. transfer of funds from OFE to IKE

The project of transferring funds from Open Pension Funds to individual pension accounts provides for an automatic transfer of funds from OFE (second pillar: previously mandatory but from 2013 voluntary FDC part of the system) to IKE (third pillar). If an OFE member submitted a special declaration, then his funds would go to ZUS (first pillar). According to the draft version of this act OFE participants would be able to choose within a designated period of 2 months. The funds accumulated in OFE by persons who would have reached the retirement age by the designated date would also be automatically transferred to ZUS. For the transformation of OFE into IKE, a fee of 15% would be charged on OFE's net assets. The fee would be equivalent to the effective tax rate for pensions paid out by ZUS. The proceeds from this fee were to be transferred to the Social Insurance Fund. The fee would be charged in two instalments. Specialized open-investment funds operating IKE, created as a result of the transformation of OFE, would invest funds in the capital market with an appropriate determination of the risk level. The proposed regulations also provide for a special mechanism of transferring assets to a more passive sub-fund, less prone to market fluctuations, within 5 years before reaching the retirement age. The Polish Development Fund is to be included in the management of funds of people who would choose for ZUS. The proposed regulations also stipulate that the funds accumulated on IKE were to be the private property of the saver and could not be transferred to the state budget. Currently (November 2020), the draft version of the act is being discussed by Parliament. The planned dates for the implementation of the reform have been postponed to 2021 due to the COVID epidemic.

2. Demographic and labour force 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.

2.1. Demographic developments

According to the EUROPOP2019 demographic projections prepared by EUROSTAT, the Polish population will decline by approximately 7 million persons by 2070 (Table 2). The main cause of this change is a decline in the fertility rate (TFR) in recent decades, from a level close to ensuring a stable population in 1990 (2.06 live births per woman) to 1.36 in 2019. According to the EUROSTAT projections, fertility will increase in the future to 1.65 in 2070 but it will still remain well below the natural replacement rate. The old-age dependency ratio would increase from about 29% in 2019 to 68% in 2070. The second important driver of the population ageing in Poland is an increasing life expectancy, which should result from changes in lifestyle and application of new medical technologies. In this respect, changes in life expectancy in Poland follow developments observed in countries that currently have the highest life expectancy.

According to the assumptions of the EUROPOP2019 population projections life expectancy at birth in Poland should increase in the years 2019-2070 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 at the age of 65 will increase by about 7 years for men and by 6 years for women. One of significant changes of the EUROPOP2019 projection in comparison to previous projections is the path of the net migration. In the ESSPOP2015 projection used in the 2018 Ageing Report, the net migration was assumed to be negative or close to zero until the 2030s. The EUROPOP2019 assumptions have been changed due to a large immigration inflow to Poland observed in recent years (Figure B). This inflow is predicted to constantly increase in the future from the level of about 20 thousand observed in 2019 to more than 70 thousand per year observed in 2070. As a result, number of potential contributors in the current projection is significantly higher than in the previous projections.

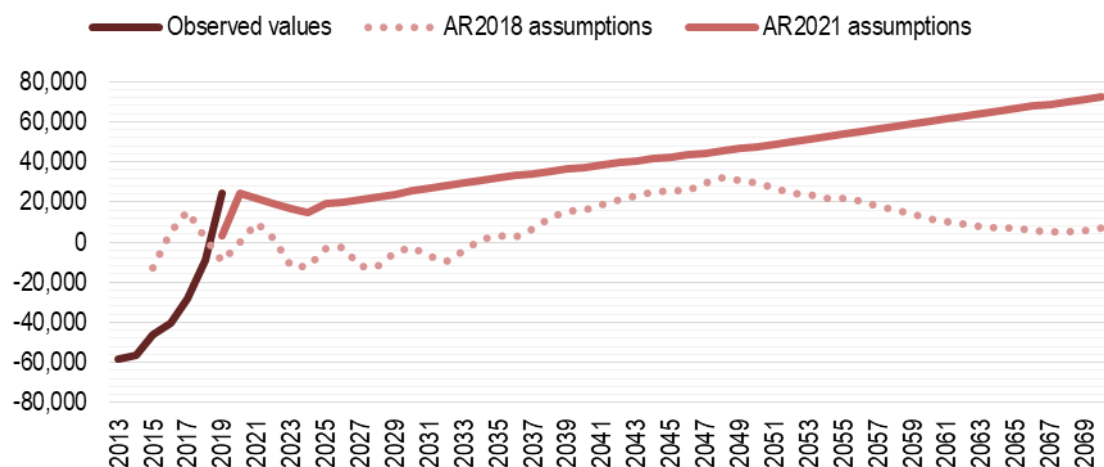
The results of the pension projection for Poland (Figure 1) show that the current age structure of the Polish population is shaped by the two baby-boom generations: persons born after the WWII in the 1950s and its echo – persons born in the beginning of the 1980s. After about 50 years this kind of fluctuations in the age structure will disappear and persons in the age group 75+ will constitute a much higher population share than is currently the case.

Table 2 – Main demographic variables

	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Population (thousand)	37,957	36,957	35,587	34,022	32,441	30,807	37,957	2019	-7,150
Population growth rate	0.0	-0.3	-0.4	-0.5	-0.5	-0.5	0.0	2019	-0.5
Old-age dependency ratio (pop 65+ / pop 20-64)	29.0	38.9	43.9	57.0	68.2	67.8	69.1	2064	38.8
Old-age dependency ratio (pop 75+ / pop 20-74)	9.8	15.7	20.1	22.5	30.8	35.9	35.9	2070	26.1
Ageing of the aged (pop 80+ / pop 65+)	24.5	25.6	36.3	32.2	36.8	46.3	46.3	2070	21.7
Men - Life expectancy at birth	74.1	76.5	78.7	80.7	82.6	84.3	84.3	2070	10.2
Women - Life expectancy at birth	82.0	83.8	85.4	86.9	88.3	89.5	89.5	2070	7.5
Men - Life expectancy at 65	16.1	17.6	18.9	20.2	21.4	22.6	22.6	2070	6.5
Women - Life expectancy at 65	20.5	21.8	23.0	24.2	25.2	26.2	26.2	2070	5.7
Men - Survivor rate at 65+	77.7	81.9	85.1	87.7	89.8	91.6	91.6	2070	13.9
Women - Survivor rate at 65+	90.1	91.9	93.2	94.3	95.2	96.0	96.0	2070	5.9
Men - Survivor rate at 80+	44.1	51.9	58.5	64.4	69.8	74.4	74.4	2070	30.3
Women - Survivor rate at 80+	68.4	73.6	77.7	81.3	84.3	86.9	86.9	2070	18.4
Net migration (thousand)	3.3	25.4	37.5	47.6	60.4	72.4	72.4	2070	69.1
Net migration over population change	-0.2	-0.2	-0.3	-0.3	-0.4	-0.4	-0.2	2024	-0.2

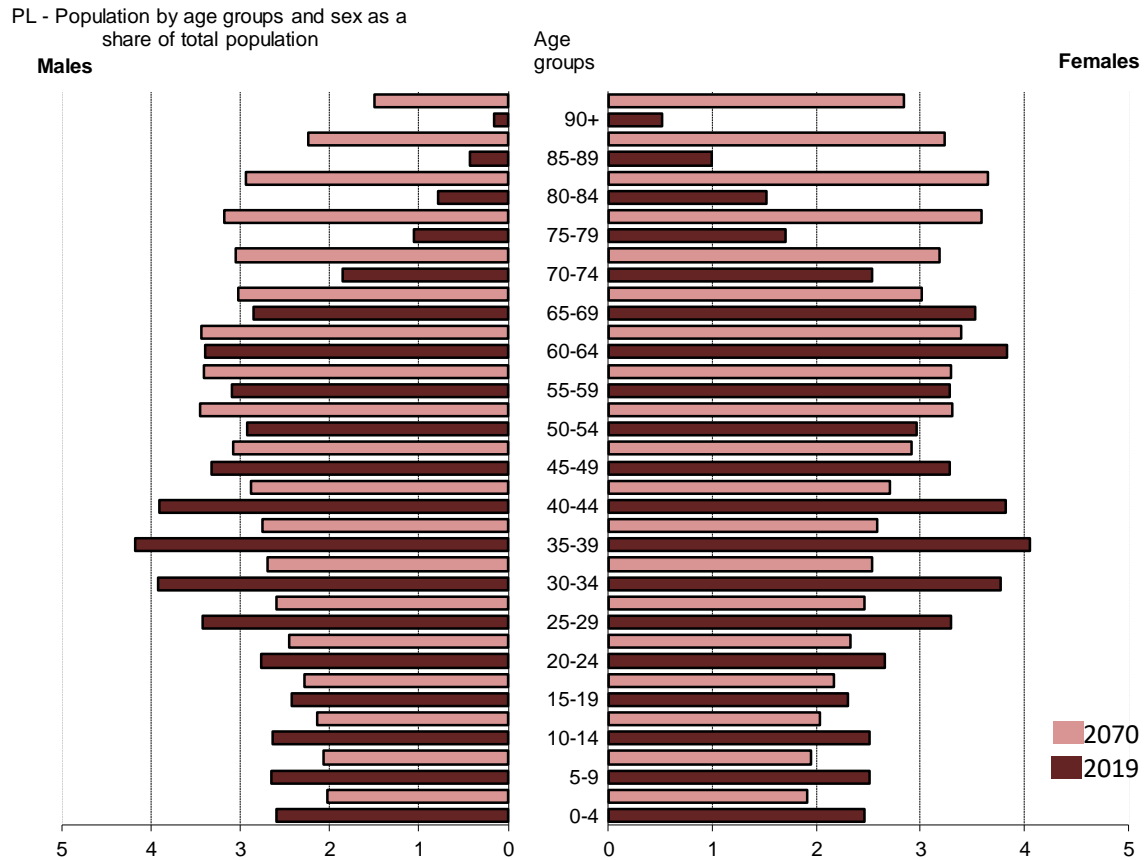
Source: EUROSTAT and European Commission

Figure B – The comparison of the annual net migration assumptions in the AWG AR2021 and AWG AR2018



Source: Own elaboration based on EUROSTAT and European Commission data

Figure 1 – Population by age groups and sex as a share of total population (age pyramid) in 2019 and in 2070



Source: EUROSTAT and European Commission

2.2. Labour force

Potential growth of the economies as well as number of contributors in the pension systems depend on 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 the potential impact of already introduced pension reforms on the exit age from the labour market of persons in pre-retirement age.

Due to a constant statutory retirement age (60/65), the changes of the LFPRs in the projection (Table 3) are driven by the population ageing (the increasing share of older persons both in the total population and inside the pre-retirement age group leads to lower LFPRs) and the convergence to higher labour force participation for pre-retirement ages which reflects trends observed in the past. In the next decades, further growth will be restrained as the baby-boom generation of the early 1980s will exit the labour market and statutory retirement ages remain constant.

Table 3 – Participation rate, employment rate and share of workers for the age groups 20-64, 20-74, 55-64 and 65-74

	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Labour force participation rate 20-64	75.7	76.9	75.0	75.3	76.5	75.9	77.4	2026	0.2
Employment rate of workers aged 20-64	73.3	73.1	71.2	71.5	72.7	72.1	74.1	2025	-1.2
Share of workers aged 20-64 in the labour force 20-64	96.8	95.1	95.0	95.0	95.0	95.0	96.8	2019	-1.8
Labour force participation rate 20-74	65.7	66.0	64.8	61.6	62.2	63.9	66.3	2034	-1.9
Employment rate of workers aged 20-74	63.6	62.8	61.6	58.6	59.2	60.8	63.6	2019	-2.9
Share of workers aged 20-74 in the labour force 20-74	96.8	95.2	95.1	95.2	95.2	95.1	96.8	2019	-1.7
Labour force participation rate 55-64	51.1	56.3	54.8	53.6	54.6	55.1	56.7	2032	4.0
Employment rate of workers aged 55-64	49.9	54.3	52.8	51.6	52.6	53.1	54.6	2032	3.2
Share of workers aged 55-64 in the labour force 55-64	97.6	96.4	96.4	96.3	96.3	96.4	97.6	2019	-1.3
Labour force participation rate 65-74	8.5	11.9	13.3	12.8	12.3	12.6	13.4	2042	4.1
Employment rate of workers aged 65-74	8.5	11.8	13.2	12.7	12.1	12.5	13.3	2042	4.0
Share of workers aged 65-74 in the labour force 65-74	99.3	99.0	99.0	98.9	99.0	99.0	99.3	2019	-0.4
Median age of the labour force	39.0	42.0	43.0	42.0	42.0	42.0	43.0	2032	3.0

Source: European Commission

The raw projection using the cohort simulation method CSM assumes that the average labour market exit age will be constant both for men and for women as an effect of the constant retirement rate (Tables 4a and 4b). However in addition this projection also assumes that despite constant retirement age there will be decline in the early labour market exit in relation to exits at the retirement age or later. Average contributory periods of the generations that reach the retirement age are going to fluctuate reflecting the fluctuations of the unemployment rates experienced by these cohorts during their life course and the changes in labour force participation rates of cohorts. The constant retirement age and increasing life expectancy assumed in the population projection lead to the increasing relation between duration of retirement and duration of contributory period to the increase of the share of adult life spent at retirement.

Table 4a – Labour market exit age, effective retirement age and expected duration of life spent in retirement – Men

	2020	2030	2040	2050	2060	2070	peak value	peak year	change 2020-2070
Average effective retirement age (administrative data)*	64.7								
Average labour market exit age (CSM)**	64.5	64.5	64.5	64.5	64.5	64.5	64.5	2022	0.0
Contributory period	37.7	38.2	38.5	37.6	38.0	38.1	38.9	2038	0.4
Duration of retirement***	16.8	18.2	19.6	21.0	22.2	23.4	23.4	2070	6.6
Duration of retirement/contributory period	0.4	0.5	0.5	0.6	0.6	0.6	0.6	2070	0.2
Percentage of adult life spent in retirement****	26.5	28.1	29.7	31.1	32.3	33.5	33.5	2070	6.9
Early/late exit*****	1.5	1.0	1.1	0.8	0.7	0.9	1.5	2020	-0.6

Source: European Commission

Table 4b – Labour market exit age, effective retirement age and expected duration of life spent in retirement – Women

	2020	2030	2040	2050	2060	2070	peak value	peak year	change 2020-2070
Average effective retirement age (administrative data)*	60.1								
Average labour market exit age (CSM)**	61.3	61.3	61.3	61.3	61.3	61.3	61.3	2034	0.0
Contributory period	33.2	33.7	33.7	33.1	33.7	33.7	34.3	2037	0.5
Duration of retirement***	23.8	25.2	26.5	27.7	28.8	29.9	29.9	2070	6.1
Duration of retirement/contributory period	0.7	0.7	0.8	0.8	0.9	0.9	0.9	2070	0.2
Percentage of adult life spent in retirement****	35.5	36.8	38.0	39.0	39.9	40.8	40.8	2070	5.4
Early/late exit*****	0.3	0.3	0.3	0.3	0.2	0.2	0.3	2020	-0.1

Source: European Commission, * The effective retirement age shows the age at which people on average start receiving a pension benefit. It is calculated on the basis of the administrative data for 2019 (see Annex Tables A4a and A4b); ** The labour market exit age as calculated based on Labour Force Survey data for the base year and estimated by the Cohort Simulation Model thereafter; *** 'Duration of retirement' is calculated as the difference between the life expectancy at the average labour market exit age and that exit age itself; **** The 'percentage of adult life spent in retirement' is calculated as the ratio between the duration of retirement and the life expectancy minus 20 years; ***** Early/late exit is the ratio between those who retire and are below the statutory retirement age and those who retire at the statutory retirement age or above.

3. Pension projection results

The 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 security systems. The projection takes into account: public expenditures on old-age and other kind of old-age early pensions, disability and survivor benefits in all schemes of the public pension system. The third pillar has not been included.

The calculations made for the purposes of the AWG projections cover almost all pension expenditures included in the Eurostat ESSPROS database (Table 5). Since the AR 2018 projection, further efforts have been made to cover as many expenditures from the pension system as are covered in the ESSPROS database. However, some differences might remain due to the differences in the definitions and delays in data collection for farmers and military services. It should also be mentioned that the data for the last years are frequently revised.

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

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	change 2009- 2017
Eurostat total pension expenditure	12.2	11.8	11.3	11.5	11.9	11.8	11.6	11.4	10.9	:	-1.3
Eurostat public pension expenditure (A)	12.2	11.8	11.3	11.5	11.9	11.8	11.6	11.4	10.9	:	-1.3
Public pension expenditure (AWG: outcome) (B)	9.6	11.4	11.0	11.0	11.4	11.3	11.1	11.1	10.6	10.7	1.0
Difference Eurostat/AWG: (A)-(B)	2.6	0.4	0.3	0.5	0.5	0.5	0.5	0.3	0.3	:	-2.3

Source: European Commission

3.2 Overview of projection results

According to the new projections, the gross public pension expenditure-to-GDP ratio would remain broadly constant in the projection period (2019-2070) (Table 6). At 10.6% of GDP, pension expenditure was slightly lower in 2019 than in the previous exercise. The projections show a similarly declining trend at the start of the projection period, reflecting the replacement of pensioners with old DB system benefits by pensioners with benefits calculated according to the DC formula. The novelty in this projection are the economic consequences of the COVID-19 epidemic. In 2020, the GDP is expected to have decreased by 4.3%, pushing up public pension expenditure to 12% of GDP. The subsequent decline starts from this level. After the reforms introduced in the past and presented in the previous AWG reports, all benefits from mandatory pension systems are paid by public institutions. Recently introduced changes in regulations should stimulate the development of the private individual non-mandatory pensions (see Box 1) but they have not been included in the current AWG projections.

In the Polish pension systems pension benefits are subject to taxes and other contributions, so part of the pension benefits return to the state budget and net pension expenditure is 1.6-1.8 pps of GDP lower than

the gross values. According to the projection, net pension expenditure in 2070 should be close to that in 2019.

The contributions in the system consist mainly of the payments to the public system. The contributions to the private part of the system FDC play only a marginal role in the total system.

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

Expenditure	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Gross public pension expenditure	10.6	11.0	10.5	10.7	10.8	10.5	12.0	2020	-0.2
Private occupational pensions*	:	:	:	:	:	:	:	:	:
Private individual mandatory pensions**	:	:	:	:	:	:	:	:	:
Private individual non-mandatory pensions*	:	:	:	:	:	:	:	:	:
Gross total pension expenditure	10.6	11.0	10.5	10.7	10.8	10.5	12.0	2020	-0.2
Net public pension expenditure***	9.0	9.3	8.9	9.1	9.2	8.9	10.2	2020	-0.1
Net total pension expenditure***	9.0	9.3	8.9	9.1	9.2	8.9	10.2	2020	-0.1
Contributions	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Public pension contributions	8.4	8.6	8.7	8.7	8.7	8.7	8.7	2042	0.3
Total pension contributions	8.6	8.7	8.8	8.8	8.8	8.7	8.8	2020	0.2

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance, *not included in the projection, **the pension capital from funded pillar is gradually transferred to ZUS (public insurance institution) before retirement so pensions are included in the public pension expenditures, ***net pension expenditure excludes taxes on pensions and compulsory social security contributions paid by beneficiaries

The most important part of the total expenditures in the pension system are old-age pensions (Table 7). Due to the assumptions that take into account the negative GDP growth in 2020, the peak in the pension expenditure-to-GDP ratio in all systems covered by the projection is in the year 2020. According to the projections, the level of expenditures on survivors and disability pensions to GDP ratio will slightly decline over time. It reflects the relative change between preretirement age groups and the working-age population.

The pension expenditures of the general system in 2019 represent 86% of the total pension expenditures. The farmers' pension system and the security provision systems accounted each for 7% of the total pension expenditures. 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 a cohort method similar to the method used by the AWG for preparing the labour force projections. The results show that the number of contributors to the farmers' system should gradually decrease from 1.2 million observed in 2019 to about 0.3 million in 2070.

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

Pension scheme	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Total public pensions	10.6	11.0	10.5	10.7	10.8	10.5	12.0	2020	-0.1
Old-age and early pensions*	9.7	10.2	9.7	10.0	10.2	9.9	11.0	2020	0.2
<i>Flat component</i>	:	:	:	:	:	:	:	:	:
<i>Earnings-related*</i>	8.5	9.2	8.8	9.0	9.3	9.1	9.7	2020	0.6
<i>Minimum pensions (non-contributory)</i>	:	:	:	:	:	:	:	:	:
Disability pensions	0.6	0.5	0.6	0.6	0.5	0.5	0.6	2020	-0.1
Survivors' pensions	0.4	0.3	0.2	0.2	0.2	0.1	0,4	2020	-0.3
Other pensions	:	:	:	:	:	:	:	:	:
Special pension schemes & general system	2019	2030	2040	2050	2060	2070	Peak value	Peak year	change 2019-2070
ZUS (general system)	9.2	10.4	9.7	9.3	9.7	9.6	10.4	2020	0.4
KRUS (farmers' pension system)	0.7	0.8	0.6	0.5	0.5	0.4	0,8	2020	-0.3
MIL (security provision forces)	0.8	0.9	0.7	0.7	0.6	0.5	0.9	2020	-0.3

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance, *The expenditures on old-age pensions in the general system are earnings-related but the expenditures on pension in KRUS and MIL are hard to classify in the categories mentioned so that the total sum is lower than the mentioned components, **Due to technical reasons supplementary expenditures to top-up pensions to the minimum level cannot be presented separately and are included in the category earnings-related together with the contributory part of these pensions. The total expenditures for persons with minimum pensions increase from about 0.1% of GDP in 2019 to 2.9% of GDP in 2070. In the 2018 Ageing Report projections, this total spending was reported under non-contributory minimum pensions.

3.3 Description of main driving forces behind the projection results and their implications

This part provides more details about the development of public pension expenditures. The standard arithmetic decomposition of the pension expenditure-to-GDP ratio into dependency ratio, coverage ratio, benefit ratio, employment rate and labour intensity is explained in Figure 2. This breakdown shows the size of the challenge of the aging process for old-age pensions and what are the channels of adjustment in the pension system. The shift from a defined benefit to a defined contribution system in 1999 introduced an automatic adjustment of pension benefits to population ageing (through the life table used to determine the pension benefit). The channels of this adjustment are explained in the decomposition.

Figure 2 – Disaggregation of public pension expenditure

$$\frac{\text{pension expenditure}}{\text{GDP}} = \overset{\text{dependency ratio}}{\downarrow} \frac{\text{population } 65+}{\text{population } 20-64} \times \overset{\text{coverage ratio}}{\downarrow} \frac{\text{number of pensioners}}{\text{population } 65+} \times \overset{\text{benefit ratio}}{\downarrow} \frac{\text{average pension income}}{\frac{\text{GDP}}{\text{hours worked } 20-74}} \times \overset{\text{labour market effect}}{\downarrow} \frac{\text{population } 20-64}{\text{hours worked } 20-74} \quad [1]$$

$$\frac{\text{number of pensioners}}{\text{population } 65+} = \overset{\text{coverage ratio old-age}}{\downarrow} \frac{\text{number of pensioners } 65+}{\text{population } 65+} + \left(\overset{\text{coverage ratio early-age}}{\downarrow} \frac{\text{number of pensioners } \leq 65}{\text{population } 50-64} \times \overset{\text{cohort effect}}{\downarrow} \frac{\text{population } 50-64}{\text{population } 65+} \right) \quad [2]$$

$$\frac{\text{population } 20-64}{\text{hours worked } 20-74} = \overset{1/\text{employment rate}}{\downarrow} \frac{\text{population } 20-64}{\text{employed people } 20-64} \times \overset{1/\text{labour intensity}}{\downarrow} \frac{\text{employed people } 20-64}{\text{hours worked by people } 20-64} \times \overset{1/\text{career shift}}{\downarrow} \frac{\text{hours worked by people } 20-64}{\text{hours worked by people } 20-74} \quad [3]$$

Source: European Commission

The results of the decomposition mentioned above are presented in [Table 8](#). According to this decomposition, **population aging (increasing dependency ratio)** is in absolute terms the main driving force behind the changes of pension expenditures in the period 2019-2070. Without any other adjustments that counteract the aging process the pension expenditures will be about 10 pps of GDP higher in 2070 than in 2019. It should be mentioned that the entire dependency ratio growth is projected to appear until 2060 and it will be especially strong in the decades 2020-2030 and 2040-2050 reflecting the ageing process of the post war baby-boom generations. However, in the last decade of the projection the dependency ratio stabilises as the majority of the baby-boom generation will pass away and a gradual increase in fertility should lead to a more balanced age distribution.

Due to already introduced reforms, the ratio of persons with pension benefits to the population 65+ (**coverage ratio effect**) is not going to be a major adjustment channel to population ageing. The negative contribution of this effect reflects mainly the shift in the effective retirement age while the statutory retirement age will remain constant. The main way of adjustment will be a decrease in the average pension in relation to the average wage (**benefit ratio effect**).

Table 8 – Factors behind the change in public pension expenditure between 2019 and 2070 (percentage points of GDP) – pensioners

	2019-30	2030-40	2040-50	2050-60	2060-70	2019-70
Public pensions to GDP	0.3	-0.5	0.2	0.1	-0.3	-0.2
Dependency ratio effect	3.7	1.3	2.9	2.0	-0.1	9.9
Coverage ratio effect*	-1.5	0.1	-0.5	-0.5	0.0	-2.4
<i>Coverage ratio old-age</i>	0.0	0.0	0.0	-0.1	-0.1	-0.1
<i>Coverage ratio early-age</i>	-3.6	0.0	0.4	-0.9	-0.1	-4.2
<i>Cohort effect</i>	-2.3	0.5	-2.9	-2.4	0.7	-6.4
Benefit ratio effect	-1.4	-2.0	-1.8	-1.1	-0.4	-6.8
Labour market effect	-0.1	0.2	-0.2	-0.2	0.2	-0.1
<i>Employment ratio effect</i>	0.0	0.3	0.0	-0.2	0.1	0.1
<i>Labour intensity effect</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Career shift effect</i>	-0.1	0.0	-0.1	0.0	0.1	-0.2
Residual	-0.3	-0.1	-0.3	-0.1	0.0	-0.9

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance; *Subcomponents of the coverage ratio effect do not necessarily add up.

Both benefit ratios 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) decreases from 54% in 2019 to about 25% in the year 2060 and stabilises at this level until 2070. The main reason of this decline is the adjustment in the pension formulas in the NDC system and the assumptions about increasing life expectancy. It should also be mentioned that despite the fact that since 2013 the pensions are calculated on the basis of the NDC formula, it is influenced by the so called “initial capital” – the calculation of capital earned before the introduction of the pension reform in 1999 plus its indexation. Before the calculation of the pension benefit, the indexed initial capital is added to the NDC accounts of persons who worked before 1999. Before 1999, unemployment was relatively lower than in the early 2000s. Before 1989, the phenomenon of unemployment was officially not even 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 that have already been granted in the past and indexed significantly below wage growth. The starting point for BR is lower than for RR because in 2019 average wages at retirement were lower than the average wage in the economy and because benefits received by the oldest pensionaries have been exposed for a long time to an indexation lower than wage growth (even if their initial values were higher -RR in the past higher than the current one). However BR is converging to RR in the projection. Changes in next decades are mainly due to the assumptions about the labour market careers of the generations that reach the retirement age and the indexation of benefits at “constant policy”. As agreed within the AWG, the indexation rules of the minimum pension benefits change from current regulations to full wage indexation after 10 years (see the definition of the constant policy). With time the coverage of the minimum pension will increase significantly.

The calculations regarding the comparison of the pension system dependency ratio (SDR) and demographic old-age dependency ratio (OADR) show to what extent the economic relations are going to be offset in comparison to purely demographic relations. The results show that the system efficiency decreases from 1.9 in 2019 to 1.5 in 2060 and then remains at this level (Table 10). It means that the adjustment of the economic variables (relation of pensioners to employees), which is going to almost double, is lower than the change in the OADR, which is more than doubling by 2070. On the other hand, the initial relation SDR / OADR is relatively high because of a large number of pensioners relative to the number of people aged 65+ (statutory retirement age for women is 60 years) and a relatively low employment rate. Over time the employment rate is going to increase (higher labour force participation in pre-retirement age group).

Table 9 – Benefit ratio(BR), Replacement rate at retirement(RR), Coverage by pension scheme (in %)

	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Public scheme (BR)	44%	39%	32%	26%	24%	23%	-21%
Coverage *	100.0	100.0	100.0	100.0	100.0	100.0	0.0
Public scheme: old-age earnings related (BR)	40%	36%	29%	24%	22%	21%	-19%
Public scheme: old-age earnings related (RR)	54%	44%	30%	25%	25%	25%	-29%
Coverage*	87.5	90.0	91.2	93.1	94.5	95.0	7.6
Private occupational scheme (BR)	:	:	:	:	:	:	:
Private occupational scheme (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Private individual schemes (BR)	:	:	:	:	:	:	:
Private individual schemes (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Total benefit ratio	44%	39%	32%	26%	24%	23%	-21%
Total replacement rate	54%	44%	30%	25%	25%	25%	-29%

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance. *Coverage of each pension scheme is calculated as a ratio of the number of pensioners within the scheme and the total number of pensioners in the country. In case data on pensioners are not available, the calculation is based on the number of pensions.

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

	2019	2030	2040	2050	2060	2070	change 2019-2070
Number of pensioners (thousand) (I)	9638	10473	11384	12414	12591	11961	2323
Employment (thousand) (II)	17655	16431	15324	13669	12359	11641	-6013
Pension system dependency ratio (SDR) (I)/(II)	54.6	63.7	74.3	90.8	101.9	102.7	48.2
Number of people aged 65+ (thousand) (III)	6810	8425	9068	10332	11013	10472	3661
Working age population 20-64 (thousand) (IV)	23506	21666	20665	18122	16150	15445	-8061
Old-age dependency ratio (OADR) (III)/(IV)	29.0	38.9	43.9	57.0	68.2	67.8	38.8
System efficiency (SDR/OADR)	1.9	1.6	1.7	1.6	1.5	1.5	-0.4

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance

The changes in the ratios of number of pensioners to population and the number of pensioners to the number of inactive persons are driven mainly by recently introduced reforms and the observed long-term trend of increasing labour force participation of older people (Tables 11a, 11b, 12a, 12b). The changes in the relation of the pensioners to population are mainly explained by the reforms that restricted access to early retirement. A decrease of the ratio of retired persons to population is consistent with an 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. This is common, in particular, in the agriculture sector. In addition, work and receiving pension benefits is allowed without any limitations above the statutory retirement age. Some limitations regarding the level of possible salary remained for persons that receive benefits before reaching the statutory retirement age. Second, it is possible (but on a very limited scale) to have simultaneous rights to benefits from different systems. Third factor are the possible entitlements to Polish pensions by emigrants from Poland. Those pensioners add to the number of total pensions despite not being included in the population of Poland. The second and third reason can also explain the 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 the population and together with pensions from other systems can exceed the number of persons in that age bracket in Poland.

Table 11a – Pensioners (public schemes) to inactive population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	6,0	5,1	4,6	3,9	3,9	3,7
Age group 55-59	53,1	41,1	35,2	32,4	32,0	31,7
Age group 60-64	96,8	94,2	94,3	90,2	88,1	90,1
Age group 65-69	110,9	115,4	120,1	117,9	113,8	114,7
Age group 70-74	110,0	105,5	108,2	109,6	106,6	104,0
Age group 75+	100,9	104,9	102,5	103,3	103,8	102,2

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance

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

	2019	2030	2040	2050	2060	2070
Age group -54	2.5	2.1	1.8	1.6	1.6	1.5
Age group 55-59	16.5	12.3	11.3	10.2	9.8	9.7
Age group 60-64	62.5	56.5	56.2	54.3	52.3	53.0
Age group 65-69	98.7	95.1	98.2	97.0	93.7	93.9
Age group 70-74	104.7	98.4	100.4	101.6	99.0	96.4
Age group 75+	100.9	104.9	102.5	103.3	103.8	102.2

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance

Table 12a – Female pensioners (public schemes) to inactive population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	4.6	4.1	3.6	3.1	3.1	2.8
Age group 55-59	42.2	27.9	22.9	21.4	21.5	19.7
Age group 60-64	109.7	123.5	124.1	120.0	120.6	123.3
Age group 65-69	109.0	106.1	109.5	107.6	104.9	105.9
Age group 70-74	107.6	98.3	101.7	103.0	100.7	99.6
Age group 75+	100.8	104.9	101.0	101.1	101.6	100.7

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance

Table 12b – female pensioners (public schemes) to population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	2.1	1.9	1.6	1.4	1.4	1.3
Age group 55-59	15.4	10.5	9.3	8.6	8.4	7.7
Age group 60-64	87.5	89.4	90.4	89.0	88.3	89.6
Age group 65-69	100.8	92.5	95.6	94.7	92.4	92.9
Age group 70-74	104.6	94.4	96.8	98.1	96.2	95.0
Age group 75+	100.8	104.9	101.0	101.1	101.6	100.7

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance

The decomposition of the factors influencing the expenditures on new pensions provides the insight into the mechanisms of the NDC general pension system in Poland (Tables 13a, 13b, 13c). These tables provide the drivers behind the changes in the expenditure on new pensions. In the case of the Polish pension system this decomposition was prepared only for the general system based on the defined 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} the average accrual rate of the new pensions (equal to the ratio 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 in the first year. The expenditures on new pensions (in absolute terms) are growing in the entire period of the projection. 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 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 the 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 their career in an environment of no or relatively low unemployment (before 1999). It is reflected in the so-called “initial capital” calculated for persons under the DB system, which worked before the introduction of the pension reform in 1999. The labour market entry of the younger generations who

started their careers after 1999 coincided with relatively high unemployment. It is also important that a large part of these generations used options to reduce their taxable and thus 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 13a – Disaggregation of new public pension expenditure (old-age and early earnings-related pensions) – Total

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	1078.4	1433.4	2093.3	2838.4	3348.5	5056.0
I. Number of new pensions (1000)	296.0	294.0	378.0	377.0	288.0	285.0
II. Average contributory period (years)	34.9	35.8	35.9	35.4	36.0	35.8
III. Average accrual rate (%) (c/A)	0.94	0.89	0.84	0.80	0.77	0.73
<i>Notional-accounts contribution rate (c)</i>	0.2	0.2	0.2	0.2	0.2	0.2
<i>Annuity factor (A)</i>	20.7	22.0	23.2	24.3	25.4	26.8
IV. Monthly average pensionable earnings	1704	2358	2824	4068	6470	10455
V. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VI. Average number of months paid the first year	6.5	6.5	6.5	6.5	6.5	6.5
(Monthly average pensionable earnings) / (monthly economy-wide average wage)	1.5	1.3	0.9	0.8	0.8	0.9

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance; *New pension expenditure equals the product of I, II, III, IV, V & VI.

The difference in labour market careers and the effective retirement age creates significant differences between sexes (Table 13b, Table 13c). Women have on average lower pensionable earnings and much lower average contributory periods (because of the lower statutory retirement age and lower employment rates). In addition, lower retirement ages means a longer period is expected to be spent in retirement (even if the unisex life tables are used in the pension calculations). It should also be noted that due to changes in mortality the proportion of women at retirement age is significantly higher than that of men, which means that their pensions have a bigger impact on the total new pension expenditures.

Table 13b – Disaggregation of new public pension expenditure (old-age and early earnings-related pensions) – Male

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	599.6	869.5	1223.4	1663.8	1978.1	2676.6
I. Number of new pensions (1000)	122.0	136.0	173.0	191.0	150.0	134.0
II. Average contributory period (years)	37.6	38.2	38.5	37.6	38.0	38.1
III. Average accrual rate (%) (c/A)	1.03	0.96	0.92	0.87	0.83	0.79
<i>Notional-accounts contribution rate (c)</i>	0.2	0.2	0.2	0.2	0.2	0.2
<i>Annuity factor (A)</i>	19.0	20.3	21.3	22.4	23.6	24.7
IV. Monthly average pensionable earnings	1961	2677	3086	4094	6452	10206
V. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VI. Average number of months paid the first year	6.5	6.5	6.5	6.5	6.5	6.5
(Monthly average pensionable earnings) / (monthly economy-wide average wage)	1.8	1.4	1.0	0.8	0.8	0.9

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance; *New pension expenditure equals the product of I, II, III, IV, V & VI.

Table 13c – disaggregation of new public pension expenditure (old-age and early earnings-related pensions) – Female

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	480.7	564.4	870.6	1173.6	1375.3	2374.5
I. Number of new pensions (1000)	174.0	158.0	205.0	186.0	139.0	151.0
II. Average contributory period (years)	33.1	33.7	33.7	33.1	33.7	33.7
III. Average accrual rate (%) (c/A)	0.89	0.83	0.79	0.75	0.71	0.68
Notional-accounts contribution rate (c)	0.2	0.2	0.2	0.2	0.2	0.2
Annuity factor (A)	21.9	23.4	24.8	26.2	27.4	28.6
IV. Monthly average pensionable earnings	1439	1955	2466	3930	6340	10522
V. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VI. Average number of months paid the first year	6.5	6.5	6.5	6.5	6.5	6.5
(Monthly average pensionable earnings) / (monthly economy-wide average wage)	1.3	1.0	0.8	0.8	0.8	0.9

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance; *New pension expenditure equals the product of I, II, III, IV, V & VI.

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 14. The contributions in the farmers' system depend on the size of a farm and are relatively low in comparison with 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 14 – Financing of the public pension system

	Public employees	Private employees	Self-employed
Contribution base	Gross wage	Gross wage	Defined voluntarily within limitations
Contribution rate/contribution			
Employer	9.76%	9.76%	19.52%
Employee	9.76%	9.76	
State*	19.52%	19.52%	19.52%
Other revenues*	Demographic Reserve Fund	Demographic Reserve Fund	Demographic Reserve Fund
Maximum contribution	30x average wage in the economy	30x average wage in the economy	30x average wage in the economy
Minimum contribution	-	-	60% of the average wage in the economy

Source: European Commission, Polish Ministry of Finance; *only legislated contributions are reported like for example: contributions from maternity leave benefits.

The total contribution revenues (Table 15) are influenced mainly by macroeconomic and demographic assumptions (employment, wage growth, inflation). The relation between the number of contributors and the 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 15 – Revenue from contributions, number of contributors in the public scheme, total employment

	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Public pension contributions (%GDP)	8.4	8.6	8.7	8.7	8.7	8.7	0.3
Employer contributions	4.9	5.1	5.2	5.2	5.2	5.2	0.3
Employee contributions	3.1	3.2	3.3	3.3	3.3	3.3	0.3
State contribution*	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Other revenues*	0.3	0.2	0.1	0.0	0.0	0.0	-0.3
Number of contributors (I) (1000)	17380	16300	15250	13557	12207	11387	-5993
Employment (II) (1000)	17655	16431	15324	13669	12359	11641	-6013
(I) / (II)	1.0	1.0	1.0	1.0	1.0	1.0	0.0

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance; *only legislated contributions are reported

3.5. Pension assets and return on assets

The reform introduced in 1999 assumed that the existence of the obligatory funded pillar of the system (FDC) is an important part of the pension system. However, the reform introduced in 2014 reduced the importance of this part of the system: 51.5% of the accounting units recorded in the individual account of each Open Pension Fund (OFE) member until 2014 were cancelled (i.e. 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. In addition, the participation in the funded pillar became no longer obligatory and persons could choose to be fully in the NDC system. For those who decided to stay in the system with the funded pillar, the new contribution rate to the funded pillar has been reduced to 2.92% from 7.3% before the reform. According to the Polish Supreme Court judgement, assets in OFE are a part of the public pension scheme managed by private institutions. The OFE have been created only for collecting the capital and finally ZUS is the institution responsible for paying pensions from the capital collected in the individual accounts. So, over time the cohorts who have been covered fully by OFE and collected assets until 2013 (other than Treasury Bonds) will see their remaining assets gradually transferred to ZUS (in the 10 years before reaching the statutory retirement age). The number of persons who have chosen to remain in OFE on a voluntary basis is limited (in 2014 it was 2.5 million contributors; this number is decreasing as it is still possible to change this decision). Because the new contribution rate is much lower than before, the assets of OFE are projected to remain on the stable but relatively low level of about 0.7% of GDP after 2050, when generations fully covered by OFE will reach retirement (Table 16).

Table 16 – Pension assets and reserves (% GDP) and return on assets (%)

	2019	2030	2040	2050	2060	2070	average 2019-2070
Public pension scheme:							
<i>assets and reserves</i>	7.1	3.8	1.4	0.6	0.7	0.7	2.2
<i>average return</i>	0.9	1.8	3.2	4.6	4.6	4.6	3.4

Source: Polish Ministry of Finance

3.6. Sensitivity analysis

The effects of different scenarios in sensitivity analysis are presented in Table 17. After the reforms introduced in 2014, pension expenditures from all mandatory schemes are paid by public institutions, so total pension expenditures from mandatory pillars are equal to public pension expenditures.

The scenarios in the AWG 2021 exercise can be divided into three groups. First the results of the alternative demographic assumptions, secondly the sensitivity tests for different paths of macroeconomic assumptions and third the scenarios that require changes in regulations (policy scenarios). Below we present their short description and differences resulting from their comparison to the baseline.

3.6.1 Alternative demographic assumptions

Four sensitivity tests have been considered regarding demographic variables: assuming an additional increase in life expectancy by 2 years and proportionally lower mortality, the two symmetric sensitivity tests regarding higher or lower migration (by 33%) and the scenario of a 20% lower fertility rate.

Higher life expectancy scenario – rising life expectancy is to a large extent compensated by the construction of the general system (pure NDC in the long run) though with other variables unchanged, it additionally decreases the replacement rate in the system. The higher pension expenditure at the end of the projection can be explained by three factors. Firstly, the method of pension benefit calculation in the Polish system relies on life tables (and life expectancy) from the moment of retirement. If the prospective life expectancy is higher than the expenditures paid to individuals surpass the amounts calculated in the system. So, not entire life expectancy growth in this scenario can be compensated by NDC system. 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 higher life expectancy affects directly expenditures in the farmers' pension system (defined benefit system) and security provision system.

Lower/higher net migration – the projection of migration changes has a more visible impact on the projection as the currently observed immigration and net migration in the future are higher in EUROPOP2019 than it was assumed in ESSPOP2015. The impact of +/- 33% migration on pension expenditure influences 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 ratio. The timespan between the negative and positive effect on expenditures of the migration scenario leads to asymmetric results until 2070. The projected impact of an increase in immigration is a

decrease of the pension benefits to GDP ratio by 0,2pp in 2070 in comparison to the baseline. Lower migration leads to the increase of expenditures by 0.2 pp. in comparison to the baseline.

Lower fertility – in the long run the level of TFR is the only variable that influences the age distribution in the population. However, the AWG projection is limited to the year 2070 and does not catch the entire influence of the changes in TFR in a very long run (less numerous generations considered in this scenario are maximum 50 years old in 2070, so there is no effect on pension expenditures). What we observe in the projection horizon is a decrease of potential GDP growth due to less numerous generations that enter the labour market. This effect appears with a delay of about 20 years (it begins around the year 2040) and leads to a gradual increase of the gap in comparison to the baseline. At the end of the projection the difference to the baseline amounts to 1.1 pp. of GDP.

3.6.2 Alternative economic assumptions

The macroeconomic variables are characterized by large variability. In order to measure the sensitivity of the results to deviations from the baseline scenario the following scenarios have been proposed: higher/lower total factor productivity (TFP) growth, higher employment rate of persons in older age (55-74y) and two scenarios created to assess a potential long-term impact of shocks experienced in 2020 due to the COVID-19 epidemic (lagged recovery and adverse structural scenario).

Higher/lower labour productivity and risk scenarios – Two scenarios are considered regarding future TFP path. The scenario of higher productivity assumes the convergence with TFP growth to 1.2% until 2070 (compared to 1% in the baseline). The so called risk scenario of lower productivity assumes that the target value for the TFP growth convergence is 0.8%. Higher productivity has an influence on all systems through higher wage growth in the economy. In the general system it results in a higher accumulation of contributions (new pensions) and higher indexation (old benefits). Also, *higher labour productivity* accelerates 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 at below wage growth, which additionally decreases the proportion of expenditures to GDP. The higher labour productivity growth scenario results in a decrease of the ratio of expenditures to GDP over the whole projection period. The *lower labour productivity scenario* has the opposite effect.

Higher employment rate of older workers – a higher employment rate of older workers contributes to an overall higher employment rate and it affects the future expenditures in three ways: (1) it directly influences the total sum of contributions and thus 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 an increase in the ratio of expenditures to GDP if future pensions are indexed to wages.

COVID-19: lagged recovery and adverse structural scenarios consist of the combination of the different assumptions regarding employment rates and TFP growth. The results of the lagged recovery scenario

leads to slightly higher expenditures to GDP in the first decade of the projection but the differences in comparison to the baseline are not significant (0.1 pp.). If we assume a longer lasting economic shock, this leads to more visible influence on the relation of pension expenditure to GDP (higher by 0.8 pp.in comparison to the baseline).

3.6.3 Policy change scenarios

There are three scenarios that assume possible changes in regulations: unchanged retirement age, linking the retirement age to increases in life expectancy and offsetting declining pension benefit ratio.

Policy scenario: unchanged retirement age – in the case of Poland this scenario is in fact the baseline scenario as the constant policy assumes the constant statutory retirement age of 60 years for women and 65 years for men until the year 2070.

Policy scenario: linking retirement age to increases in life expectancy – the initial huge difference between statutory retirement age of men and women requires an assumption that the increase of the average retirement age will be due to the convergence of the retirement age of women and men. According to this assumption the same retirement age for men and women will be reached in 2030. After that the statutory retirement age for both sexes increases in line with the changes of the life expectancy of person in the age 65. Regarding the results, the higher statutory retirement age leads to reduction of the public pension expenditures by 0,6 pp. of GDP in 2030 and the difference of 0,6-0,7 pp. in comparison to baseline remain until the end of the projection. This is a result of the two effects: (1) it increases the average contributory period, (2) it shortens the average period when the old-age pension is paid. However, the reduction of the total amount paid at the individual level is permanent only in KRUS system. In the main ZUS system (NDC) the decrease in pension expenditures due to an increase in the retirement age is limited as longer work careers corresponds with higher accumulation of the implicit liabilities in the system. So, at the individual level, the increasing retirement age delays the payment of the accumulated liabilities but not the amount to be paid. On the other hand, the increasing retirement age improves the adequacy of the pension benefits and thus decrease the coverage of the minimum pension as more persons (in particular women) have benefits higher than the threshold. Due to this fact, the expenditures on minimum pension guarantee are substantially lower and the replacement rate decline is slower and stabilise at the higher level than in the baseline scenario.

Policy scenario: offset declining pension benefit ratio – the aim of this scenario is to simulate what would happen if the earnings-related public benefit ratio (BR) in the pension system (the relation of the average old-age pension to the average wage in the economy) decline only by 10% in comparison to the level from 2019. In the NDC system the decline of the replacement rate of new generations is the main channel of adjustment assuming no changes of the retirement age (see tables 8 and 9). It can be imagined that in order to prevent too deep reduction of the benefits the automatic mechanism of the NDC system is counterbalanced by additional indexation rule that prevents old-age benefit rate from declining. However such additional mechanism would generate considerable costs for the public finance after the year 2030 when the old-age benefit ratio hits the 90% of the initial value. In 2040 public expenditures are higher by 2,2 pps of GDP in comparison to the baseline scenario by the end of the projection in 2070 the difference reach 6,7 pps of GDP.

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

Public pension expenditure	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Baseline (% GDP)	10,6	11,0	10,5	10,7	10,8	10,5	-0,2
Higher life expectancy at birth (+2y)	0,0	0,0	0,1	0,2	0,2	0,3	0,3
Higher migration (+33%)	0,0	0,0	0,0	-0,1	-0,2	-0,2	-0,2
Lower migration (-33%)	0,0	0,0	0,0	0,1	0,2	0,2	0,2
Lower fertility (-20%)	0,0	0,0	0,0	0,4	0,7	1,1	1,1
Higher employment rate of older workers (+10 pps.)	0,0	-0,2	-0,2	-0,5	-0,5	-0,3	-0,3
Higher TFP growth (convergence to 1.2%)	0,0	0,1	-0,1	-0,3	-0,4	-0,4	-0,4
TFP risk scenario (convergence to 0.8%)	0,0	0,1	0,3	0,4	0,4	0,4	0,4
Policy scenario: linking retirement age to change in life expectancy	0,0	-0,6	-0,7	-0,7	-0,6	-0,7	-0,7
Policy scenario: unchanged retirement age	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Policy scenario: offset declining pension benefit ratio*	0,0	0,0	2,2	4,6	6,3	6,7	6,7
Lagged recovery scenario	0,0	0,0	0,1	0,1	0,1	0,1	0,1
Adverse structural scenario	0,0	0,4	0,6	0,8	0,9	0,8	0,8

Total pension expenditure	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Baseline (% GDP)	10,6	11,0	10,5	10,7	10,8	10,5	-0,2
Higher life expectancy at birth (+2y)	0,0	0,0	0,1	0,2	0,2	0,3	0,3
Higher migration (+33%)	0,0	0,0	0,0	-0,1	-0,2	-0,2	-0,2
Lower migration (-33%)	0,0	0,0	0,0	0,1	0,2	0,2	0,2
Lower fertility (-20%)	0,0	0,0	0,0	0,4	0,7	1,1	1,1
Higher employment rate of older workers (+10 pps.)	0,0	-0,2	-0,2	-0,5	-0,5	-0,3	-0,3
Higher TFP growth (convergence to 1.2%)	0,0	0,1	-0,1	-0,3	-0,4	-0,4	-0,4
TFP risk scenario (convergence to 0.8%)	0,0	0,1	0,3	0,4	0,4	0,4	0,4
Policy scenario: linking retirement age to change in life expectancy	0,0	-0,6	-0,7	-0,7	-0,6	-0,7	-0,7
Policy scenario: unchanged retirement age	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Policy scenario: offset declining pension benefit ratio*	0,0	0,0	2,2	4,6	6,3	6,7	6,7
Lagged recovery scenario	0,0	0,0	0,1	0,1	0,1	0,1	0,1
Adverse structural scenario	0,0	0,4	0,6	0,8	0,9	0,8	0,8

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance

3.7. Description of the changes in comparison with the 2006, 2009, 2012, 2015 and 2018 projections

The comparison of the results of the current projection with those of the previous projections (Table 18) shows that the potential influence of the ageing process on the pension expenditures is decreasing as ageing has already materialised to some extent in the current age structure of the Polish population. In addition, a more distant time horizon also brings a stabilisation of the fluctuations created by the baby-boom generations.

Table 18 – Change in the public pension expenditure-to-GDP ratio and disaggregation for consecutive projection exercises (pps of GDP)

	Public pension expenditure	Dependency ratio effect	Coverage ratio effect	Benefit ratio effect	Labour market effect	Residual (incl. interaction effect)
2006 Ageing Report (2004-2050*)	-5.7	10.4	-5.7	-6.3	-3.2	-0.9
2009 Ageing Report (2007-2060*)	-2.8	13.4	-6.3	-7.1	-1.0	-1.8
2012 Ageing Report (2010-2060*)	-2.0	13.5	-5.9	-6.5	-0.9	-2.1
2015 Ageing Report (2013-2060*)	-0.7	12.4	-5.2	-5.2	-1.4	-1.2
2018 Ageing Report (2016-2070*)	-1.0	11.7	-3.0	-8.1	-0.4	-1.2
2021 Ageing Report (2019-2070*)	-0.2	9.9	-2.4	-6.8	-0.1	-0.9

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance, *The table presents the total change in public pension expenditure during the consecutive projection horizons and the contribution of the different components to that overall change; The disaggregation for 2006/2009/2012 is on the basis of pensions, for 2015/2018/2021 it is on the basis of pensioners; The projection horizon has been extended over consecutive Ageing Reports, limiting comparability over time.

The new factor in AWG AR 2021 projection is the assumption of a relatively numerous immigration which contributes to higher GDP growth. As a result, the dependency ratio effect in the current projection is for the first time below 10 pps. The main way of the adjustment to ageing in the horizon 2019-2070 is the decrease of the level of pension benefits. However, their value is lower than in the previous projections. The counterbalancing effect of the coverage ratio is lower than in the previous projections due to the assumed constant retirement age (60/65) and the observed increase of the LFPRs of persons in the pre-retirement age that has left less space for further improvements in the future. The comparison of the previous projections to the actual numbers suggests that most of the changes were due to a more dynamic GDP growth than the one assumed in the 2018 projection (Table 19a). As a result the actual pension expenditures were 0.1-0.5 pp. of GDP lower than previously projected.

The current projection round presents a path of the total pension expenditures to GDP that is lower than in the last projection despite the absence of significant policy changes (Table 19b). Faster, than previously assumed, economic growth up to the base year 2019 was taken into account and extrapolated to the future, in assumptions of immigration, labour force participation and unemployment rate. Slight changes in the models have only a marginal influence on the results.

Table 19a – Disaggregation of the difference between the 2018 projections and actual public pension expenditure in 2016-2019 (% GDP)

	2016	2017	2018	2019
Ageing Report 2018 projections	11,2	10,7	11,0	11,0
<i>Assumptions (pps of GDP)</i>	-0,1	-0,3	-0,3	-0,5
<i>Coverage of projections (pps of GDP)</i>	0,0	0,1	0,1	0,1
<i>Constant policy impact (pps of GDP)</i>	0,0	0,0	0,0	0,0
<i>Policy-related impact (pps of GDP)</i>	0,0	0,0	0,0	0,0
Actual public pension expenditure	11,1	10,6	10,7	10,6

Source: Polish Ministry of Finance

Table 19b – Disaggregation of the difference between the 2018 and the new public pension projections (% GDP)

	2019	2030	2040	2050	2060	2070
Ageing Report 2018 projections	11,0	11,0	10,8	11,2	11,1	10,2
<i>Change in assumptions (pps of GDP)</i>	-0,5	0,1	-0,2	-0,3	-0,1	0,1
<i>Improvement in the coverage or in the modelling (pps of GDP)</i>	0,1	-0,1	-0,1	0,1	-0,1	0,2
<i>Change in the interpretation of constant policy (pps of GDP)</i>	0,0	0,0	0,0	0,0	0,0	0,0
<i>Policy-related changes (pps of GDP)</i>	0,0	0,0	0,0	0,0	0,0	0,0
New projections	10,6	11,0	10,5	10,7	10,8	10,5

Source: Polish Ministry of Finance

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

4.1. Institutional context in which the projections are made

4.2.1 The general pension system (FUS model)

The main part of the Polish pension system has been modelled using the current version of pension model created and used in Polish Insurance Institution (ZUS). This model is used both for evaluation of new policy proposals and for preparations of regular long-term projections of pension expenditures like ZUS(2019) and ZUS(2020) published on the website of ZUS³. The results have been supplemented by the simulations carried out using additional microsimulation model.

4.2.2 Farmers' pension system model

Farmers' pension system was modelled using the PROST methodology developed by World Bank. This model has been created and serves as a tool in the Ministry of Finance. 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 PROST methodology developed by World Bank. Separate models were prepared to model the systems with different regulations regarding pension formulas and minimum retirement age. All models have been created as tools in the Ministry of Finance. The AWG assumptions have been adjusted to create an input to these models.

4.2. Assumptions and methodologies applied

4.2.1 The general pension system (FUS model)

The model is based on AWG assumptions. The internal parameters are based on the relationships and observations observed in the databases of Polish contributors and benefit takers in the past years. The target population in the general system is based on the AWG population assumptions adjusted to take into account the number of persons who are not the target of that system (e.g. farmers and potential members of the security provision systems).

4.2.2 Farmers' pension system model

The AWG assumptions have been adjusted to create an input to this model. The projection of the number of contributors eligible for pensions in the future has been calculated on the basis of the farm employment projection prepared using the model similar to CSM model used by AWG in the predictions of the labour force participation rates projection⁴. The internal parameters of the model have been calculated in the bases of the databases provided by the institution responsible for payments from that system (KRUS).

³ See: <https://www.zus.pl/baza-wiedzy/statystyka/prognozy-fus>

⁴The description of the method is presented here: http://rocznikikae.sgh.waw.pl/p/roczniki_kae_z28_06.pdf

4.2.3 Security provision system model

The AWG assumptions have been adjusted to create an input to models of the systems included in this category. The parameters for the age and sex groups have been calculated on the basis of the past observations in the data provided by the institutions responsible for payments from these systems.

4.3. Data used to run the model

Different models used the same set of 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 the one applied in the CSM projections of the LFPRs. The parameters of the models have been estimated on the basis of the databases from ZUS, KRUS and security provision systems.

4.4. Reforms incorporated in the model

All reforms legislated until June 2020 have been incorporated in the models (Please see chapter 1.2. for the detailed description of the reforms).

4.5 General description of the model(s)

Regarding the main ZUS model, the kernel of this model 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 and sickness plus accident insurance. The tool distinguishes between different mortality rates of certain types of benefit recipients. Main outputs of the model include standard fiscal indicators (expenditures, revenues, surplus/debt of the Social Insurance Fund) and various standard ratios (e.g. benefit ratio).

4.6 Additional features of the projection model

The consistency of the results between the projections generated by tools used in ZUS and PROST models of the farmer's pension systems and security provision systems is assured by the additional assumptions regarding number of new employees in these sectors. The share of new farmers in the young generations is going to decline according to the projection using CSM method (see Strzelecki(2012) for the description) . The relation of young employees entering the security provision occupations to population remains constant in the projection.

References

Strzelecki, P. (2012), 'Zastosowanie dynamicznej metody kohortowej do prognozowania liczby pracujących w rolnictwie w Polsce' ['Application of the dynamic cohort method to agriculture employment projections'], Roczniki Kolegium Analiz Ekonomicznych SGH, 28/2012, 125-144.

ZUS, (2019), 'Prognoza wpływów i wydatków Funduszu Emerytalnego do 2080 roku', Departament Statystyki i prognoz Aktuarnych, Warszawa.

ZUS, (2020), 'Prognoza wpływów i wydatków Funduszu Ubezpieczeń Społecznych na lata 2021-2025', Departament Statystyki i prognoz Aktuarnych, Warszawa.

Methodological annex

The aim of this part is the presentation of additional assumptions that have been taken into account in the projections.

Economy-wide average wage at retirement

In principle the construction of the ZUS pension model assumes flat age profile of wages. However the model to some extent reproduce currently observed differences between persons of different age and sex who apply for pension and the relation of their wages to the average wage. That is why its growth rate is almost the same as in the rest of the economy. The initial difference is a result of the currently observed difference between the average wage in the economy and wages of persons at retirement (Table A1). The slight differences in growth of the two categories of wages are generated by slight changes of the age structure of persons who apply for the first pension in time.

Table A1 – Economy wide average wage at retirement (1000 eur)

	2019	2030	2040	2050	2060	2070	% change 2019-2070
Economy-wide average gross wage at retirement	12,5	20,5	34,6	55,1	85,3	130,3	946,0
Economy-wide average gross wage	13,3	22,4	37,0	58,9	91,4	138,0	934,2

Source: European Commission, ZUS (Polish Social Insurance Institution)

Pensioners vs. pensions

In principle in all systems one pension should be given to every pensioner. A slightly higher number of pensions is a result of following exceptions:

- persons who receive pensions from more than one system.
- persons who receive survivor's and disability pensions in the same time (in the general system).

Pension taxation

The pension benefits in Poland are covered by the same regulations regarding personal income tax like for example wage income. In line with the agreed AWG methodology the effective tax rate on pension in the future remains constant and equal to effective tax rate from the year 2019.

Disability pensions

The definitions of persons eligible for disability benefits are similar in all systems but in each of them there are different regulations regarding their level. In the recent years these regulation have not been changes but there is a visible tendency to more and more strict medical certification of the individual cases. When the statutory retirement age is reached the disability pensions are replaced by the old-age benefits.

Survivors' pensions

The modelling of the survivors pensions is based on the trends of the parameters observed in the databases of the institutions responsible for payments in the previous years.

Non-earnings related minimum pension

The minimum pension is an additional guarantee in the Polish pension system. This is an instrument to top up the lacking part of the pension benefits for persons who collected too less retirement capital to have

benefit lower or equal to the minimum pension. It can be paid to persons covered by the general system who reached the statutory retirement age and have the required minimum contributory period of 25 years for men and 20 years for women. In the current projection, due to the technical reasons, the projection is not presented separately.

Contributions

The contribution rates in general system (ZUS) and in the farmer's system (KRUS) are assumed to be constant in time

Alternative pension spending disaggregation

Table A2 provides alternative disaggregation of the forces behind changes in public pension expenditures but based on the data on pensions and not pensionaries like Table 8. The main message about the channels of adjustment to the increasing dependency ratio remains the same as there is only slight difference between the number of pensions and number of pensionaries in the projections.

Table A2 – Factors behind the change in public pension expenditure between 2019 and 2070 (percentage points of GDP) – pensions

	2019-30	2030-40	2040-50	2050-60	2060-70	2019-70
Public pensions to GDP	0.3	-0.5	0.2	0.1	-0.3	-0.2
Dependency ratio effect	3.7	1.3	2.9	2.0	-0.1	9.9
Coverage ratio effect	-1.5	0.1	-0.5	-0.5	0.0	-2.5
<i>Coverage ratio old-age*</i>	-0.1	0.0	0.0	-0.1	-0.1	-0.3
<i>Coverage ratio early-age*</i>	-3.6	0.0	0.4	-0.9	-0.1	-4.2
<i>Cohort effect*</i>	-2.3	0.5	-2.9	-2.4	0.7	-6.4
Benefit ratio effect	-1.4	-2.0	-1.8	-1.1	-0.4	-6.7
Labour market effect	-0.1	0.2	-0.2	-0.2	0.2	-0.1
<i>Employment ratio effect</i>	0.0	0.3	0.0	-0.2	0.1	0.1
<i>Labour intensity effect</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Career shift effect</i>	-0.1	0.0	-0.1	0.0	0.1	-0.2
Residual	-0.3	-0.1	-0.3	-0.1	0.0	-0.9

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance

Administrative data on new pensioners

Tables A3a, A3b and A3c show the administrative data reported for the base year (or the most recent year). The old-age figures have been used to calculate the average effective retirement ages in Tables 4a and 4b.

Table A3a – Number of new pensioners by age group in 2019 (administrative data) – men

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	14960	3484	6827	4649	0
50 - 54	5662	1430	3735	497	0
55 - 59	8828	387	7459	982	0
60 - 64	20257	7214	11294	1749	0
65 - 69	109195	108650	0	0	545
70 - 74	842	727	0	0	115
75+	262	152	0	0	110

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance

Table A3b – Number of new pensioners by age group in 2019 (administrative data) – women

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	12342	0	6009	6333	0
50 - 54	6988	1	3324	3663	0
55 - 59	11139	525	5097	5517	0
60 - 64	175975	172754	0	0	3221
65 - 69	1904	523	0	0	1381
70 - 74	2034	216	0	0	1818
75+	4261	196	0	0	4065

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance

Table A3c – Number of new pensioners by age group in 2019 (administrative data) – total

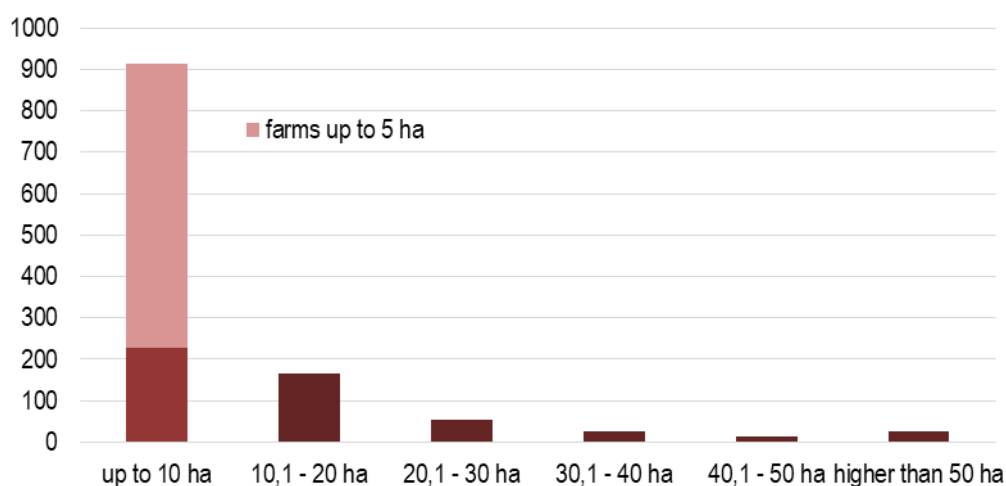
Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	27302	3484	12836	10982	0
50 - 54	12650	1431	7059	4160	0
55 - 59	19967	912	12556	6499	0
60 - 64	196232	179968	11294	1749	3221
65 - 69	111099	109173	0	0	1926
70 - 74	2876	943	0	0	1933
75+	4523	348	0	0	4175

Source: European Commission calculations on the basis of data reported by Polish Ministry of Finance

Additional annexes

A1. Additional information regarding the changes in farmers pensions

Figure A1 - Number of insured by farm size in thousands by farm size (as of December 31, 2019)



Source: Polish Ministry of Finance and Agricultural Social Insurance Fund

Compared to the previous projection, the share of farmers with farms from 5 to 20 hectares has decreased, while the share of smaller farmers (up to 5 ha) and larger (over 50 ha) has increased. Observing the data from recent years, we notice that farmer's system is expiring

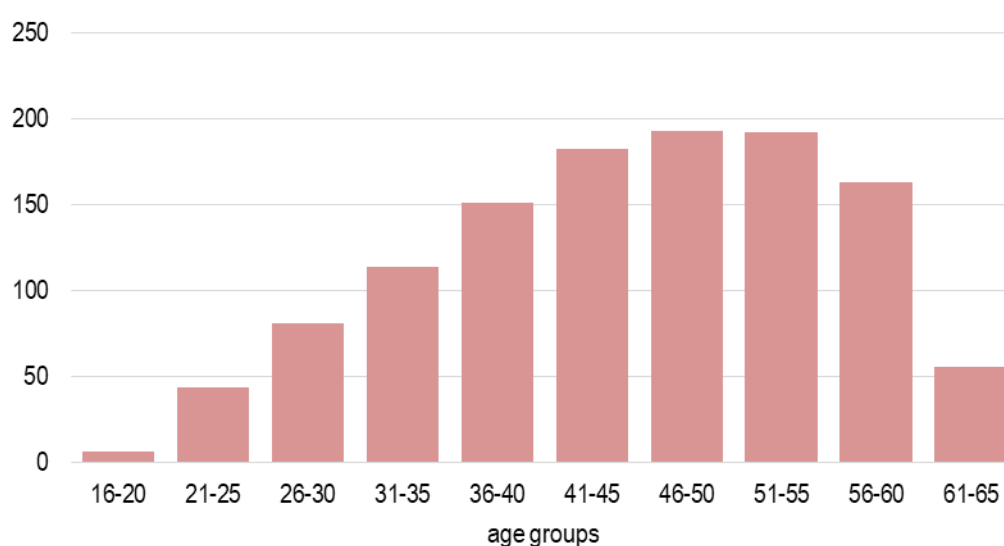
Table A4 - Number of farmer contributors in 2010-2019 (in thousands)

year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
number	1 520	1 502	1 482	1 460	1 452	1 434	1 321	1 295	1 273	1 187

Source: Polish Ministry of Finance and Agricultural Social Insurance Fund

Therefore, referring to the discussion about the need to reform this system, one should look at the problem much more broadly. Not only from the point of view of the social security system, but above all from the point of view of the labour market, which is changing, causing more and more people to move to employment and become covered by the general system, which we assume in our forecasts. If we look at the age structure of the insured, it turns out that the greatest number of people is over 41. In the event of introducing a possible reform, the oldest participants of the system should be excluded from the new solutions, as is the case with most introduced reforms. Therefore, taking into account the changes in employment in agriculture, the age structure of current farmers, the transitional period could turn out that the reform would cover a small group of the insured. Therefore, no changes to the farmers' insurance system are planned in the near future.

Figure A2 - Number of farmer's contributors by age groups (thousands in 2019)



Source: Polish Ministry of Finance and Agricultural Social Insurance Fund

A2. More extended description of the special systems covered by the general system

There are special pension systems in the Polish pension system, such as bridging pensions, teachers' compensatory benefits and pre-retirement benefits. These systems are expiring systems and have not been included in the current projection.

Old-age bridging pension

The right to an old-age bridging pension is acquired by an employee who meets jointly the following conditions:

- was born after 31 December 1948,
- has completed a period of employment in special conditions or of a special character of at least 15 years,
- has reached at least the age of 55 years (woman) and 60 years (man),
- has completed the insurance period (contributory and non-contributory) of at least 20 years (woman) and 25 years (man),
- after 31 December 2008 performed work in special conditions or of a special character,
- has terminated his/her employment relationship.

The old-age bridging pensions are financed mainly by the state budget. A part of the costs is covered by employers from the contribution transferred to the Old-Age Bridging Pensions Fund. In 2019 the old-age bridging pensions were paid by ZUS to an average of ca 29,1 thousand pensioners. The average amount of the pension was PLN 2,901.38. The expenditure on old-age bridging pensions in 2019 was PLN 1,014 million.

Teacher's Compensatory Benefit

A person who has worked as a teacher, tutor or other educator can apply for the teacher's compensatory benefit if the following conditions are met:

- will reach a certain age, that is:
 - woman: at least 55 years - by the end of 2024, at least 56 years - in the years 2025–2026, at least 57 years - in the years 2027–2028, at least 58 years - in the years 2029-2030, at least 59 years - in the years 2031-2032,
 - man: at least 55 years - by the end of 2014, at least 56 years - in the years 2015-2016, at least 57 years - in the years 2017-2018, at least 58 years - in the years 2019-2020, at least 59 years - in the years 2021-2022, at least 60 years - in the years 2023-2024, at least 61 years - in the years 2025–2026, at least 62 years - in the years 2027–2028, at least 63 years - in the years 2029-2030, at least 64 years - in the years 2031–2032,
- have at least 30 years of work experience, i.e. contributory and non-contributory periods, including at least 20 years of teaching work with at least 1/2 of the compulsory number of lessons,
- terminate (or terminate) your employment upon your request or it will end in certain circumstances.

The teacher's compensatory benefit are financed mainly by the state budget. In 2019 the benefits were paid by ZUS to an average of ca 12,6 thousand pensioners. The average amount of the pension was PLN 2,308.87. The expenditure in 2019 was PLN 347,8 thousand.

Pre-retirement benefit

The pre-retirement benefit is granted to a person who has the status of an unemployed person and meets the conditions concerning, inter alia, the mode of employment relationship termination, age and insurance period. A person who is in one of special seven situations will be entitled to the pre-retirement benefit if he/she has been receiving unemployment benefit for at least 180 days and meets all of the following conditions:

- is still registered as an unemployed person,
- within the period of receiving unemployment benefit did not refuse, without justified reason, a proposal of suitable employment or other gainful work or intervention works and public works,
- will submit an application for the pre-retirement benefit within 30 days from the day of issue by the powiat (district) labour office of a document certifying the 180-day period of receiving the unemployment benefit.

As from 1 March 2019, the amount of the pre-retirement benefit is PLN 1,210.99 and is subject to periodic adjustment. In 2019, ZUS paid the pre-retirement benefits to 89,1 thousand persons. The total amount of benefits was PLN 1,180 million. These benefits are financed from the Labour Fund.