Romania

Country fiche on pension projections prepared for the Economic Policy Committee

Update of the 2018 Ageing Report
in line with changes in the pension system legislation
that came into force in 2017, 2018 and 2019

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Bucharest

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1.1. Description of the Romanian pension system, main provisions and new measures

The Romanian pension system is governed by the recently legislated Law no. 127/ 2019, which replaced Law no. 263/2010. Due to the large amount of bureaucratic work involved by the recalculation of the individuals' pension amount, the present law will enter into force in September 2022. Nevertheless, the two articles which set the ad-hoc values of the pension point as from September 1st 2019 and September 1st 2020 will enter into force at these two dates, respectively.

The national pension system consists of three pillars:

Pillar I, the **mandatory public pension scheme** administered by the state, is a PAYG scheme, governed by the following principles: uniqueness, mandatory contributiveness, equal rights, redistribution, and social intergenerational solidarity. This scheme includes old age pension, early retirement pension, partial early retirement pension, disability pension and survivor pension. Further to these categories, there is the minimum pension, which represents a threshold, so that if an individual's old age, disability or survivor pension is below this level, a top-up to reach this threshold will be granted.

Pillar II, the **mandatory private pension scheme,** is a defined contribution scheme, with a minimum investment guarantee, based on individual accounts (part of the individual contribution from the public pension system is accumulated in such individual accounts); The access has begun in 2007; the scheme is compulsory for all eligible persons aged up to 35 and voluntary for age group 35-45. Portfolio size by July 2019: 7.35 million participants, total assets equivalent of 12 billion euros.

The second pillar contribution quota in 2019 is 3.75%, from the total employee's social contribution quota of 25%. The second pillar contribution rate was originally set to increase by 0.5 pp per year, from 2% in 2008 to 6% in 2016, then to remain at this ceiling. In 2013 its value remained the same as in 2012 (4%) and then evolved as follows: 4.5% in 2014, 5% in 2015, 5.1% in 2016 and 2017. As the social contribution burden shifted, at the beginning of 2018, from the employers towards the employees, leading to an increase of the gross wages, the nominal equivalent of the 5.1% quota applied to the previous level of wages was calculated, thus the quota of 3.75% resulted and was applied in 2018 and 2019. GEO 114/December 2018 offers the individuals who contribute at least 5 years in the second pillar the choice to direct, from now on, the entire 25% contribution rate to the first pillar. Thus, they will return totally to the public pension system. Nevertheless, the amount of money accumulated in their 2nd pillar accounts will be available only at retirement. Very few participants have chosen this option so far. Another decision taken under GEO 114/December 2018 diminishes the administration fees corresponding to the second pillar contributions, from 2.5% to 1%.

Pillar III, the **voluntary private pension scheme,** is a defined contribution scheme with voluntary participation, based on individual accounts. Investment guarantees are permitted by the law, but not mandatory. The participants can contribute cumulatively to more than one

voluntary pension funds, but the cumulated contributions to the funds are limited to 15% of the gross monthly cumulated income. In order to be eligible for a facultative pension, each participant must exceed 90 monthly contributions, achieve the age of 60 and a minimum cumulated amount in order to be able to receive the benefits. The amount representing the contributions to voluntary pension fund is tax deductible for both participant and employer within the limits of an amount representing RON equivalent of 400 EUR per fiscal year. Portfolio size by July 2019: 488 thousand participants, total assets equivalent of 490 million euros.

➢**The social contribution rates (out of the employee's gross wage):**

<table>
<tr><td></td><td>Before January 1st, 2018</td><td>After January 1st, 2018</td></tr>
<tr><td rowspan="6">Employer:</td><td>Unemployment fund 0.5%</td><td></td></tr>
<tr><td>Social insurance 15.8% (20.8% for difficult working conditions, 25.8% for special working conditions)</td><td>Social insurance 0% (4% for difficult working conditions, 8% for special working conditions)</td></tr>
<tr><td>Social health insurance 5.2%</td><td></td></tr>
<tr><td>Leaves and indemnities 0.85%</td><td rowspan="3">Work insurance 2.25%</td></tr>
<tr><td>Wage debt fund 0.25%</td></tr>
<tr><td>Risk and accident fund 0.15%</td></tr>
<tr><td rowspan="4">Employee:</td><td>Social insurance 10.5%</td><td>Social insurance 25%</td></tr>
<tr><td>Social health insurance 5.5%</td><td>Social health insurance 10%</td></tr>
<tr><td>Income tax 16%</td><td>Income tax 10%</td></tr>
<tr><td>Unemployment fund 0.5%</td><td></td></tr>
</table>

The above-mentioned transfer of contribution burden triggered an increase in the gross wages, given that the intention of reform was to keep the net wage and the total cost of labour borne by the employer unchanged after this shift. Mathematically, this meant a 20% increase in the average gross wage.

Pillar 2 contribution rate (out of the total employee's social insurance rate):

	Old (AR18 scenario)	New (Fiscal changes January 1st, 2018)
2015	5%	5%
2016	5.1%	5.1%
2017	5.1%	5.1%
2018	6%	3.75%
2019	6%	3.75%
2020	6%	3.75%
2070	6%	3.75%

➢**The social allowance for pensioners** (part of the old pension law) addressed the public system pensioners, resident in Romania, regardless of the retirement application date, if their monthly pension amount was below the ceiling set by the law (2017 - 520 RON, the equivalent of approx. 117 euro). This social allowance was introduced by the pension Law no. 263/2010 and now tops up the old age and early retirement pensions, as well as the disability ones. Before this measure, there was no supplement for the pension benefits. Those who didn't comply with the 15 year contribution period requirement got the minimum income guarantee (of 32 euro per month in 2017), to be replaced as of April 1st 2018 by the minimum inclusion income (up to the ceiling of 300 RON, equivalent of 65 euro per month). These social pension entitlements have evolved as follows:

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of beneficiaries (thou)	419.1	413.5	421.5	391.3	370.6	478.2	459.4	660.2	765.8
Average level of monthly allowance (euro)	21.54	21.52	20.67	21.32	23.20	28.80	31.18	38.50	44.70

The new pension law institutes the notion of "minimum pension", to be set as percentage of the minimum gross economy-wide wage, as follows: 45% for the 15 year minimum contribution period, plus 1% for each year of contribution exceeding 15. The maximum percentage is 75%. The minimum pension replaces the social allowance for pensioners, so it represents a ceiling up to which the computed pension amount is raised, for those who comply with the 15 year contribution period criterion.

Pensioners who accomplished 10-15 years of contribution also qualify, but for a ceiling of only 40% of the minimum gross economy-wide wage, plus 1% for each year between 11 and 14. The minimum pension for the survivor pensioners is 35% of the minimum gross economy-wide wage, for each beneficiary. For pensioners who completed less than 10 years of contribution, as handicapped or blind, the level of pension would be 40% of the minimum gross economy-wide wage.

On a simulation based on the actual empiric ratio between the minimum and the average wage (40%), here is the change in these parameters:

	Number of beneficiaries (thou) – old law	Number of beneficiaries (thou) – new law	Annual volume of expenditures (mil euro) – old law	Annual volume of expenditures (mil euro) – new law
2020	475.2	471.4	178.6	176.6
2025	495.6	807.9	251.5	498.0
2030	524.5	849.1	271.8	654.4
2035	543.9	893.1	489.2	858.1
2040	558.8	940.3	495.7	1127.1
2045	557.7	991.0	751.7	1482.7
2050	556.3	1045.3	740.0	1953.7
2055	548.7	1103.6	1087.3	2578.1

2060	536.4	1166.3	1060.4	3407.1
2065	522.1	1233.6	1518.4	4508.8
2070	504.5	1306.0	1465.0	5974.8

Eligibility requirements

➢ **The old age pension** is granted to the insured that cumulatively fulfil the conditions of standard retirement age, set according to the date of birth and gradually increased to 65 for men (January 2015) and still increasing to 63 for women (until 2030) and the minimum contribution period (15 years, same intervals of increase). The full contribution period gradually increases up to 35 years (same intervals of increase). July 2019: standard retirement age: 61.1 years (F), minimum contributory period 15 years (F), full contributory period 31.1 years (F).

NEW LAW:

- Women had been offered the option to retire at the age of 63, during the gradual increase of the statutory retirement age for women
- Women who completed the minimum contributory period and gave birth to 3 children whom they raised until the age of 16 can request the diminution of their statutory retirement age by 6 years. This reduction increases by one year for each child beginning with the fourth.

For active military police corps and special public servants within national defense, public order and national security, the standard retirement age will increase gradually up to 60 (56 years and 6 months in December 2016), with a 30-year-full contribution period and a minimum contribution period of 20 years, in 2030.

Any insured participant can benefit of reduced statutory retirement age if he/she:

- worked under special or hard working conditions; or
- completed a period of contribution as disabled, the disablement having been prior to the quality of insured; or
- is a blind person who was certified to have this condition for at least one third of the full contribution period.

➢ Early retirement pension**,** under the old pension law, was granted up to 5 years before the insured person reached the standard retirement age, provided they completed the full contributory period required by the law and exceeded it with a minimum of 8 years.

➢ Partial early retirement pension**,** under the old pension law, was granted to the insured persons who completed the full contribution period required by the law and exceeded it with less than 8 years. In case of partial early retirement pension, the amount was calculated by diminishing the old-age pension benefit by 0.75% for each month of early retirement before complying with the old-age pension requirements. At the time when the old age pension requirements were fulfilled, the early pension was transformed into old age pension.

Pension Law no 127/2019 includes the above-mentioned early retirement pensions under the old-age pension category (as they technically were, and still are, treated similarly), while the

ex- "partial early retirement" pension is now called "**early retirement**" pension. Furthermore, the penalty percentage of 0.75% is now replaced by the following table:

Number of contribution years fulfilled, exceeding the full contributory period required	Penalty for each month of early retirement
< 1	0.50%
1-2	0.45%
2-3	0.40%
3-4	0.35%
4-5	0.30%
5-6	0.25%
6-7	0.20%
7-8	0.15%

When the accumulated contribution period is calculated in order to register for early retirement, the following periods of time are considered contributory stages:

- the period when the insured received a disability pension;
- the years spent on full time higher education courses, at the end of which the individual graduated with a diploma; in case a person graduated more than one higher education institute, he will choose only one such period of education to be considered as contributory period;
- the leaves due to child raising (up to the age of 2) or temporary working incapacity;
- the time when the insured served as military, was called under arms or taken prisoner.

Numeric example (table 1 below): As one can see, the full pension benefits can be granted if:

a) The person accomplished the minimum contributory period and reached the statutory retirement age or

b) The person contributed for at least 8 years longer than the statutory contribution period. Someone in this situation can retire not sooner than 5 years before the statutory retirement age.

The penalty is associated with the early retirement, i.e. contributory period exceeding the statutory full contributory period with less than 8 years. Thus, considering the penalty in case of "earliest retirement age", it means that the person retires 5 years (=60 months) before the statutory retirement age. Until September 2021, when the new law enters into force, the penalty doesn't depend on the contribution period accomplished, and its value is 60 x 0.75% = 45% of the full pension. As from September 2021 on, a person (still at the earliest retirement

age) who exceeded the statutory contribution period by less than 1 year will be penalized by 60 x 0.50% = 30%, while someone who contributed for statutory contribution period + (7..8) years will be penalized by 60 x 0.15% = 9%. The penalty lasts until the person reaches the statutory retirement age.

Table 1: Qualifying condition for retiring – NEW LAW

		2016	2020	2030	2040	2050	2060	2070
Qualifying conditions for retiring with a full pension (minimum contribution years requirements)	Contributory period- men	15	15	15	15	15	15	15
	Contributory period- women	15	15	15	15	15	15	15
	Retirement age – men (STATUTORY)	65	65	65	65	65	65	65
	Retirement age – women (STATUTORY)	60.3	61.3	63	63	63	63	63
Qualifying conditions for retiring with a full pension (minimum retirement ages requirements)	Contributory period- men	43	43	43	43	43	43	43
	Contributory period- women	38.4	39.4	43	43	43	43	43
	Retirement age - men	60	60	60	60	60	60	60
	Retirement age – women	55.3	56.3	58	58	58	58	58
Qualifying conditions for retiring **without** a full pension (early retirement = ex-partial early retirement)	Early retirement age - men	60	60	60	60	60	60	60
	Early retirement age - women	55.3	56.3	58	58	58	58	58
	Penalty in case of earliest retirement age	NOT A CRITERION						
	Penalty in case of earliest retirement age AND shortest acceptable contributory period	45%	45%	30%	30%	30%	30%	30%
	Penalty in case of earliest retirement age AND longest contributory period below requirements	45%	45%	9%	9%	9%	9%	9%
	Bonus in case of late retirement	-	-	-	-	-	-	-
	Minimum contributory period - men	35	35	35	35	35	35	35
	Minimum contributory period - women	30.4	31.4	35	35	35	35	35
	Minimum residence period - men	-	-	-	-	-	-	-
	Minimum residence period - women	-	-	-	-	-	-	-

Table 1: Qualifying condition for retiring – OLD LAW

		2016	2020	2030	2040	2050	2060	2070
Qualifying conditions for retiring with a full pension (statutory old age)	Contributory period- men	15	15	15	15	15	15	15
	Contributory period- women	15	15	15	15	15	15	15
	Retirement age - men	65	65	65	65	65	65	65
	Retirement age – women	60.3	61.3	63	63	63	63	63
Qualifying conditions for retiring with a full pension (early retirement)	Contributory period- men	43	43	43	43	43	43	43
	Contributory period- women	43	43	43	43	43	43	43
	Retirement age - men	60	60	60	60	60	60	60
	Retirement age – women	55.3	56.3	58	58	58	58	58
Qualifying conditions for retiring **without** a full pension (partial early retirement)	Statutory retirement age - men	65	65	65	65	65	65	65
	Statutory retirement age - women	60.3	61.3	63	63	63	63	63
	Early retirement age - men	60	60	60	60	60	60	60
	Early retirement age - women	55.3	56.3	58	58	58	58	58
	Penalty in case of earliest retirement age	45%	45%	45%	45%	45%	45%	45%
	Bonus in case of late retirement	-	-	-	-	-	-	-
	Minimum contributory period - men	35	35	35	35	35	35	35
	Minimum contributory period - women	30.4	31.4	35	35	35	35	35
	Minimum residence period - men	-	-	-	-	-	-	-
	Minimum residence period - women	-	-	-	-	-	-	-

➢ The **survivor pension** is paid to children up to the age of 16 (or until they complete their studies, no later than at the age of 26) and to the surviving spouse (when they reach the standard retirement age). The amount of the survivor pension (percentage of the deceased's old age pension): 50% for a single survivor, 75% for two survivors, 100% for at least 3 survivors. The full survivor pension for the spouse is granted provided that the marriage lasted at least 15 years. If the marriage lasted less than 15 years, but more than 10, the amount of the survivor pension diminishes by 0.5% per month, respectively by 6% for each year of the marriage less than 15.

If the surviving spouse is also entitled to their own pension, they can choose the more advantageous of the two. New pension law: if they opt for their own pension, they are additionally entitled to a monthly allowance, provided they fulfil the full contributory period and statutory retirement age criterion, didn't remarry and the marriage lasted at least 10 years. The monthly allowance is calculated as 25% of the deceased spouse's pension (paid or due at the date of death). Nevertheless, the total amount received will not exceed 80% of the minimum economy-wide gross wage.

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➢ The **disability pension** is payable to the persons who lost their capacity to work, totally or partially (at least half). As from 2012, the eligibility for the disability pension is no longer conditioned by the contribution period fulfilled, but only by the degree of disability. The amount of the disability pension is the result of the reference point value multiplied by the sum of the number of points accumulated during the contributory period and the number of "potential" points, i.e. the total points to be accumulated during the potential stage, defined as the difference between the full contribution period and the stage already achieved at the date when the disability appears. The monthly number of potential points equals to 0.50 / 0.35 / 0.15 of the old-age point value, depending on the degree of disability (the percentages provided for by the old law: 0.70 / 0.55 / 0.35). Another small change brought about by the new pension law is that the caretaker indemnity the first-degree disabled are entitled to has changed from 80% of the pension point value, to 50% of the minimum basic gross wage economy-wide.

➢ **Calculation of pensions**

Pensions are computed according to a point formula, by multiplying the average annual number of points achieved by the insured with the value of one pension point. For **2017**, the value of the pension point was set at **917.5 lei in January 2017,** followed by a 9% increase to **1000 lei (222.68 euro) in July 2017.** The latest increase of the pension point considered in the set of projections included in the Ageing Report 2018 was up to 1100 lei (245 euro), as from July 1st, 2018.

According to Law 263/2010, beginning with the 1st of January 2013, the pension point value has been annually indexed with 100% of inflation rate plus 50% of the real average gross wage growth of the previous year. If one of the above mentioned indicators was to be negative, only the positive value would have been considered (this provision is still valid). In fact, the pension point values set at the beginnings of the years were equivalent to small adjustments of the values obtained with the formula 100% inflation + 50% wages.

Regarding the history of the ad-hoc increases of the pension point in Romania, here is how the average pension evolved in the recent past:

	2012	2013	2014	2015	2016	2017
Social Insurance Pension	774	806	847	893	949	1089
- percentage change compared to previous period-	2.8	4.1	5.1	5.4	6.3	14.8
calculated according to Law 263/2010's formula	4.68	4.99	3.75	4.37	4.31	4.63
of which:						
- State's Social Insurance Pension		809	845	886	931	1065
- percentage change compared to previous period-		4.0	4.4	4.9	5.1	14.4
Point value	732.8	762.1	790.7	830.2	871.7	958.75

Thus, in 2012 the point value was still frozen to its 2010 level (below the value calculated according to the formula); afterwards, the ad-hoc increases haven't been significant, until the 9% increase from July 2017.

The same previous pension law stated that, starting with 2021, the pension point value would have been annually indexed with 100% inflation rate plus 45% of the real average gross wage growth of the previous year. The weight of the real average gross wage growth would have been gradually reduced by 5 p.p. each year; Hence, starting with 2030, the pension point value was set to be indexed annually only by 100% inflation rate.

The new pension law provides for the forthcoming period three ad-hoc increases of the point value[1]:

- As from September 1st, 2019 the point value to reach 1,265 RON (271 eur),
- As from September 1st, 2020 the point value to reach 1,775 RON (381 eur) and
- As from September 1st, 2021 the point value to reach 1,875 RON (403 eur).

Afterwards, the original formula 100% inflation + 50% wages will apply. The difference under the new law is that this formula will now remain constant, i.e. the progressive reduction of the wage weight (by 5p.p. per year) making the indexation converge to inflation only by 2030, has been abolished.

The new pension law also changes significantly the number of points to be considered in the calculation of the pension. Under the former Law 263/2010, the total number of points accumulated by a person throughout his career was divided by the statutory contribution period corresponding to the year of his retirement. Then, this number was adjusted with (multiplied by) the correction index. In the 2019 pension law, the total number of points accumulated will be divided by 25 (starting with September 2021), this figure being considered as the actual average effective contribution period in Romania. The average impact of the replacement of the statutory contribution period by average effective contribution period of 25 on all the pensions in payment as at September 1st, 2021, will be a 20% increase in existing pension expenditure.

The value of the correction index, to be applied only once, at retirement, was set to 1.14, for persons who apply for retirement as of January 1st, 2017, to 1.15 for those who retired in 2018, and to 1.20 for those who retired in 2019. The new pension law doesn't include this correction index in the formula, anymore.

Thus, the impact of the changes in formula is stronger on the older generations of pensioners, as the new streams would have benefit of this correction index.

[1] The new pension law introduces the new notion of RPV (reference point value). For the ease of understanding, within this material we will continue to use PV (point value) in all formulas and references, as RPV = PV /25. RPV is defined as the ratio between PV and the average effective level of the contributory period under the old legislation, respectively 25. Hence, the amount of pensions, in reference with RPV, will equal to the total number of points accumulated by the insured, multiplied by RPV.

Here are the old and the new pension formulae:

Pension benefit $OLD_Y = PV\ old_Y * N * CI_Y / T_Y$
Pension benefit $NEW_Y = N * RPV_Y = N * PV_Y\ new /25$

where
N = the applicant's number of points at retirement
T_Y = full or standard contributory period for the wave of new pensioners of year Y
CI_Y = Correction index in year Y
$PV\ old_Y$ = pension point value (old law) in year Y
$PV\ new_Y$ = pension point value (new law) in year Y
RPV_Y = reference point value in year Y

Importantly, all reformed parameters used for pension calculation (correction index cancellation, 25 contributory years at the denominator instead of the full or standard contributory period, and pension point value indexation) will change not only for new pensions, but also for existing pensions, meaning that existing pensions would be recalculated as if they were new ones.

In particular, under the new projections as compared to the AR 2018 baseline, the correction index cancellation will mitigate a part of the pension expenditure increase caused by changes in the other parameters (indexation, contributory period) in both new and existing pension expenditure[2] over the entire projection period. The ratio between the average old-age earning-related pensions (new exercise versus AR18) reaches a peak of 1.82 in 2032, and then steadily diminishes down to 1.45 in 2070, as on the long run it goes down along with the fraction:
(1+inflation + 50% wage growth) / (1+ inflation + 100% wage growth),

A numeric example of pension calculation can be found in the Annex.

<u>Important:</u> If the amount of the recalculated pension is lower than the one under the old law, the latter will be maintained. Unfortunately, we have no data or assumptions on how many such cases would exist, so we couldn't include this element in the projections.

[2] This because the upward correction originally applied to pensions (number of pension points) through the correction index (CI) at the respective times of retirement of existing beneficiaries, will be now cancelled.

Box 1. Comparison of public pension expenditure under different pension point values

In the AR2018, a comparison table was presented, reflecting the effects of the three ad-hoc point value increases on the gross public pension expenditure as % of GDP. Note that at that moment the envisaged raises of the pension point value were slightly different, as can be seen in the table that shows three different scenarios:

1. A scenario based on the point values increasing according to the July 2017 legislated formula;
2. The baseline scenario of the Ageing Report 2018 projections, taking into account the legislated ad-hoc 2018 value increase (which was the only one legislated at the time of AR18)
3. A scenario considering all the additional ad-hoc increases envisaged until 2020 (as they were known at the time of AR18).

Table B1. Public pension expenditure under different pension point values, % of GDP

	2016	2020	2030	2040	2050	2060	2070
1. Point value = 985.6 lei (July 2017, before GOE 82/2017)	7.99	6.98	6.51	7.68	8.67	8.93	8.69
2. Baseline AR 2018 projections - Point value July 1st 2018 = 1100 lei	7.99	7.28	6.65	7.72	8.68	8.93	8.69
3. Multiple point value increases (July 1st 2018 = 1100 lei, April 1st 2019 = 1265 lei, April 1st 2020 = 1400 lei, October 1st 2020= 1775 RON)	7.99	8.91	7.43	7.99	8.72	8.93	8.69

A further row, including the projection on the present basis, will look like this:

4. New baseline peer review 2019: Multiple point value increases (July 1st 2018 = 1100 lei, September 1st 2019 = 1265 lei, September 1st 2020 = 1775 lei, September 1st 2021= 1875 RON) plus new formula	7.99	8.87	11.58	13.27	14.20	13.81	12.52

As for points 1. – 3., the explanations still stand: under the old law, the ad-hoc increases of the pension point value could influence only the cohorts who retire in years before the revision's one. This was because of the new pension stream formula, which connected the new pension only with the previous year's economy-wide average, by mean of the correction index, now abolished by the new law.

Table B2. Pension point values under the old and new law

	Value of the pension point (euro) – old law	Value of the pension point (euro) – new law	Pension point value increase
2020	254.5	319.5	126%
2025	304.6	471.5	155%
2030	346.5	573.1	165%
2035	382.5	683.4	179%
2040	422.3	802.0	190%
2045	466.3	938.7	201%
2050	514.8	1093.1	212%
2055	568.4	1267.9	223%
2060	627.6	1466.0	234%
2065	692.9	1689.8	244%
2070	765.0	1941.8	254%

Table 2a: Number of new pensioners by age group – administrative data (year 2015) M

Age Group	All	Old age	Disability	Survivor	Other
0-49	13,857	1,034	12,823	M+F = 37,687 (not available by age brackets)	
50-54	7,415	1,953	5,462		
55-59	22,986	13,146	9,840		
60-64	52,208	46,797	5,411		
65-69	46,938	46,912	26		
70-74	607	607			

Source: Commission services

Table 2b: Number of new pensioners by age group – administrative data (year 2015) F

Age Group	All	Old age	Disability	Survivor	Other
0-49	11,599	41	11,558	M+F=37,687 (not available by age brackets)	
50-54	7,455	1,466	5,989		
55-59	35,705	28,217	7,488		
60-64	69,827	69,727	100		
65-69	2,562	2,562	0		
70-74	173	173			

Source: Commission services

Table 2c: Number of new pensioners by age group – administrative data (year 2015) TOTAL

Age Group	All	Old age	Disability	Survivor	Other
0-49	25,456	1,075	24,381	37,687 (not available by age brackets)	
50-54	14,870	3,419	11,451		
55-59	58,691	41,363	17,328		
60-64	122,035	116,524	5,511		
65-69	49,500	49,474	26		
70-74	780	780			

Source: Commission services

2.1 Demographic development

Similar with the evolutions in other European Union member states, the pace of the ageing expenditure growth is influenced in Romania by a pronounced inversion of the age pyramid.

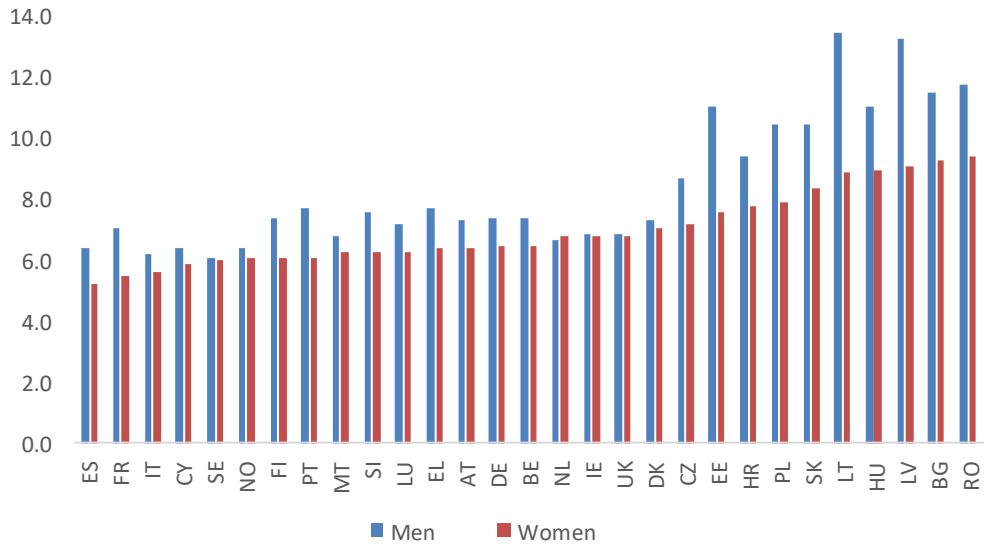
Table 3 – Main demographic variables evolution

Demography	2016	2020	2030	2040	2050	2060	2070	Peak year
Population (thousand)	19,672	19,199	17,965	17,029	16,301	15,664	14,985	2016
Population growth rate (%)	-0.7	-0.6	-0.7	-0.5	-0.4	-0.4	-0.4	2053
Old-aged dependency ratio (pop65/pop15-64)	26.3	29.6	34.7	45.7	54.2	56.7	52.8	2055
Ageing of the aged (pop80+/pop65+)	24.4	24.9	26.8	31.2	33.2	41.2	46.2	2070
Men - Life expectancy at birth	71.8	72.9	75.4	77.8	79.9	81.8	83.6	2070
Men - Life expectancy at 65	14.8	15.4	16.8	18.2	19.5	20.8	22.0	2070
Women - Life expectancy at birth	78.9	79.9	81.8	83.6	85.3	86.9	88.3	2070
Women - Life expectancy at 65	18.2	18.8	20.2	21.5	22.8	24.0	25.1	2070
Men - Survivor rate at 65+	72.1	74.4	79.1	82.9	86.1	88.7	90.8	2070
Men - Survivor rate at 80+	35.3	38.8	46.7	54.1	60.9	66.9	72.2	2070
Women - Survivor rate at 65+	87.1	88.2	90.3	92.0	93.4	94.5	95.5	2070
Women - Survivor rate at 80+	58.7	61.6	67.7	73.1	77.7	81.5	84.8	2070
Net migration (thousand. of pers.)	-63.8	-65.1	-51.1	-8.9	7.7	1.6	2.6	2052
Net migration over population change	0.5	0.5	0.4	0.1	-0.1	0.0	0.0	2018

In Romania, the life expectancy at birth for men is estimated to grow by approximately 11.8 years over the projection horizon, from 71.8 in 2016 to 83.6 in 2070. For women, the life expectancy at birth is estimated to grow by 9.4 years, from 78.9 in 2016 to 88.3 in 2070, these trends reflecting a slight convergence of life expectancy between men and women.

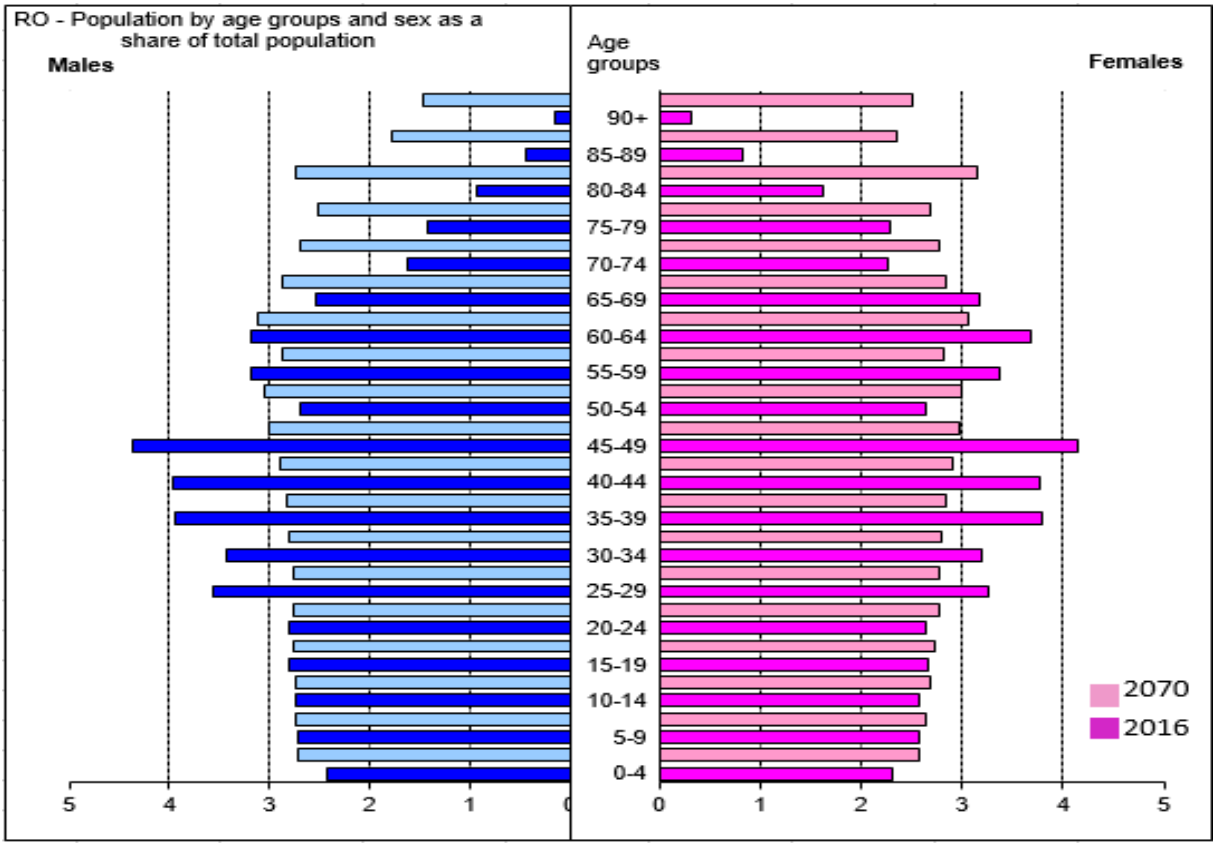
In the case of women, the increase in life expectancy for the period 2016-2070 is the largest in the EU28 + NO, according to chart 1 hereafter, and in the case of men RO has the third largest growth.

Chart 1 – Increase in life expectancy at birth for men and women: 2016 vs 2070



Source: Eurostat

Chart 2 - Structure of population: 2016–2070

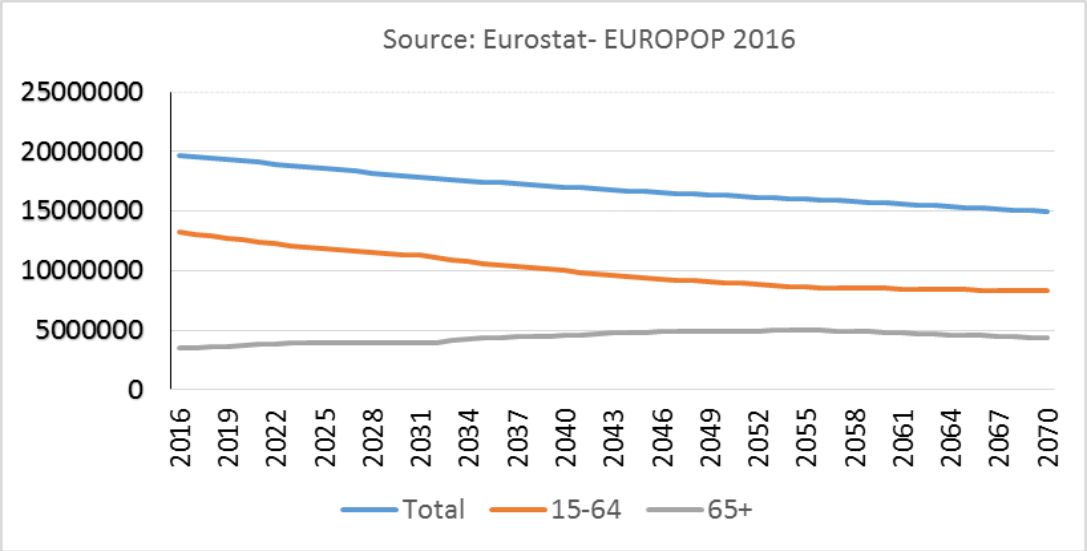


Source: Eurostat

The demographic changes will alter the structure of population in Romania. The extent and the pace of the ageing of population depend on the future trends in life expectancy, fertility and migration.

The magnitude and speed of aging population will change the ratio between retirement age and the working age population, so that the labour market will undergo significant changes in its age structure, with an overall negative impact. The ratio between the persons aged 65 and more and those at working age (15-65 years) increases substantially. Thus, in the view of the coming years, the resources of the public pension system will diminish as compared to the expenditures thereof. This trend, of constant growth in the pension expenditures, will reverse after 2040, when the volume of new pension system entries will become stabilized. Consequently, the pension expenditures will stop their growth. The Pension System will be balanced also due to the exit from the life cycle of the baby-boom generation. These cohorts will entry the pension system around 2030 and will begin to exit as from 2040.

Chart 3 - Development of population

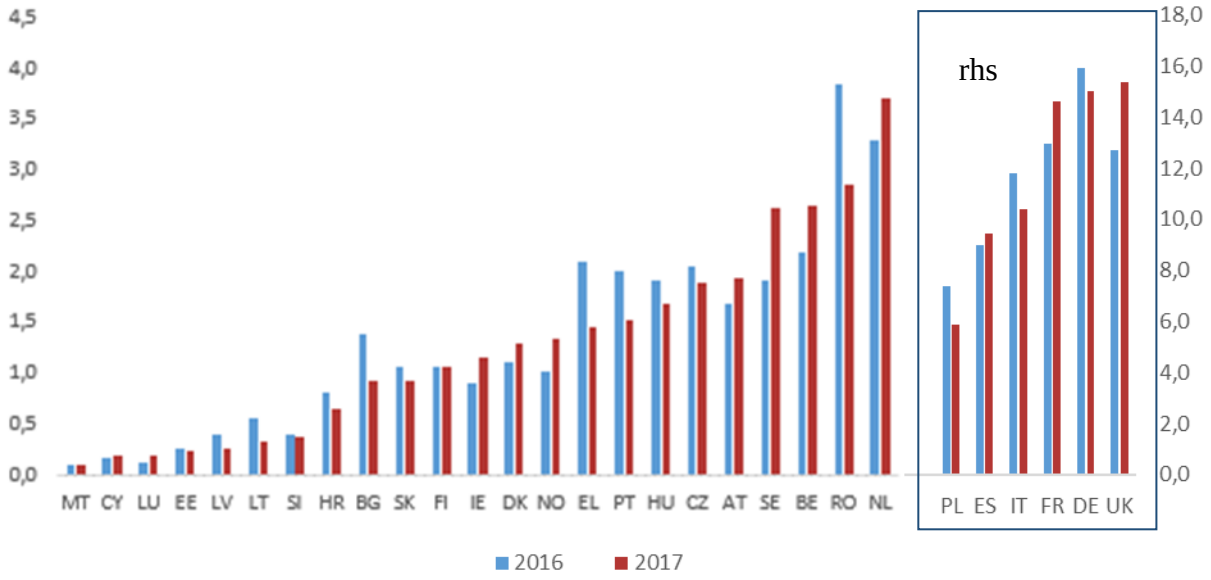


Source: Eurostat

The results of the demographic projections made by Eurostat for Romania (EUROPOP 2016), reflect a significant drop in the volume of population, by 4.7 million persons, in 2070, as compared to 2016 (a 23.8% decrease).

By 2070 RO will drop a position in the rank of population share within the total population in EU28 + NO in the favour of NL, according to chart 4 hereafter. The main drivers for this change are the ageing population, the fertility rates and the levels of migration.

Chart 4 - Percentage of the population in each country in the total EU population (28+NO) in 2016 and 2070



Source: Eurostat

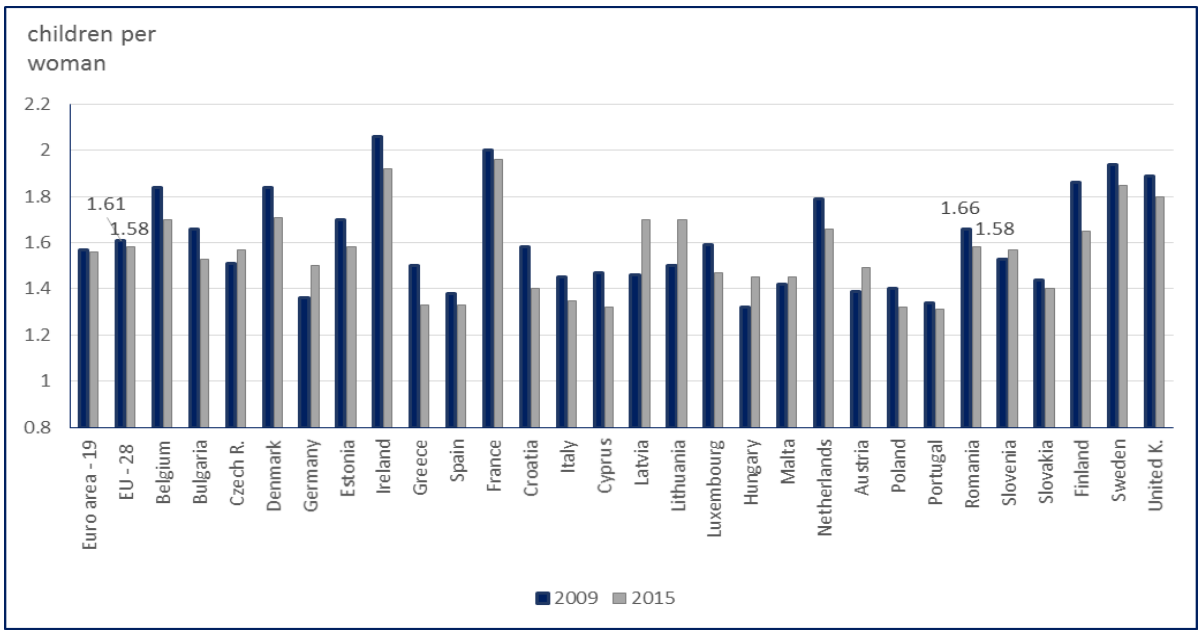
The population of the European Union is estimated to increase until 2070 by about 12 million people. Among the countries with a significant positive fluctuation are United Kingdom with an increase of about 15.6 million (3% of the total population) and France with an increase of about 10 million (2% of the total population). Among the negative trends, Poland stands out with a decrease of about 7 million (-1.5% of the total population) and Italy with a 5.8 million drop (-1.3% of the total population).

The highest positive fluctuations are estimated for Sweden +40.5% 2070 vs 2016 (increase of 4 million people) and Norway +34.3% 2070 vs 2016 (an increase of 1.8 million people). The highest decreases are estimated for Lithuania -40.3% (a decrease of 1.2 million people), Bulgaria and Latvia – 31.8% (BG -2.3 million people, LV -0.6 million people).

The ageing of the population in Romania is also a consequence of the low fertility. In 2015 the fertility rate was 1.58 children per woman, below the optimal replacement level. The level estimated by Eurostat for the Romanian fertility rate in 2070 is 1.89.

Although the young population decreases as result of the constant reduction in the number of women at the fertile age, there are still some positive signs, coming from the augmentation of the fertility rate.

Chart 5 - Fertility rate



Source: Eurostat

2.2 Labour force

Table 4 – Participation rate, employment rate and share of workers for the age groups 55-64 and 65-74

	2016	2020	2030	2040	2050	2060	2070	Peak year
Labour force participation rate 55-64	44.0	47.5	51.5	49.9	49.7	51.4	50.7	2026
Employment rate for workers aged 55-64	42.6	46.3	49.9	48.4	48.3	49.8	49.2	2026
Share of workers aged 55-64 on the total labour force	96.8	97.4	96.8	96.9	97.0	96.9	97.0	2021
Labour force participation rate 65-74	15.1	12.8	14.7	16.4	15.4	15.3	16.1	2036
Employment rate for workers aged 65-74	15.1	12.8	14.7	16.4	15.4	15.3	16.1	2036
Share of workers aged 65-74 on the total labour force	100.0	100.0	100.0	100.0	100.0	100.0	100.0	2016
Median age of the labour force	40.0	41.0	43.0	43.0	42.0	41.0	41.0	2034

Table 4 reflects an increase in the employment rate and labour force participation rate for persons aged 55-64 until 2020-2030 and for persons aged 65-74 until 2030-2040. Afterwards, the weight begins to drop, toward the end of the projection horizon, as result of the cycle ending for the so-called baby-boom phenomenon.

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

MEN	2017	2020	2030	2040	2050	2060	2070	Peak year
Average effective exit age (CSM)	64.0	64.0	64.0	64.0	64.0	64.0	64.0	2016
(Average) Contributory period	32.8	33.3	34.0	33.7	34.6	35.2	35.1	2062
Duration of retirement *	15.6	16.1	17.5	18.9	20.3	21.6	22.8	2070
Duration of retirement / contributory period	0.5	0.5	0.5	0.6	0.6	0.6	0.7	2070
Percentage of adult life spent at retirement **	25.3	25.9	27.6	29.1	30.6	32.0	33.1	2070
Early / late exit ***	1.6	1.4	1.4	1.0	0.9	0.8	0.9	2016

**Calculated as the difference between the life expectancy at average effective exit age and the average effective exit age itself.*

***Calculated as the ratio between the duration of retirement and the life expectancy diminished by 18 years.*

****Is the ratio of those who retired and aged less than the statutory retirement age and those who retired and are aged more than the statutory retirement age.*

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

WOMEN	2017	2020	2030	2040	2050	2060	2070	Peak year
Average effective exit age (CSM)	62.4	62.4	62.6	62.6	62.6	62.6	62.6	2016
(Average) Contributory period	28.2	28.7	28.8	29.1	29.6	30.1	30.1	2066
Duration of retirement *	20.8	21.3	21.9	23.2	24.5	25.8	26.9	2070
Duration of retirement / contributory period	0.7	0.7	0.8	0.8	0.8	0.9	0.9	2070
Percentage of adult life spent at retirement **	31.9	32.4	32.9	34.2	35.5	36.6	37.6	2070
Early / late exit ***	0.7	0.5	0.9	0.7	0.6	0.7	0.8	2027

**Calculated as the difference between the life expectancy at average effective exit age and the average effective exit age itself.*

***Calculated as the ratio between the duration of retirement and the life expectancy diminished by 18 years.*

****Is the ratio of those who retired and aged less than the statutory retirement age and those who retired and are aged more than thestatutory retirement age.*

Increasing life expectancy for females and males leads to a longer period of life spent at retirement (+6,1 years for females and +7,2 for males), so that further pressure is added on the pension system. The private pensions system (Pillar II) has been implemented in order to reduce this potential burden over the public system and to ensure the necessary financial resources for the pensioners.

The assumptions related to the average labour market entry and exit ages are relatively constant in the model. Consequently, the average effective duration of the career will also be a constant. However, the contribution period grows over the projection horizon by approximately 2.2 years for males and 1.7 years for females – indicating a diminution of the early retirement effect.

The difference between the contribution period and the average effective duration of the career is explained by the fact that some persons still work, while also receiving social assistance from the State, like the disabled individuals who undergo physical examination periodically in order to assess whether they will be able to re-enter, at some point, the work force. Furthermore, the methodology used for employment by the international labour office also includes categories like day-workers and part-time employees. All these categories are considerable in Romania, they are still registered as active on the labour market, but usually don’t pay social contributions (it’s not compulsory).

PART III - PROJECTION RESULTS

Summary of the new measures included in the projections:

i) Capping of increases in contribution rates to pillar 2 (legislated in 2017 through GEO 82): The share of contributions transferred to Pillar 2 were reduced from expected level of 6% in 2018 to 3,75%, and legislated to remain at this level.

ii) Lower military pension indexation (legislated in 2017), previously the military pension was indexed similar with old age pension (inflation and half the increase of average wage), but considering the size of these expenditures and the impact on spending, starting with 2017 the military pensions are indexed only by the inflation rate. Another change related to the military pensions: before the shift of contribution burden in the beginning of 2018, their rates of contribution for the public pension system were 5.5% from the employer and 0% from employee. Now their contribution rate to the first pillar is 25%, the same as the civilians' one (with the corresponding increase of their gross wage).

iii) Shift of contribution burden from employers to employees (legislated through GEO 79/2017 and starting with 1 January 2018).

	Before January 1st, 2018	After January 1st, 2018
Employer:	Unemployment fund 0.5%	
	Social insurance 15.8% (20.8% for difficult working conditions, 25.8% for special working conditions)	Social insurance 0% (4% for difficult working conditions, 8% for special working conditions)
	Social health insurance 5.2%	
	Leaves and indemnities 0.85%	Work insurance 2.25%
	Wage debt fund 0.25%	
	Risk and accident fund 0.15%	
Employee:	Social insurance 10.5%	Social insurance 25%
	Social health insurance 5.5%	Social health insurance 10%
	Income tax 16%	Income tax 10%
	Unemployment fund 0.5%	

This shift implies a 20% increase in the average gross wage, given that the reform intended to keep unchanged the net wage and the total cost of labour borne by the employer.

iv) Changes in several parameters of old age, minimum, disability and survivor pensions, **(**legislated in July 2019**)** as follows:

Old-age earnings-related (OAER) pension

The law changes several parameters used to calculate pension benefits, as follows:

- Rises the pension point value (PV), the main parameter used for pension indexation, in two ways:
  - In an ad-hoc manner, through intermediate PV increases until the full entry into force of the law on 1 Sept 2021, as follows:

- September 1st 2019 = 1265 lei
- September 1st 2020 = 1775 lei
- September 1st 2021 = 1875 lei

  - Via indexation thereafter, as the indexation factor for *existing* pensions would no longer converge towards prices, but would instead remain permanently composed of wages and prices (pensions would be annually indexed with 100% of inflation rate plus 50% of the [real] average gross wage growth of two years before).

- Shortens of the contributory period used to calculate a person's pension from an average of 29.4y as the full or standard contributory period previously applied used to range between 25 and 35 years, depending on the year of retirement, to a fix value of 25 years.
- Abolishes the correction index for *new* pensions, which used to partly link the first pension to wages; this would mitigate the overall pension expenditure increase caused by the changes in the other parameters.
- Introduces the notion of reference point value (RPV), representing the value of the pension point divided by the new average contributory period of 25y.
  - On 1 Sept 2021 when the law comes into force RPV is 75 lei (=1875/25).
  - From 2022 onwards, the RPV is annually indexed by the average annual inflation rate, plus 50% of the countrywide gross average wage real growth.

The new calculation formula would apply to both new and existing pensions.
All the indexations of the pension point affect not only old age, but also disability and survivor pensions, which are based on the pension point value.

In respect of the old age pension eligibility requirements, the new pension law allows women to retire at the age of 63, even during the period of gradual increase of the statutory retirement age (to reach 63 only in 2030). On the other hand, women who completed the minimum contributory period and gave birth to 3 children whom they raised until the age of 16 can request the diminution of their statutory retirement age by 6 years. This reduction increases by one year for each child beginning with the fourth.
There is also a modification of the early retirement penalty, as from 0.75% of the old-age pension amount per each month of early retirement, to the following gradual table:

Number of contribution years fulfilled, exceeding the full contributory period required	Penalty for each month of early retirement
< 1	0.50%
1-2	0.45%
2-3	0.40%
3-4	0.35%
4-5	0.30%
5-6	0.25%
6-7	0.20%
7-8	0.15%

Minimum pension: a social allowance covered from the government's budget.

Under the new law the minimum pension tops up the difference between the OAER, disability or survivor pension and an amount that depends on the minimum country-wide gross wage and a person's contributory period, as follows: Starting in 2021, the minimum pension is set at minimum 45%/40% (35% for survivor) of that year's minimum wage [corresponding to the minimum contributory period of 15y/10y], plus 1% for each additional contributory year above 10 years, but not exceeding the 75% of the minimum wage. This difference with the old law is that previously the minimum pension (social allowance) was a fixed amount established in the law, rather than a function of the minimum countrywide gross wage and a person's contributory period.

Disability pension

Under the new law disability the potential pension point value used in the disability pension calculation is now lower, 0.50/0.35/0.15 of the regular old-age pension point depending on the disability degree (I, II or III) as opposed to 0.70/0.55/0.35 under the old law. The new law also modifies the calculation basis for the caretaker indemnity the first degree disabled are entitled to: from 80% of the pension point value to 50% of the minimum basic gross economy-wide wage.

Survivor pension

The new law introduces a support for the survivor spouse of 25% of the deceased's old age pension (previously, if the surviving spouse is also entitled to their own pension, they could choose the more advantageous of the two). Under the new pension law, this option remains and, additionally, if one opts for their own pension, they are entitled to a monthly allowance of 25% of the deceased spouse's old age pension, provided they fulfil the full contributory period and statutory retirement age criterion, didn't remarry and the marriage lasted at least 10 years. Nevertheless, the total amount received will not exceed 80% of the minimum economy-wide gross wage.

Mandatory private pensions (pillar II)

From 2019 (GOE), the individuals who contribute at least 5 years in the second pillar can reinstate their entire 25% social insurance contribution rate to the first pillar. Thus, they will return totally to the public pension system. However, the amount of money accumulated in their 2nd pillar accounts will be available only at retirement. Very few participants have chosen this option so far. Another provision affecting the private pension market is the diminution of the administration fees from 2.5% to 1%.

Pension taxation

At the time of AR18 the pension was taxed as follows: the difference between pension gross benefit (only if greater than 1000 RON), minus the contribution for health insurance (5.5 applied to pension benefit), minus the threshold set up by law (1000 RON) was subject to personal income tax (by a tax rate of 16%.). This system was modified in 2017, so no more health insurance contribution was paid by the pensioners, while the ceiling for tax was raised from 1000 to 2000 RON. Another change has been adopted at the beginning of 2018: the tax rate has been decreased from 16% to 10%.

III.1 Extent of the coverage of pension schemes in the projection

The table below shows the pension expenditure in % of GDP between 2006 and 2014, according to Eurostat's ESSPROS database and the data provided by Romania to the Ageing Working Group.

Table 6: Eurostat (ESSPROS) vs. Ageing Working Group (definition of pension expenditure - % of GDP)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1. Eurostat total pension expenditure	6.0	6.4	7.5	9.2	9.3	9.1	8.7	8.3	8.2			
2. Eurostat public pension expenditure	6.0	6.4	7.5	9.2	9.3	9.1	8.7	8.3	8.2			
3. Public pension expenditure AWG	6.0	6.3	7.5	9.2	9.2	9.0	8.6	8.2	8.2	8.1	8.0	7.3
4. Difference (2)-(3)	0	0.1	0	0	0.1	0.1	0.1	0.1	0.0			
5. Expenditure categories not considered in the AWG definition												

III.2 Overview of the projection results

Following the imbalances due to the economic crisis (the fall of GDP, resulting in the raise of the pension expenditures' weight; the pension benefits having been reduced by 15% as a measure of austerity and later reinstated, on the background of recovery), the long run trend seems to be the return to a constant level. Furthermore, the development of the second pillar and the beginning of the pension payments thereof will gradually relieve the stress that would have accumulated on the public pension pillar under the former circumstances.

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

Expenditure	2016	2020	2030	2040	2050	2060	2070	Peak year
Gross public pension expenditures	8.0	8.9	11.6	13.3	14.2	13.8	12.5	2053
Occupational pensions	:	:	:	:	:	:	:	
Private pensions	0.0	0.0	0.1	0.4	0.7	0.8	0.9	2070
Mandatory private	0.0	0.0	0.1	0.4	0.7	0.8	0.9	2070
Non-mandatory private	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2017
Gross total pension expenditure	8.0	8.9	11.7	13.7	14.9	14.6	13.4	2054
Net public pension expenditure	7.7	8.8	11.5	13.1	14.0	13.7	12.4	2053
Net total pension expenditure	7.7	8.8	11.6	13.5	14.7	14.5	13.3	2054
Contributions	**2016**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**	**Peak year**
Public pensions contributions	5.6	8.0	7.7	7.7	7.8	8.1	8.8	2070
Total pension contributions	6.4	9.2	9.2	9.4	9.7	10.1	10.9	2070

After the considerable increase of the gross public pension total expenditure during the first decade of this century, an increase due to the necessary convergence toward a European life standard, these expenditures have reached a significant weight in GDP. Therefore, a pension reform became necessary in order to stabilize this increase. The principle behind the pension indexation has changed since 2010, so that the growth has become smaller than the nominal GDP growth.

The macro assumptions indicate a correlation between the average wage' and the GDP's developments. This contradicts the 2012 projection exercise that forecasted that the average wage would double between 2040 and 2060, while the GDP would increase by only 76%. In this context, a limitation of the pension expenditures, as percentage of GDP, is also estimated. As we expect an improvement in the collection of contributions, it is expected that

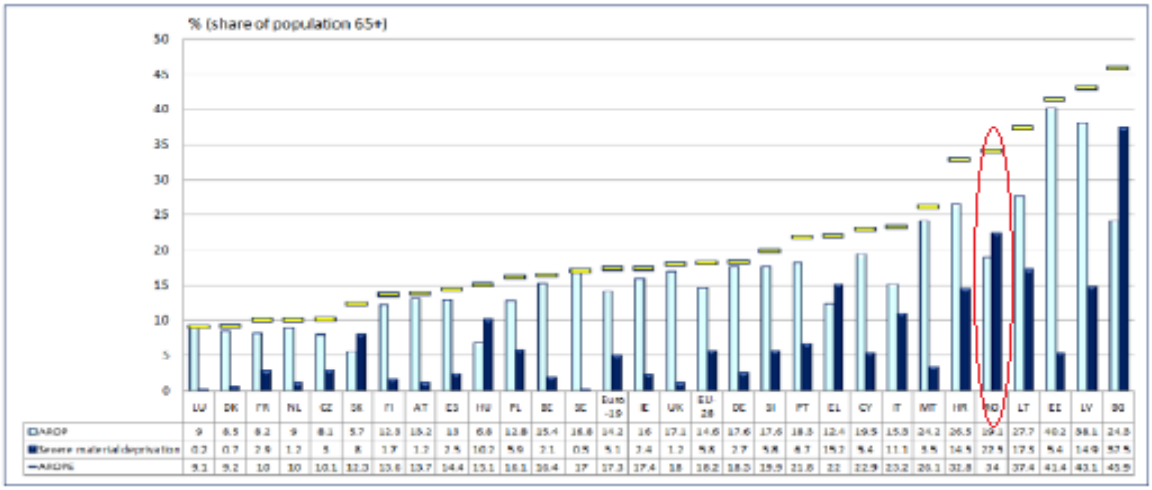
contributions will increase, both as regards the number and the amounts. Hopefully, starting from 2030, the black or grey parts of the economy will decrease in size.

The risk of poverty and social exclusion among older people is very high in Romania, compared to other Member States. In 2016, more than 30 percent of older people in Romania are affected by poverty or social exclusion in old age and the AROPE (at risk of poverty or social exclusion) rate has decreased slightly compared to 2013.

At the same time, it is important to mention that in 2015, before the introduction of the latest measures, the pension expenditure on old-age pension per beneficiary in Romania was lower compared to other Member States - one fifth of EU-28 average and 10 times lower than in the highest pension expenditure country.

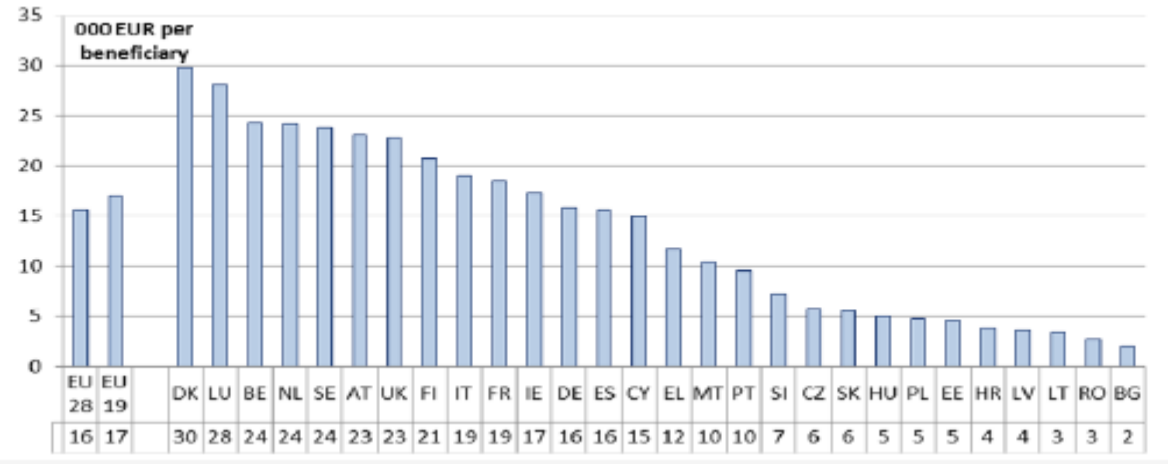
Considering this statistics, the policy measures aiming to improve the standard of living for older people were stringent. Thus, successive pension increases were granted during 2016-2019 (the pension point increased from 871 RON in 2016 to 1100 RON in 2018, and at 1st September 2019 to 1265).

Chart 6: At risk of poverty and severe material deprivation in old age (65+), 2016, %



Source: Pension Adequacy Report 2018

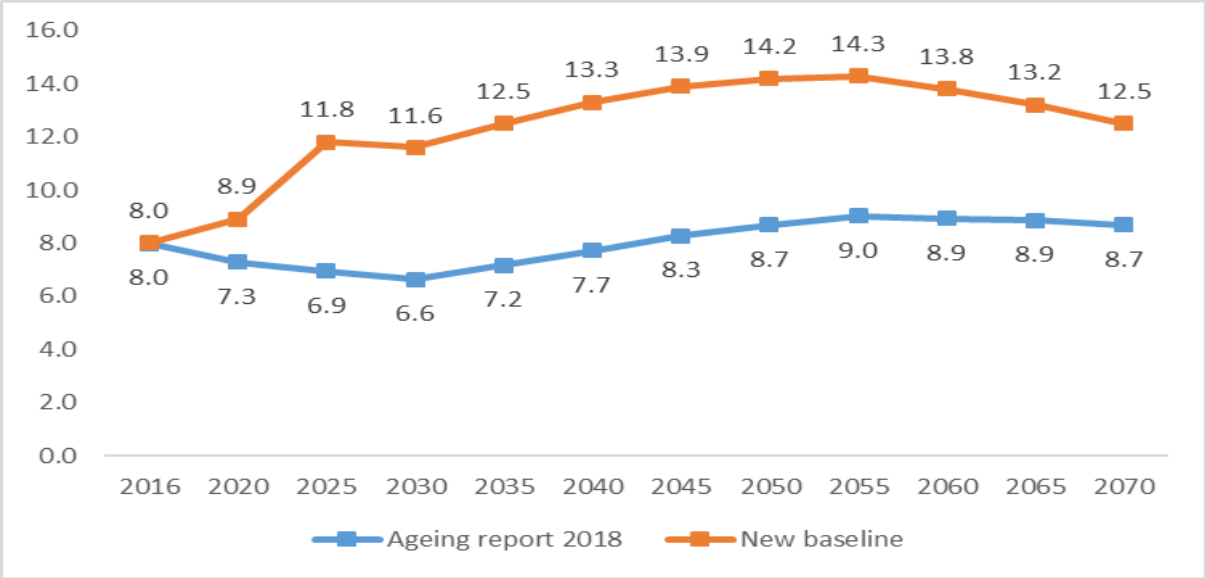
Chart 7: Pension expenditure per beneficiary for old-age and survivor's pensions, in '000 EUR, 2015



Source: Pension Adequacy Report 2018

The new pension law (2019) intends to be more generous with the pensioners, as one can see from the following graph:

Chart 8: Projected gross public pension spending, old vs new law



The new indexation rule for of the pension point, as well as the change in the calculation of the pensions put extra expenditure pressure. This will create uncertainty regarding the accomplishment of the budgetary targets for the next years and the fulfilment of the SGP targets, mainly the 3% deficit rule and the adjustment toward the MTO.

As a safeguard, the new pension law maintains the old law's provision that in case the expenditures are forecasted to go beyond the fiscal rules ceilings (especially the 3% deficit stated in the Stability and Growth Pact), the pension point can be increased different than in the pension law, through the law with the budget expenditure ceilings specified in the fiscal-budgetary framework.

In practice, the law with budget expenditure ceilings is approved according to the budget calendar in the second part of the year together with the fiscal-budgetary strategy. If by that time, each year, the fiscal-budgetary situation shows that there is a certainty that for the next year the expenditures with the pensions will lead to a larger deficit than the threshold of 3% established by the SGP, then, through the law with the ceilings, new percentages of increasing the pension point can be established to meet the approved spending limits and accommodate the 3% deficit.

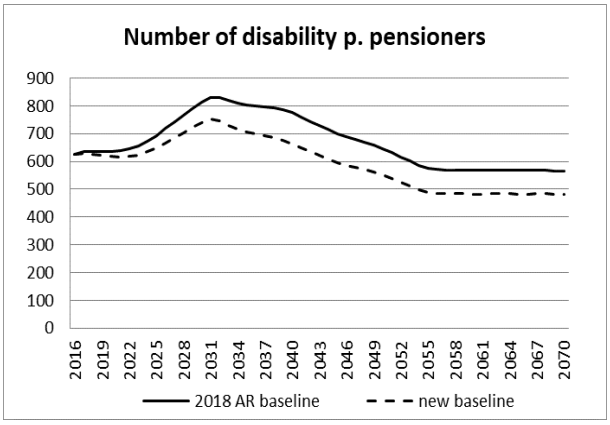
Table 8: Projected gross public pension spending: by scheme (as % of GDP)

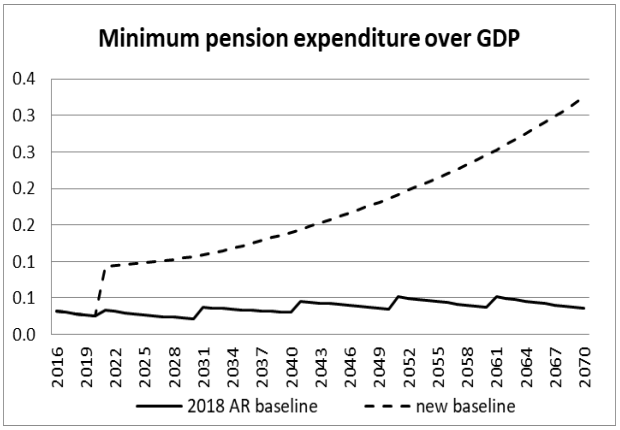
Pension scheme	2016	2020	2030	2040	2050	2060	2070	Peak year
Total public pensions	8.0	8.9	11.6	13.3	14.2	13.8	12.5	2053
of which								
Old age and early pensions	5.9	6.7	8.9	10.5	11.4	11.1	10.0	2054
Flat component	:	:	:	:	:	:	:	:
Earning related	5.9	6.6	8.8	10.4	11.2	10.9	9.7	2054
Minimum pensions (non-contributory)	0.0	0.0	0.1	0.1	0.2	0.2	0.3	2070
Disability pensions	0.61	0.74	1.20	1.14	1.01	0.90	0.88	2031
Survivor pensions	0.42	0.63	0.80	0.93	1.04	1.05	0.94	2055
Other pensions	1.00	0.84	0.67	0.70	0.74	0.74	0.72	2016

The total public pensions will grow considerably beyond the evolution forecasted in AR18, with a peak of 14.4% of GDP in 2053. The old age pensions will reach, at the end of the projection horizon, 10.0% of GDP, as compared to 6.7% in AR18. To notice: in Romania, the baby-boomers are persons born between 1967 and 1969. Important increases are also forecasted for the disability and survivor pensions. Nevertheless, the disability pension expenditures could be a little overestimated, as we included no assumption related to the new, lower, number of potential points granted for the three degrees of disability. On the other hand, the non-earning related pension expenditures could be slightly underestimated, as the social pensioners with less than 10 years of contribution weren't considered in the projections (the social allowance is paid on various criteria, whilst none of these, including age, is differentiated in statistics). Important, the disability pensions transform into old age pensions, once the standard retirement age is reached.

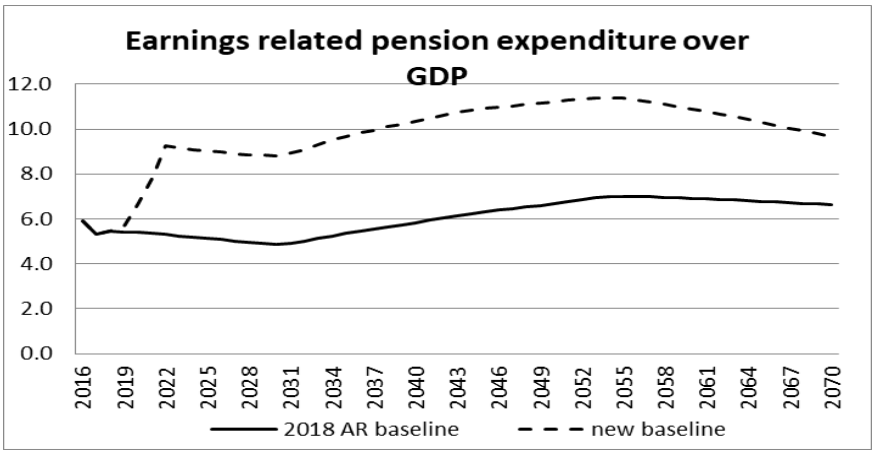
Importantly, while the value of the pension point in new law increases significantly due to the ad-hoc increases until 2021 and mostly to the more generous indexation formula (see Table B2), this does not reflect in an equivalent growth in expenditure (expenditures increase 40-60 % in comparison to the previous projections). This disconnect is essentially explained by the elimination of the correction index, which used to increase the number of points in the pension

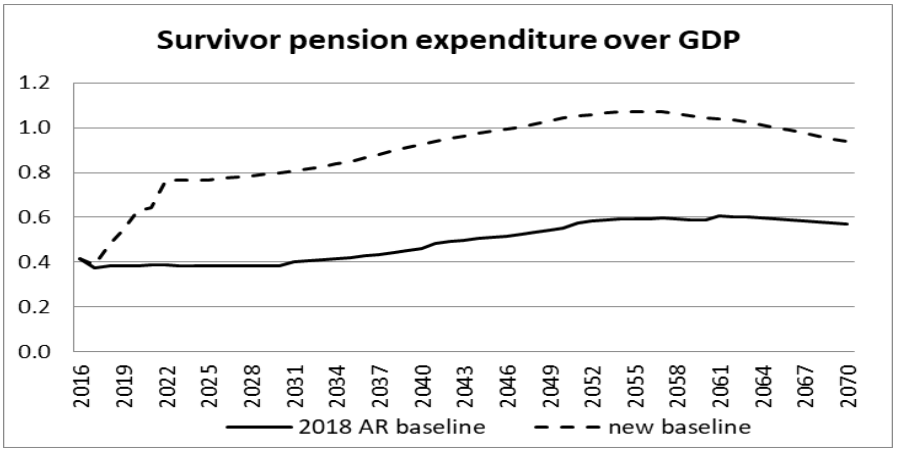
formula and thus lifting the first pension by connecting it with wages. The cancellation of the correction index significantly mitigates the increase in pension expenditure since, for example, the correction index in 2070 was almost 4 în AR18.

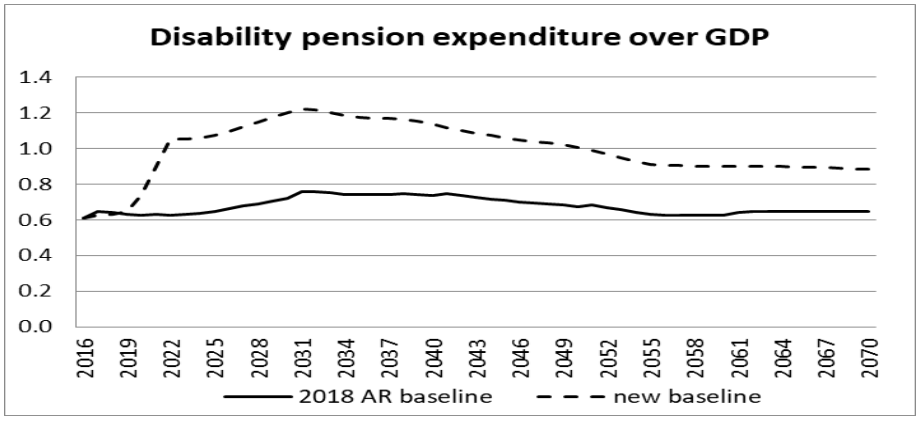




One result of the projections is that the gap between pension expenditure under the New baseline compared to the AR 2018 will first broaden an then narrow towards the end of the forecast horizon.







Explanation: The new pension law provides a significant change in the number of points to be considered in the calculation of the pension. Law 263/2010 divided the total number of points accumulated by a person throughout his career by the statutory contribution period corresponding to the year of his retirement. Then, this number was adjusted with the correction index (which, under the new law, no longer exists). In the 2019 pension law, the total number of points accumulated will only be divided by 25 (starting with September 2021), this figure being considered as the actual average effective contribution period in Romania. The average impact on all the pensions in payment as at September 1st, 2021, will be a 20% increase.

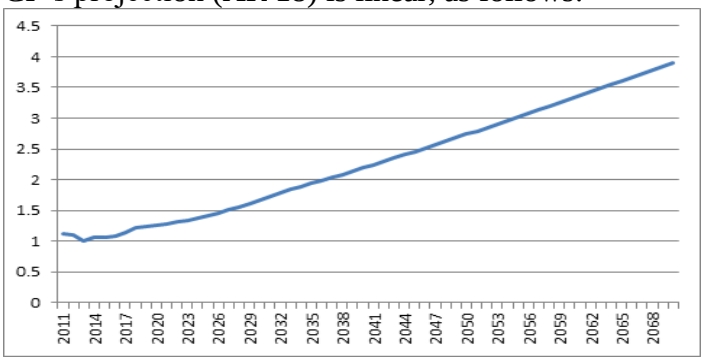
Here is a comparison NEW versus OLD expenditure projection:

Pension amount (year Y):
NEW: $RPV_Y * N = PV\ new_Y /25*N$
OLD: $PV\ old_Y *N*CI / T$
(N = total number of points, PV = point value)

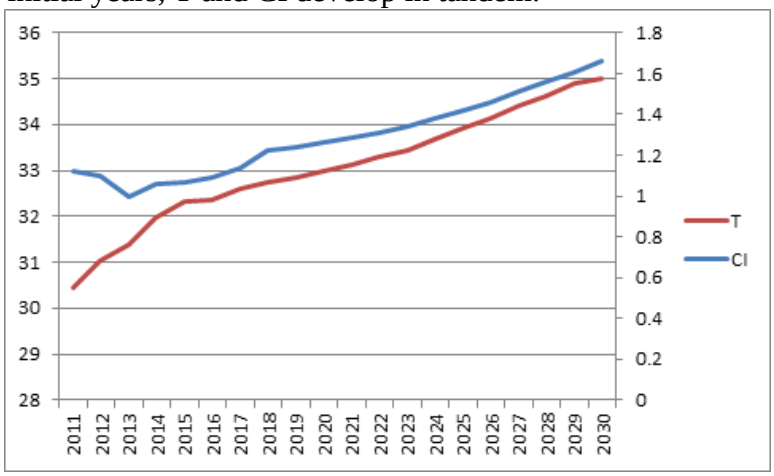
$NEW/OLD = (PV\ new / PV\ old)_Y * T/CI/25$

T and CI are those from the retirement year of each pensioner. We can assume an average retirement year equal to Y-k, for the mass of pensioners existing in year Y. Supposing an average duration of life at pension of about 16-18 years, k would be about 8-9
.
Thus, $NEW/OLD = (PV\ new / PV\ old)_Y * (T/CI)_{Y-k} /25$
T (average men+women) is 32.6 in 2017, growing to 35 in 2030, then constant.

CI 's projection (AR 18) is linear, as follows:



For the initial years, T and CI develop in tandem:



So until the mid 30's we can approximate NEW/OLD growing in line with (PV new / PV old) $_{Y}$. So the gap increases annually by the new indexation formula (inflation + 50% wages) over the old one (inflation + 50% falling to 0% wages).

As from the moment when T remains constant at 35 (retirement year 2030, influencing the gap from some years later), the gap will be between [inflation + 50% wages] / [inflation] and the correction index $_{Y-k}$:

NEW/OLD = (PV new / PV old) $_{Y}$ * (T/CI) $_{Y-k}$ /25

NEW/OLD $_{Y+1}$ / NEW/OLD $_{Y}$ = Indexation new $_{Y+1}$ / indexation old $_{Y}$ / CI $_{Y-(k-1)}$ *CI $_{Y-k}$

CI $_{Y-(k-1)}$= .433 x average wage $_{Y-k}$ / PV old $_{Y-(k-1)}$

CI $_{Y-k}$ = .433 x average wage $_{Y-(k+1)}$ / PV old $_{Y-k}$

Thus

NEW/OLD $_{Y+1}$]/ NEW/OLD $_{Y}$ =
[1+inflation + 50% wage growth $_{Y+1}$] / [1+inflation] *
average wage $_{Y-(k+1)}$]/ average wage $_{Y-k}$ *
PV old $_{Y-k}$ / PV old $_{Y-(k-1)}$

=[1+inflation + 50% wage growth $_{Y+1}$] / [1+inflation] *
1 / (1+ inflation + wage growth $_{Y-k}$) *
1/ (1 + inflation)

= (1+inflation+50% x wage growth $_{Y}$) / (1+inflation+100% x wage growth $_{Y-k}$)

The denominator is higher than the numerator, that's why the gap is narrowing.

III.3 Description of main driving forces

This part provides more details about the development of public pension expenditures (Table 9). It uses a standard decomposition of a ratio of pension expenditures to GDP into the dependency, coverage, benefit ratio, employment rate and labour intensity.

$$\frac{\text{Pension Exp}}{\text{GDP}} = \overbrace{\frac{\text{Population } 65+}{\text{Population } 20-64}}^{\text{Dependency Ratio}} \times \overbrace{\frac{\text{Number of Pensioners (Pensions)}}{\text{Population } 65+}}^{\text{Coverage Ratio}} \times \overbrace{\frac{\frac{\text{Average income from pensions (Average Pension)}}{\text{GDP}}}{\frac{\text{Hours Worked } 20-74}{}}}^{\text{Benefit Ratio}} \times \overbrace{\frac{\text{Population } 20-64}{\text{Hours Worked } 20-74}}^{\text{Labour Market / Labour Intensity}} \quad [1]$$

Note: 'Average pension' = social security pension expenditure divided by the number of pensioners

Two further sub-decompositions have been added in the 2015 exercise, and kept afterwards:

$$\overbrace{\frac{\text{Number of Pensioners}}{\text{Population } 65+}}^{\text{Coverage Ratio}} = \overbrace{\frac{\text{Number of Pensioners } 65+}{\text{Population } 65+}}^{\text{Coverage Ratio Old-Age}} + \left(\overbrace{\frac{\text{Number of Pensioners} \leq 65}{\text{Population } 50-64}}^{\text{Coverage Ratio Early-Age}} \times \overbrace{\frac{\text{Population } 50-64}{\text{Population } 65+}}^{\text{Cohort effect}} \right) \quad [2]$$

$$\overbrace{\frac{\text{Population } 20-64}{\text{Hours Worked } 20-74}}^{\text{Labour Market / Labour Intensity}} = \overbrace{\frac{\text{Population } 20-64}{\text{Working People } 20-64}}^{\text{1 / Employment Rate}} \times \overbrace{\frac{\text{Working People } 20-64}{\text{Hours Worked } 20-64}}^{\text{1 / Labour intensity}} \times \overbrace{\frac{\text{Hours Worked } 20-64}{\text{Hours Worked } 20-74}}^{\text{1 / Career shift}} \quad [3]$$

Furthermore, the same decomposition is proposed, but taking into consideration the number of pensions, instead of the number of pensioners.

On the overall projection horizon, the public pension expenditures, as percentage of GDP, increases by 4.6 percentage points (much higher than projected in AR18: 0.7 pp).

Obviously, the main pressure related to the increase of the pension expenditures comes from the dependency ratio, as result of the population ageing, which will dramatically change the ratio between the active and the old-age population. This peak of the dependency is forecasted to be

reached during the decade 2030-40, when the generations born in 1967-1970, representing the Romanian „baby boom" phenomenon, will exit the labour supply.

Moreover, the coverage ratio will also decrease over time. The growth in the number of pensioners will be exceeded by the augmentation of the volume of people aged 65+. The main determination comes from the heightening of the statutory retirement age. This will diminish the number of pensioners below the age of 65, relative to the population 50-64. Moreover, an additional decline of the coverage ratio takes place in the last years of the projection horizon, when the total population will drop as well. The decreasing population also impacts on the number of disability pensions, which also goes down, as well as on the number of survivor pensions, which stagnates.

The effects of the ratio between the labour market and the labour intensity will have a limited impact on the expenditures, as percentage of the GDP. This factor is forecasted to remain, practically, constant along the projection horizon.

The benefit ratio will constantly drop, as labour productivity will grow faster than the pension benefits. For this reason, the decade 2020-2030 will be characterized by an important reduction of the benefit ratio (almost half of its total diminution until 2070): the pension reform decelerates the increase of the average pension benefits, while the resuming of the economic growth will lead to lower benefit ratios.

Table 9a: Factors behind the change in public pension expenditures between 2016 and 2070 (in percentage points of GDP) – pensions

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70	Average annual change
Public pensions to GDP	0.9	2.7	1.7	0.9	-0.4	-1.3	4.6	8.1%
Dependency ratio effect	1.0	1.5	3.7	2.4	0.7	-0.9	8.5	15.8%
Coverage ratio effect	-0.5	-0.1	-0.9	-0.4	0.2	0.8	-0.9	-2.7%
Coverage ratio – old age*	-0.3	-0.3	-0.4	0.1	0.4	0.5	0.0	0.3%
Coverage ratio – early age*	-0.6	-0.2	1.3	2.2	0.8	0.8	4.4	5.6%
Cohort effect*	-0.3	0.5	-2.9	-3.6	-1.3	0.9	-6.6	-14.2%
Benefit ratio effect	0.7	0.8	-0.8	-0.9	-1.1	-1.3	-2.5	-4.5%
Labour market / Labour intensity effect	-0.2	0.3	-0.1	-0.1	-0.1	0.1	-0.1	-0.3%
Employment ratio effect	-0.2	0.4	0.1	-0.1	-0.2	0.1	0.0	0.0%
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1%
Career shift effect	0.0	-0.1	-0.3	0.0	0.1	0.1	-0.1	-0.3%
Residual	-0.1	0.1	-0.2	-0.1	-0.1	0.0	-0.4	-0.2%

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

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

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70	Average annual change
Public pensions to GDP	0.9	2.7	1.7	0.9	-0.4	-1.3	4.6	8.1%
Dependency ratio effect	1.0	1.5	3.7	2.4	0.7	-0.9	8.5	15.8%
Coverage ratio effect	-0.5	-0.7	-0.9	-0.6	-0.2	0.3	-2.6	-5.7%
Coverage ratio – old age*	-0.3	-0.7	-0.4	0.1	0.3	0.1	-1.0	-1.5%
Coverage ratio – early age*	-0.7	-1.1	0.9	1.2	-0.4	0.2	0.2	-2.3%
Cohort effect*	-0.3	0.5	-2.9	-3.6	-1.3	0.9	-6.6	-14.2%
Benefit ratio effect	0.7	1.5	-0.7	-0.7	-0.8	-0.8	-0.8	-1.4%
Labour market / Labour intensity effect	-0.2	0.3	-0.1	-0.1	-0.1	0.1	-0.1	-0.3%
Employment ratio effect	-0.2	0.4	0.1	-0.1	-0.2	0.1	0.0	0.0%
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1%
Career shift effect	0.0	-0.1	-0.3	0.0	0.1	0.1	-0.1	-0.3%
Residual	-0.1	0.0	-0.2	-0.1	0.0	0.0	-0.5	-0.3%

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

Replacement rate (RR)

The replacement rate at retirement represents the first pension as percentage of the last wage. The replacement rate level, within the public scheme, will steadily go down over the projection horizon, significantly below the AR18 values (to reach 26% at the end of the projection horizon, compared to 32% in AR18). This is mainly the effect of the correction index abolition. As the pension formula will change, in order to reflect the shift from the first to the second tier, the average number of pension points is considered to decline over time. On the other hand, the additional pension benefits resulted from the participation in Pillars II and III compensate the diminution resulted from the formula.

The following table extracted from the model shows the reformed PAYG pillar formulae. As one can see, both the basic replacement rate and the incremental replacement rate (which is the accrual rate) are different between switchers and non-switchers, with switchers having lower rates for both from the reformed PAYG. In the monopillar table, the incremental replacement rate (given by the wage growth, the full length of service and the pension correction index) multiplied by the minimum statutory length of service gives the basic replacement rate. In the multi-pillar table, shown here, the incremental replacement rate for the switchers diminishes proportionally to the ratio between the quota of contribution remained for the first pillar and the total quota of contribution (also including the contribution to 2nd pillar). "Switchers" are those pensioners who at least have begun to receive pension payments under

the second pillar. The model estimates that all the Romanian pensioners will become switchers starting with 2035 (women) and 2037 (men)

The shift takes into account that the switch implies the separation of the total contribution rate 25% into 21.25 % for the public pillar and 3.75% for the second pillar.

Non-switchers:
In AR18 the incremental replacement rates (IRR) were declining until 2030 (when the indexation formula was supposed to begin its lowering connection with the wages). Between 2030 and 2070, there was a slight increase. $IRR_{[year\ y]}$ / $IRR_{[year\ y-1]}$ was technically equal to $T_{y-1}/T_y * W_{y-2}/W_y$, where W_y = average nominal wage and T_y = statutory contributory period in year y. So the explanation of the evolution was that the ratio W_{y-2}/W_y was in slight crescendo, while T_{y-1}/T_y was <1 until 2030 (end of the gradual increase of T for women.
In the 2019 projections, we have an increase until 2022 (year when the new law enters into force), then a steady fall until 2070. The correction index is eliminated, so we have:
Until 2022:
$IRR_y / IRR_{y-1} = T_{y-1}/T_y * W_{y-1}/W_y * PV_y/PV_{y-1}$, with PV = point value, which considerably increases ad-hoc.
After 2022, $IRR_y / IRR_{y-1} = PV_y/W_y/PV_{y-1} * W_{y-1}$ =
= (1+ inflation) * (1+50% wage growth)/ (1+ inflation) / (1+100% wage growth) = (1+50% wage growth)/ (1+100% wage growth) which is <1

Switchers:
For the switchers, IRR diminishes with the ratio between the contribution rates directed to pillar I and those directed to pillars I +II.

2019 projections:
The ratio between IRR's yearly increase under the new baseline versus AR18 goes steadily <1 (but close: about 0.99 each year), even during 2022- 2030 (when T increases for women – hence, the diminution during this period is more significant for Men)[3].

[3] IRRnew = PVnew* N/25/W/N = PVnew/W/25 [where N = number of points accumulated]
IRRold = PVold*N*CI/T/W/N = PVold*CI/W/T
Thus, IRRnew/IRRold [y] = PVnew/PVold/25*T/CI
2016-2022: = the ratio increases (due to important ad-hoc increases), up to 1.38 (M) and 1.22 (F).
When the PV will be indexed according to the formula (while no longer ad hoc), the ratio [y]/ratio[y-1] will become:
$(1+inflation)*(1+50\%\ wage\ growth)/ (1+inflation)/(1+50\%\ to\ 0\%wage\ growth)*T_y/T_{y-1}*CI_{y-1}/CI_y$ =
$PVnew_y/PVnew_{y-1} *PVold_{y-1}/PVold_y *T_y/T_{y-1} *.433* W_{y-2}/PVold_{y-1}/.433*PVold_y/W_{y-1}$ =
$= (1+inflation)*(1+50\%\ wage\ growth) *T_y/T_{y-1} *W_{y-2}/W_{y-1}$ =
$=(1+inflation)*(1+50\%\ wage\ growth) *T_y/T_{y-1} / (1+inflation)/(1+100\%\ wage\ growth)$ =
$= (1+50\%\ wage\ growth) /(1+100\%\ wage\ growth) *T_y/T_{y-1} < 1$

Benefit Formula Parameters for Old age									
	Non-switchers								
	2017	2020	2030	2060	2070	2017	2020	2030	2034F/ 2036 M
Men									
Required Years of Service for Basic RR	15	15	15	15	15	15	15	15	15
Basic RR	17.5%	14.4%	20.2%	14.6%	13.5%	17.5%	14.4%	20.2%	18.7%
Incremental RR	0.9%	0.8%	1.1%	0.8%	0.8%	1.2%	1.1%	1.3%	1.3%
Maximum RR	300%	300%	300%	300%	300%	300%	300%	300%	300%
Women									
Required Years of Service for Basic RR	15	15	15	15	15	15	15	15	15
Basic RR	20.2%	16.3%	20.2%	14.6%	13.5%	20.2%	16.3%	20.2%	19.1%
Incremental RR	1.0%	0.9%	1.1%	0.8%	0.8%	1.3%	1.1%	1.3%	1.3%
Maximum RR	300%	300%	300%	300%	300%	300%	300%	300%	300%
Men									
Years in Final Average Wage	33	33	33	33	33	33	33	33	33
Wages are Valorized to Inflation									
Wages are Valorized to Nominal Wage Growth	100%	100%	100%	100%	100%	100%	100%	100%	100%
Women									
Years in Final Average Wage	28	28	28	28	28	28	28	28	28
Wages are Valorized to Inflation									
Wages are Valorized to Nominal Wage Growth	100%	100%	100%	100%	100%	100%	100%	100%	100%

According to the old point value indexation formula, the average wage growth would have been taken into account less and less and, as from 2030 on, it wouldn't have been considered at all. Thus, on the overall pensions, the average value would have been outpaced by the economy-wide average wage. The ratio between these two indices is reflected by the benefit ratio (BR). The increase of the career's length, as result of the pension reform, will lead to the fall of the benefit ratio. Another element, which is relevant from the perspective of the wage, as development and dynamics, which are faster than the dynamics of pension benefits, is the distinctiveness of the Romanian labour market. Thus, the considerable weight of the lower-wage employees, from the primary sector, will be modified over time, by the pronounced shift toward the tertiary sector. The benefit ratio evolution goes the other way around than the replacement rate. In the sense that, as compared to AR18 (when it was supposed to stabilize at 26-27% over the projection period), now it stays at high levels, despite diminishing gradually, down to 31% in 2070.

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

	2016	2020	2030	2040	2050	2060	2070
Public scheme(BR)	35%	32%	39%	37%	36%	34%	31%
Public scheme(RR)	43%	38%	43%	33%	31%	28%	26%
Coverage	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Public scheme– old-age earnings related (BR)	39%	35%	43%	40%	38%	35%	33%
Public scheme– old-age earnings related (RR)	30%	26%	35%	30%	29%	26%	24%
Coverage	66.9	68.0	69.2	72.9	74.4	74.9	74.1
Private individual scheme (BR)	8%	22%	5%	3%	3%	3%	3%
Private individual scheme (RR)	16%	28%	8%	5%	5%	5%	5%
Coverage	0.2	0.8	9.0	39.8	62.6	74.5	77.2
Total (BR)	35%	32%	39%	39%	37%	36%	34%
Total (RR)	44%	41%	49%	37%	36%	34%	32%

The number of pensioners is expected to augment significantly, during the years expected for the baby-boomers to live at the pension (after 2030). The peak value is expected to be reached in 2053 (5550.7 thou); afterwards it will begin to diminish, as the total volume of population will decrease (as from nearly 20 million in 2013 to 17.0 million in 2040 and 15.0 million in 2070). On the other hand, the employment will continuously go down, so that the ratio between these two will worsen, as from 0.6 back in 2016, to almost 1.0 in 2060. Nevertheless, the ratio between the number of persons aged over 65 (in constant raise) and the working-age population (which will diminish by circa 30% in 2070, as compared to the base year) will deteriorate during the entire projection horizon.

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

	2016	2020	2030	2040	2050	2060	2070
Number of pensioners (I)	5151.6	5157.3	5057.9	5413.0	5533.0	5381.0	5019.8
Employment (II)	8407.5	8225.9	7268.1	6412.6	5810.0	5497.7	5313.3
Pension System Dependency Ratio (SDR) (I)/(II)	61.3	62.8	69.6	84.4	95.2	97.9	94.5
Number of people aged 65+ (III)	3463.2	3716.1	3941.3	4567.1	4880.3	4804.7	4379.3
Working age Population 15-64 (IV)	13192.9	12563.5	11355.6	9983.4	9002.7	8480.3	8287.2
Old-age Dependency Ratio ODR (III/IV)	26.3	29.6	34.7	45.7	54.2	56.7	52.8
System efficiency SDR / ODR	2.3	2.1	2.0	1.8	1.8	1.7	1.8

As the labour force will decline sharply, more elderly people will choose to continue their career, moreover that the health condition at their age will improve as compared to nowadays. The better health and the higher life expectancy will also lead to the diminution of the number of disability and survivor pensioners. On the other hand, the estimated diminution of the total

employment will dramatically contribute to the decline of the support ratio. The rate of the contributors within the total employment will increase over time, as the "grey" economy will be combated and gradually eliminated.

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

	2016	2020	2030	2040	2050	2060	2070
Age group -54	6.5	7.2	7.5	7.1	6.6	6.7	6.7
Age group 55-59	70.6	80.3	74.1	74.5	77.7	77.7	79.1
Age group 60-64	89.3	96.3	84.7	92.4	94.9	101.4	98.5
Age group 65-69	101.5	97.0	105.5	102.7	103.1	106.6	103.7
Age group 70-74	113.4	101.3	100.2	96.1	98.1	99.8	100.0
Age group 75+	116.3	114.1	94.8	93.0	91.1	91.7	93.3

Table 12b: Pensioners (public schemes) to population ratio by age group (%)

	2016	2020	2030	2040	2050	2060	2070
Age group -54	2.9	3.2	3.5	3.4	3.2	3.3	3.3
Age group 55-59	29.0	30.9	28.5	29.3	30.0	30.0	30.6
Age group 60-64	62.7	61.6	49.4	55.1	56.2	59.7	58.1
Age group 65-69	85.0	81.6	84.1	81.3	81.9	84.4	82.0
Age group 70-74	98.2	92.3	90.3	84.7	87.5	89.0	89.0
Age group 75+	116.3	114.1	94.8	93.0	91.1	91.7	93.3

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

	2016	2020	2030	2040	2050	2060	2070
Age group -54	5.3	5.9	6.1	5.6	5.1	5.2	5.2
Age group 55-59	55.0	63.6	59.8	58.2	58.1	57.9	59.0
Age group 60-64	90.7	89.2	73.2	84.1	83.7	84.8	86.2
Age group 65-69	85.7	84.5	90.9	90.9	92.9	94.4	95.6
Age group 70-74	92.2	84.5	87.1	84.8	88.9	90.5	91.5
Age group 75+	94.5	93.7	83.4	84.5	84.3	86.2	88.0

Table 13b: Female pensioners (public schemes) to population ratio by age group (%)

	2016	2020	2030	2040	2050	2060	2070
Age group -54	2.8	3.1	3.3	3.1	2.8	2.9	2.9
Age group 55-59	28.5	31.1	29.6	30.3	30.2	30.0	30.6
Age group 60-64	71.2	67.4	50.1	59.4	60.0	60.3	61.3
Age group 65-69	73.3	73.0	76.8	76.3	78.8	80.1	81.0
Age group 70-74	81.1	77.8	80.8	77.1	81.8	83.5	84.2
Age group 75+	94.5	93.7	83.4	84.5	84.3	86.2	88.0

For the age groups -54 and 55-59, the ratios will not vary significantly over time. However, there is a noticeable decrease for women in the age group 60-64. This diminution is not related to the total inactive population, but strictly to the number and, hence, the weight of the pensioners within the population in this age group, consequence of the pension reform: the statutory retirement age increases, the eligibility for disability pension is supposed to stricter criteria and the early retirement is discouraged. On the other hand, a lot of recent Romanian emigrants around the world will come back to their home country at retirement, thus receiving the pension benefits only from the country where they worked. The higher coverage ratios from the first year are also due to the fact that the pensioners from these years come from the ex-communist regime, when every individual was obliged to have a job.

With regard to the new pension decomposition, the table below illustrates the evolution of the new public pension expenditures in relation to the average number of new retirees, the point value and the number of pension points.

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

New pension	2016	2020	2030	2040	2050	2060	2070
I. Projected new pension expenditure old age and early retirement (millions EUR)	255.5	293.3	545.1	1059.8	1341.9	1341.0	1709.6
II. Number of new pensions ('000)	215.7	187.2	143.6	199.4	177.0	132.0	130.1
Average annual pension	2.4	3.1	7.6	10.6	15.2	20.3	26.3
III. Contributory period	32.3	33.0	25.0	25.0	25.0	25.0	25.0
IV. Point value (EUR)	194.1	319.5	573.1	802.0	1093.1	1466.0	1941.8
V. Total average pension points at retirement	30.2	26.9	27.6	27.6	28.9	28.9	28.2
VI. Average number of months paid the first year	6	6	6	6	6	6	6

VII. Correction index	1.1	1.0	1.0	1.0	1.0	1.0	1.0
VIII. II*IV*V*VI*VII/III	255.5	293.3	545.1	1059.8	1341.9	1341.0	1709.6
Additional information							
IX. Average contributory period	31.0	31.2	32.1	31.5	32.3	32.8	32.5
X. Monthly average pensionable earnings / Monthly economy-wide average wage	1.06	1.06	1.07	1.11	1.12	1.11	1.10
XI. Average new pension over economy wide average wage	32%	28%	38%	34%	32%	29%	26%

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

New pension	2016	2020	2030	2040	2050	2060	2070
I. Projected new pension expenditure old age and early retirement (millions EUR)	147.9	160.1	365.2	591.8	772.0	758.4	902.5
II. Number of new pensions ('000)	114.8	102.1	91.0	104.0	95.3	69.6	64.0
Average annual pension	2.6	3.1	8.0	11.4	16.2	21.8	28.2
III. Contributory period	35.0	35.0	25.0	25.0	25.0	25.0	25.0
IV. Point value (EUR)	194.1	319.5	573.1	802.0	1093.1	1466.0	1941.8
V. Total average pension points at	35.5	28.6	29.2	29.6	30.9	31.0	30.2
VI. Average number of months paid the first year	6	6	6	6	6	6	6
VII. Correction index	1.1	1.0	1.0	1.0	1.0	1.0	1.0
VIII. II*IV*V*VI*VII/III	147.9	160.1	365.2	591.8	772.0	758.4	902.5
Additional information:							
IX. Average contributory period	33.0	33.3	34.0	33.7	34.6	35.2	35.1
X. Monthly average pensionable earnings / Monthly economy-wide average wage	1.09	1.08	1.08	1.11	1.11	1.09	1.09
XI. Average new pension over economy wide average wage	35%	28%	40%	36%	34%	31%	28%

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

New pension	2016	2020	2030	2040	2050	2060	2070
I. Projected new pension expenditure old age and early retirement (millions EUR)	107.5	133.2	179.9	468.1	569.9	582.5	807.1
II. Number of new pensions ('000)	100.9	85.1	52.6	95.4	81.7	62.5	66.0
Average annual pension	2.1	3.1	6.8	9.8	13.9	18.7	24.4
III. Contributory period	30.3	31.3	25.0	25.0	25.0	25.0	25.0
IV. Point value (EUR)	194.1	319.5	573.1	802.0	1093.1	1466.0	1941.8
V. Total average pension points at retirement	25.4	25.6	24.9	25.5	26.6	26.5	26.2
VI. Average number of months paid the first year	6	6	6	6	6	6	6
VII. Correction index	1.1	1.0	1.0	1.0	1.0	1.0	1.0
VIII. II*IV*V*VI*VII/III	107.5	133.2	179.9	468.1	569.9	582.5	807.1
Additional information:							
IX. Average contributory period	28.7	28.7	28.8	29.1	29.6	30.1	30.1
X. Monthly average pensionable earnings / Monthly economy-wide average wage	1.06	1.06	1.07	1.09	1.09	1.09	1.08
XI. Average new pension over economy wide average wage	29%	28%	34%	31%	29%	27%	24%

The amount of the pension benefits of an individual is thus calculated using a point-based formula, by multiplying the average annual number of points accrued by the insured, by the point value. For each career month, gross earnings are divided by the gross economy-wide average wage for that month. The annual number of points is obtained as the average of the 12 monthly numbers of points. The total number of points accrued in an individual's career is the sum of the annual numbers of points.

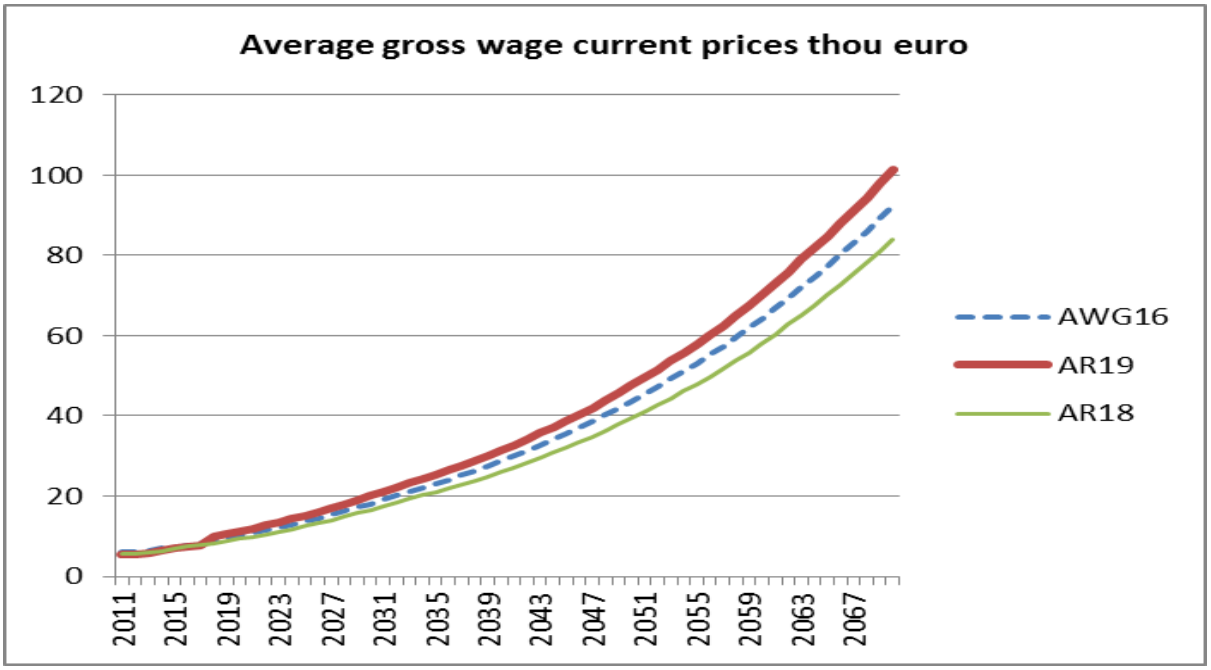
The average annual number of points is the ratio between the total number of points accrued by the individual along his career and (OLD LAW) the statutory contributory period corresponding to the individual's cohort. In the new law, the statutory contributory period corresponding to the individual's cohort is replaced in the formula by 25, which is considered to be the effective average contributory during the period governed by the old law. Hence, the effective contributory period of the person is not taken into consideration for the pension benefits calculation. The statutory contributory period is set by the Labour Ministry, according to the retirement age set for the cohort in case and to the evolution of the life expectancy.

Row VII shows the correction index which was applied every year under the old law, only for the persons who retired during that specific year. This correction index represents a multiplying factor, for the average number of pension points of that generation, and is computed by dividing 43.3% of the economy-wide gross average wage from the previous year by the value of the pension point for that specific year. The retiree continued with that new number of points throughout all the years afterwards. The new pension law eliminates this correction index (or, just to keep the same formula, we can equally set it as 1.00).

As one can easily notice, despite the overall significant increase of pension expenditures, the reform focused this outcome toward the existing pensions, while for the new pension streams the projection goes down (26.3 thou euro annual average new pension in 2070, versus 27.5 under the old law). Thus, a balance between new and old pensioners is intended.

Noticeable, the economy-wide average series used differs from the one employed by the European Commission services. The series we used here follows the same trend, but the basic level is lower, as represented in the chart below.

Chart 9 – Economy-wide average wage – in thou. euros per year



Source: Eurostat

III.4 Financing of the pension system

Table 15 – Financing of the system

	Public employees	Private employees	Self-employed
Contribution base	0	0	0
Contribution rate/contribution			
Employer	Between 0% and 8%, according to the working conditions, as follows: 0% (normal working conditions) 4% (difficult working conditions) 8% (special working conditions)	Between 0% and 8%, according to the working conditions, as follows: 0% (normal working conditions) 4% (difficult working conditions) 8% (special working conditions)	
Employee	25%	25%	25%
State			
Other revenues	State provides funds from the national budget to cover the public pension system deficit	State provides funds from the national budget to cover the public pension system deficit	State provides funds from the national budget to cover the public pension system deficit
Maximum contribution	0	0	0
Minimum contribution	0	0	0

Source: Commission Services

Note: There might be a slight underestimation of the revenue from contributions, as the rare cases of difficult and special working conditions are not considered as such (by mean of this additional 4% or 8% contribution on the burden of the employers) in these projections.

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

	2016	2020	2030	2040	2050	2060	2070
Public contribution	9512.2	17055.2	26189.7	36624.6	51736.8	75062.6	112333.0
Employer contribution	6677.7	0	0	0	0	0	0
Employee contribution	2834.5	17055.2	26189.7	36624.6	51736.8	75062.6	112333.0
State contribution							
Number of contributors (I)	5591.3	6261.5	5477.3	4790.2	4418.2	4349.3	4557.8
Employment (II)	8407.5	8225.9	7268.1	6412.6	5810.0	5497.7	5313.3
Ratio of I/II	0.7	0.8	0.8	0.7	0.8	0.8	0.9

Before the shift of contributions, the total quota (employer + employee) driven to the pension contributions was 10.5+15.8= 26.3% of the gross wage (out of which 5.1% to pillar 2}. After the shift, the rate is 25% of a higher-by-20%- gross wage (out of which 3.75% to P2). So, under

the new fiscal frame, a higher amount is directed to the financing of the pension system. The 20% gross wage increase was needed to ensure that the employees are receiving the same net wage as before the transfer of the contributions from employer to employees.

There are 3 main drivers of the increase in revenues observed in the current 2019 projections with respect to the AR2018 ones:

- the increase in gross wage to which the contribution rate is applied.
- the reduced transfer of contributions to the second pillar; while the overall rate of pension contributions collected remains roughly similar (25% vs 26.3%), the rate transferred to the second pillar is now capped to 3.75% instead of 6%, allowing for the difference in contribution revenue to remain under the first pillar. In fact, the shift of contribution burden was also accompanied by a reallocation of the contributions, so part of the pension contribution gain comes from the personal income tax reduction.
- the significant change related to the military pensions: before the shift of contribution burden in the beginning of 2018, their rates of contribution for the public pension system were 5.5% from the employer and 0% from employee. Now their contribution rate to the first pillar is 25%, the same as the civilians' one (with the corresponding increase of their gross wage). This measure had a bigger then expected impact, as the military are around 250 thousand in number and have well above the average salaries.

In sum, the measures above lead to an increase of revenues to the consolidated budget from contributions in 2018 of around 37% compared to the previous AR2018 projections. The fiscal changes brought about by the shift of contributions resulted in a higher volume directed towards the social insurance contributions, despite an almost equal number of contributors estimated for 2070 in AR18 (4506 million) and 2019 pension projections (4558 million). The 2014 legislative measure of decreasing the employer's social contribution rate by 5 p.p. (i.e. from 20.8 to 15.8 of the employee's gross wage, for normal working conditions) was rapidly offset, within the total volume of contributions, by the enlargement of the contribution base.

The projections also show a difference in the number of contributors and employment which is shrinking during the projection period and which can be explained by features of the Romanian economy and by some methodological aspects. Concretely, the employment is estimated to follow a continuously decreasing trend, down to 63% of the current number of employees, at the end of the projection horizon. Nevertheless, the estimates related to the number of contributors are positive, as the grey and black areas of the economy will gradually disappear. Thus, the weight of the contributors among the employees will constantly improve. Still, this improvement was estimated to gain momentum rather later in the projections horizon, that's why some of the youngsters drawn from the black market will only reach the retirement age beyond 2070. Furthermore, there is no strong increase in the coverage system because, for the people who come from the gray or black market, it is hard to make the minimum contributory period, so that they can be eligible for the old age pension, while some won't even qualify for minimum pension (10 years minimum contribution).

Differences between the number of contributors and the volume of employees come from the different methodologies applied in calculation. The employment is calculated according to the international labour office methodology, so it can also include day-workers or part-time workers. These categories are considerable in Romania, and they are not included as contributors. On the other hand, the indemnified unemployed are also contributors, so can be other categories not included in employment, as well. Moreover, the demographic projections indicate a progressive inversion of the migration flows, which from 2035 on are estimated to turn positive; this means young working age people coming from abroad.

The projected evolution takes into account the specific features of employment in Romania, respectively the significant weight of the self-employed. The weight of the self-employed among total employment in Romania is still far from the EU28's average, which is 15.3%, The same ratio for Romania reaches 25,2% in 2016, according to AMECO national accounts statistics. Out of these self-employed, almost half are farmers. This category contributes voluntarily to the pension system. Romania's long-term development and the rural modernization, also including the consistent European aid, will reduce the percentage of these people compared to the wage earners. Consequently, the number of contributors from this category will increase, even on the background of the ageing of population. Important, in Romania the above-mentioned trend is validated by the recent years' reality, when the ratio between the number of contributors and the employment has improved from 57% in 2010 to approximately 67% in 2016. In figures, the ratio of contributors among working age population keeps the trend from AR2015 (from 0.42 vs 0.46 in 2016 to 0.50 vs 0.52 in 2060) while contributors as compared to employment keep the same percentage points progression (67% to 77% versus 74% to 84% in AR 2015).

As for the existence of a buffer fund, to smooth the financing gaps that occur due to the cyclicality of employment, this is not expressly stipulated. However, at the budgetary revisions, the necessary amounts can be transferred from the State's Budget to the Social Insurance Budget. The extent to which the State has an obligation to cover any remaining financing gaps is related to people's right to benefit of social insurance. This right is guaranteed by the State, in accordance with the fundamental law.

III.5 Sensitivity analysis

The sensitivity analysis of the public pension expenditure, as a percentage of GDP, is undertaken through a series of alternative scenarios, based on specific deviations from the baseline scenario. The deviations in assumptions apply to only one parameter for each alternative scenario, while the other parameters considered remain unchanged.

Table 17: Total and public pension expenditures under different scenarios (deviation from baseline scenario)

Public Pension Expenditure	2016	2020	2030	2040	2050	2060	2070
Baseline	8.0	8.9	11.6	13.3	14.2	13.8	12.5
Higher employment rate (+ 2 pp)	0.0	0.0	-0.3	-0.2	-0.2	-0.2	-0.1
Higher life expectancy (+2 years)	0.0	0.0	0.1	0.3	0.5	0.6	0.7
Higher migration (+33%)	0.0	0.1	0.3	0.5	0.5	0.3	0.1
Higher TFP (+0.4 pp)	0.0	0.0	-0.1	-0.5	-0.9	-1.3	-1.6
Lower fertility (-20%)	0.0	0.0	0.0	0.3	1.1	1.9	2.8
Lower employment rate (-2 pp)	0.0	0.0	0.3	0.4	0.4	0.3	0.2
Lower migration (-33%)	0.0	-0.1	-0.3	-0.3	-0.3	-0.2	-0.1
Lower TFP (-0.4 pp)	0.0	0.0	0.0	0.1	0.7	1.1	1.5
Higher emp. of older workers (+10 pp.)	0.0	-0.1	-0.7	-0.9	-0.8	-0.7	-0.6
Risk scenario	0.0	0.0	0.3	0.7	1.0	1.2	1.4
Policy scenario: linking retirement age to increase in life expectancy	0.0	0.0	0.0	-0.5	-1.0	-1.4	-1.8

Total Pension Expenditure	2016	2020	2030	2040	2050	2060	2070
Baseline	8.0	8.9	11.7	13.7	14.9	14.6	13.4
Higher employment rate (+ 2 pp)	0.0	0.0	-0.3	-0.2	-0.2	-0.2	-0.1
Higher life expectancy (+2 years)	0.0	0.0	0.1	0.3	0.5	0.6	0.7
Higher migration (+33%)	0.0	0.1	0.3	0.5	0.5	0.3	0.1
Higher TFP (+0.4 pp)	0.0	0.0	-0.1	-0.5	-0.9	-1.4	-1.7
Lower fertility (-20%)	0.0	0.0	0.0	0.3	1.1	2.0	3.0
Lower employment rate (-2 pp)	0.0	0.0	0.3	0.4	0.4	0.3	0.2
Lower migration (-33%)	0.0	-0.1	-0.3	-0.3	-0.3	-0.2	-0.1
Lower TFP (-0.4 pp)	0.0	0.0	0.0	0.1	0.7	1.2	1.6
Higher emp. of older workers (+10 pp.)	0.0	-0.1	-0.7	-0.9	-0.9	-0.7	-0.6
Risk scenario	0.0	0.0	0.3	0.8	1.1	1.3	1.5
Policy scenario: linking retirement age to increase in life expectancy	0.0	0.0	0.0	-0.6	-1.0	-1.5	-1.9

The higher employment rate results in higher GDP, so the weight of the relatively equal pension expenditures within GDP diminishes. For the higher employment rate of old workers, the GDP grows even more and such growth is more significant than the increase of the pension expenditures.

For the higher total factor productivity assumption, there is a 1.6/1.7 percentage point decrease of the total pension expenditures, at the end of the projection horizon, compared to the baseline.

The main reason for this decrease is the quick impact of productivity on the GDP and the delayed impact on the pension benefits; the latter are a reflection of the pensioner's earnings throughout his entire career. The same explanation, in the mirror, applies to the lower productivity.

The higher life expectancy determines a 0.7 p.p. deviation from the baseline scenario. The GDP would not increase significantly, but a longer life leads to more people receiving pension benefits and, thus, results in higher pension expenditures.

In the case of higher/lower migration, the deviations are not considerable, as the negative estimates of the migration flows are followed by positive trends. Nevertheless, the differences induced in the volume of population are more significant for the working-age category than for the population over 65. Therefore, a lower migration scenario would lead to a gain of 300,000 persons at working age, hence improving the results

The alternative scenarios pertinent to the dynamic retirement age, yearly adjusted in accordance with the life expectancy evolution, would lead to significant gains, of 1.8/1.9 p.p., at the end of the projection horizon.

The risks associated with a worse development of TFP can lead to a 1.4 p.p. (for public pensions) and 1.5 p.p. (for total pension expenditures) deviation of the pension expenditures, as percentage of GDP. So a worse development of TFP would produce significant deviations from the baseline.

By far, the worst possible scenario is the one involving the 20% reduction of the fertility rate. Taking into consideration the already problematic development of the demography from the baseline scenario, there is no surprise that such worsen fertility rates would lead to 2.8 / 3.0.pp. negative deviations.

III.6 Description of the changes in comparison with the previous projections

Table 18a: Overall change in public pension expenditure to GDP under the 2009, 2012, 2015, 2018 and 2019 projection exercises - pensions

	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
2009	9.24	13.61	-4.91	0.28	1.73	:	-1.46
2012	3.70	12.93	-4.69	0.36	-3.70	-0.01	-1.20
2015	-0.15	6.80	-2.45	0.02	-3.90	-0.01	-0.62
2018	0.70	5.60	-1.68	-0.07	-2.61	0.00	-0.54
2019	4.56	8.51	-0.91	0.02	-2.54	0.00	-0.52

Table 18b: Overall change in public pension expenditure to GDP under the 2009, 2012, 2015, 2018 and 2019 projection exercises - pensioners

	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
2009	9.24	13.61	-4.91	0.28	1.73	:	-1.46
2012	3.70	12.93	-4.69	0.36	-3.70	-0.01	-1.20
2015	-0.15	6.80	-2.34	0.02	-4.00	-0.01	-0.62
2018	0.70	5.60	-1.68	-0.07	-2.61	0.00	-0.54
2019	4.56	8.51	-2.57	0.02	-0.79	0.00	-0.61

Tables 18 and 19 refer to the differences between the results of the present projections and those from the previous exercises.

The public pensions, as percentage of GDP, are forecasted more stable in time, with every round of projections. The evolution of the dependency ratio also improves. The coverage ratio is presumed to decline softer, but an eventual further increase of the retirement ages would bring the figures closer to the older assumptions.

Table 19: Decomposition of the difference between 2018 and the new public pension projection (% of GDP)

	2016	2020	2030	2040	2050	2060	2070
Ageing report 2018	8.0	7.3	6.6	7.7	8.7	8.9	8.7
Change in assumptions (2019 update)	0.0	0.0	-0.1	-0.2	-0.2	-0.2	-0.2
Improvement in the coverage or in the modelling							
Change in the interpretation of constant policy							
Policy related changes (2019 update)	0.0	1.6	5.0	5.8	5.7	5.1	4.0
New projection	8.0	8.9	11.5	13.3	14.2	13.8	12.5

The only one change of assumptions between AR2018 and AR2019 was the one related to the number of disabled. The corresponding impact on expenditures growths to 0.20% GDP in 2040, then going down to 0.154% in 2070.

PART IV –DESCRIPTION OF THE MODEL AND THE DATABASE

IV. 1 Institutional context in which the projections are made

The projections are made strictly for the Ageing Report 2018.

IV.2. Assumptions and methodologies applied

The model applied relies on informed assumptions of future patterns including:

- Wage growth
- Real returns on pensions assets
- Economic growth
- Growth in coverage of a contributory pension scheme

One of the main assumptions of the model is that, once retired, the individuals continue to receive the pension benefits until the end of their life. At the same age, both the pensioners and the individuals still active have the same probability of dying.

IV.3. Data used to run the model

The main data necessary in order to forecast the expenditure for the pension system are:

Entry Indicators:

A. GENERAL:
1. Base year data
2. Wage and pension brackets and cumulative distributions
3. Demographic trends (sex ratio at birth, mortality rate multiplier for disabled, mortality rate multiplier for Old Age pensioners)
4. Macroeconomic trends (actual figures until 2016, EC projections afterwards)
    a) real GDP growth
    b) productivity growth of minimum wage workers
    c) inflation rate
5. Interest rate
6. Benefit eligibility
7. Percentage of people willing, but not allowed for normal retirement, after reform
8. Replacement rate
9. Revenue sources
10. Costs and other expenditure
11. Indexation
    a) pension indexation to inflation
    b) pension indexation to normal wage growth
12. Benefit formula parameters for old age

B. POPULATION:
1. Population volume
2. Fertility rates
3. Mortality rates
4. Immigration

C. LABOR

1. Labour participation rate
2. Unemployment rate
3. Earning profile in terms of minimum wage
4. Pension profile in terms of minimum pension

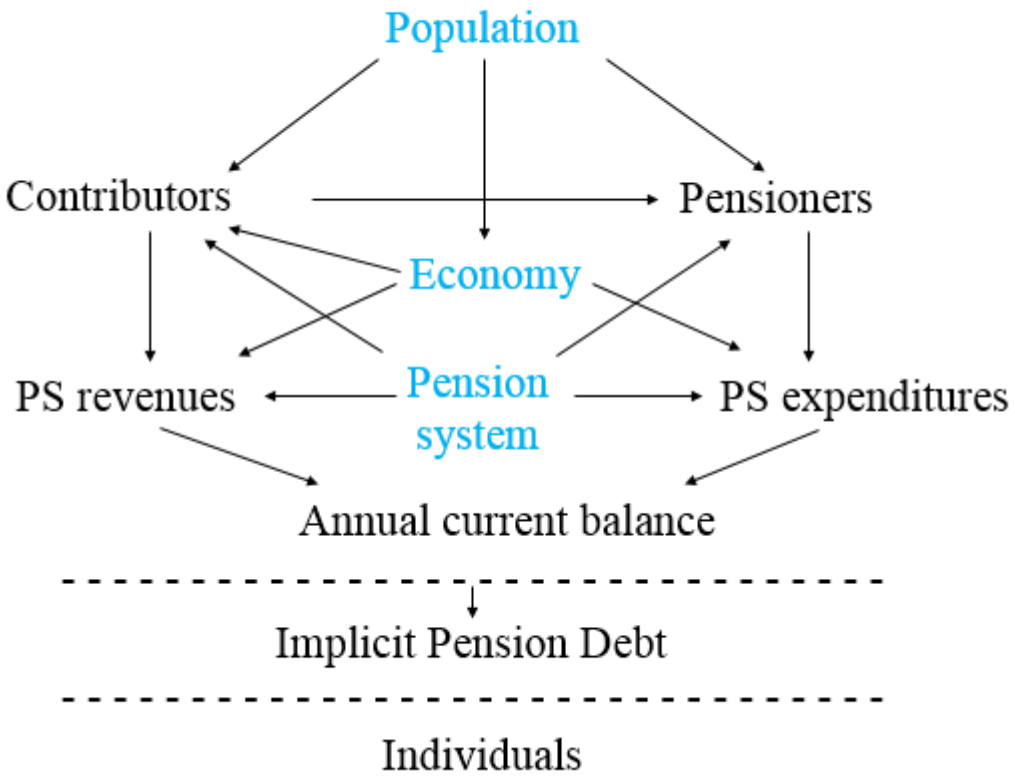
D. PENSION

1. Pension system in base year and reform
2. Length of service at retirement
3. Contributors as percentage of population
4. Old age – stock of population
5. Disabled as percentage of population
6. Survivors as percentage of population
7. Exemption rate

The model is data intensive in order to support the robustness of the results. The key required data are:

- Population fertility and mortality rates by age and gender.
- Labour force participation rates and unemployment rates by age and gender.
- Numbers of contributors and beneficiaries, their contribution and retirement patterns by age and gender.
- Wages and pensions by age and gender, income distribution for contributors and pensioners.

General Calculation Scheme



IV.4. Reforms incorporated in the model

The model can assess anything from 'parametric' reforms of initial pay-as-you-go systems changing pensionable ages, contribution rates, benefits, indexation etc.—to structural reforms, such as the introduction of individual, funded retirement savings accounts or notional accounts. PROST model can handle provident fund schemes as well as pay-as-you-go systems as the starting point, before reform.

IV.5. General description of the model

The core model is the World Bank's **pension reform options simulation toolkit (PROST)**. It comprises a set of instruments which can model pension contributions, entitlements, system revenues and system expenditures over a long timeframe into the future. The model is designed to promote evidence-based policy-making, bridging the gap between quantitative and qualitative analysis of pension regimes. Additionally, two models, one for the repartition on sex and age groups and the other for the second pillar, have been included.

The model utilizes country-specific data, provided by the European Commission, and generates population projections. These projections, combined with economic assumptions, are used to forecast future numbers of contributors and beneficiaries. In turn, this approach generates flows of revenues and expenditures. The model then projects fiscal balances, taking into account any partial pre-funding of liabilities. The model can use either a 'stock' or a 'flow' approach. In the stock concept, parameters such as retirement are expressed as total retirees as a percentage of population rather than as probabilities of retirement, since the stocks can be more stable predictors of the future.

There are three indices (dimensions) for each variable: a=age, t= time (year), g=gender.

Main equations:

Total population:

$$P(a,t,g) = [1 - m\%(a-1,t-1,g)]P(a-1,t-1,g) + im(a,t,g),$$

where im(a,t,g) is the net migration, and m(a,t,g) is the probability of dying.

The equation can be used for any age group, other than the new-born (a>0). For the latter, the following formula applies:

$$NEWBORN(t) = \sum_{a} f\%(a,t-1)P(a,t-1,2),$$

where f(a,t) is the fertility rate.

The PROST model groups the total population in 3 age categories: youth (YP), working age (WP) and old (OP). If a_r represents the retirement age, then:

$$YP(t,g)=\sum_{a=0}^{14}P(a,t,g),\quad WP(t,g)=\sum_{a=15}^{a_r}P(a,t,g),\quad OP(t,g)=\sum_{a=a_r}^{a_{\max}}P(a,t,g)$$

Labour supply:

$$LF(a,t,g)=P(a,t,g)\cdot lfp\%(a,t,g),$$

where lfp(a,t,g) is the labour supply's participation rate.

Employed:

$$EM(a,t,g)=LF(a,t,g)\cdot[1-u\%(a,t,g)],$$

where u(a,t,g) is the unemployment rate.

Number of existing pensioners:

$$EP(a,t,g)=P(a,t,g)\cdot rr\%(a,t,g),$$

where rr(a,t,g) is the retirement (exit) rate.

Number of existing disabled:

$$ED(a,t,g)=P(a,t,g)\cdot ds\%(a,t,g),$$

where ds (a,t,g) represents the disability occurrence rate

Number of effective contributors:

$$EC(a,t,g)=NC(a,t,g)\cdot[1-ee\%(a,t,g)],$$

where ee(a,t,g) represents the contributors' exemption rate, and NC(a,t,g) is the number of nominal contributors.

Number of nominal contributors:

$$NC(a,t,g)=P(a,t,g)\cdot cr\%(a,t,g),$$

where cr(a,t,g) is the contribution rate, calculated as percentage of the contributors of age **a** and gender **g** within total persona of age a and gender g.

Pension fund revenues:

$$REV(t) = CON\_COLL(t,3) + PEN\_COLL(t) + TR(t) + O\_REV(t) + INVEST(t),$$

Where CON_COLL(t,3) represents the contributions from the income tax;
PEN_COLL(t) represents the contributions from pensions (e.g. pension tax);
TR(t) represents transfers from the state's budget;
O_REV(t) represents other revenues;
INVEST(t) represents investment revenues.

Pension funds expenditures:

$$EXP(t) = PAYM\_T(3,t) + O\_EXP(t) + ADMIN(t) + ASSET\_M(t),$$

where PAYM_T(3,t) represents expenditures incurred with the pension payments;
O_EXP(t) represents other expenditures;
ADMIN(t) represents administrative expenditures;
ASSET_M(t) represents the costs incurred with the administration of the assets.

Current balance:

$$BAL(t) = REV(t) - EXP(t)$$

Model output
The PROST program produces five output modules, presented as Microsoft Excel tables with graphic summaries. The modules are:

Population projections, including life tables, population pyramids, population dependency ratios etc.

Demographic structure: labour force and employment, numbers of contributors and beneficiaries, system dependency ratio.

Financial flows: projections of wages, benefits, revenues and expenditures of the pension system, pension scheme balance and the implicit pension debt. The financial flows module also calculates the adjustments—to benefit levels or contribution rates—that would 'balance' the system, i.e. would bring revenues and expenditures into line.

Fundamental systemic reforms: this module illustrates the effect of a shift to a 'multipillar' regime, incorporating both a pay-as-you-go, defined-benefit pension and a funded, defined contribution scheme or exclusively one or the other. Again, it measures the impact both on the system finances and on individuals' pension entitlements, including measurement of transition costs. The total pension benefit and the value of each of the pillars are provided separately.

IV.6. Additional features of the projection model

The model can accommodate a distribution of wages per cohort which allows users to determine the effects of changes in floors and ceilings of income, subject to contribution and the effects of changes in the minimum and maximum pension levels.

The model, which can be based either on population or on employment, also allows different transition paths to a new system, including the age cohorts (generations) covered by the new system (such as applying reforms only to younger workers) and the treatment of pension rights accrued before the reform. Accrued rights can be paid in multiple ways, including as recognition bonds and as proportional wages. On-going funded defined contribution schemes and notional accounts can be modelled in PROST as well.

Additionally, the developments of the number of pensioners and pension expenditures, corresponding to the non-earnings related pensions, facultative private pensions and special (sectorial) pensions have also been modelled outside the main model. Starting with 2005, the pensions for farmers are also paid from the State Budget. Their extinction is estimated around the year 2035.

In order to estimate the expenditure for the farmer's scheme we used a simple, linear model, based on data provided by the House of Pensions. The military (including defense, intelligence and police pensioners) have also been included, but estimated outside the main model. The assumptions associated are their constant ratio as active corps among total population, constant ratio of military pensioners among their active corps and constant ratio of their average old-age pension over the regular old-age pension. Beginning with 2016, their pension system has been transferred from the Social Security Budget to the State's Budget.
The social pensions, although being paid from the Social Security Budget, have been modelled separately.

METHODOLOGICAL ANNEX

Economy-wide average wage at retirement

Table A1: Economy-wide average wage at retirement evolution (thousands euro)

	2010	2016	2020	2030	2040	2050	2060	2070
Economy-wide average wage	5.42	7.42	11.32	20.04	31.34	47.59	70.28	101.37
Economy-wide average wage at retirement	5.64	7.86	11.99	21.42	34.92	53.13	77.78	111.43

Pensioners vs Pensions

Generally speaking, every pensioner gets a public pension. Some of the public pensioners become switchers; further, a segment of the public pensioners may also enlist in the private facultative pensions. Almost all of the beneficiaries of a social pension receive it additionally to the old-age pension. This is why the figures for the number of public earning related pensions can be found in the Questionnaire's chapter „Number of pensioners".

Pension taxation

Beginning with **2011** the pensioners with pension above 740 RON had to pay health insurance (5.5 applied to the difference between the pension amount and the mentioned ceiling of 740). For the pensioners with pension benefits higher than 1000 RON, pension tax applied to the amount which exceeds this ceiling, after the deduction of the health insurance contribution. The calculation of the tax was as follows: the difference between pension gross benefit (only if greater than 1000 RON), minus the contribution for health insurance (5.5 applied to pension benefit), minus the threshold set up by law (1000 RON according to GPO 87/2000) was subject to personal income tax (by a tax rate of 16%.).

This system was modified in 2017, so no more health insurance contribution was paid by the pensioners, while the ceiling for tax was raised from 1000 to 2000 RON. Another change has been adopted at the beginning of 2018: the tax rate has been decreased from 16% to 10%. Overall, the legislated modifications in pension taxation resulted in a reduction of the amount paid as taxes from about 3.7% of the total gross public pension expenditures in 2016 to 1.15% in 2018.

Disability pension

The beneficiaries of disability pensions are transferred to old age pensions, once they reach the statutory retirement age. The legal dispositions in order to qualify for a disability pension changed back in 2012, when the criteria of a certain contributory period accomplished was eliminated. The methodological assumption at that time was that the number of disability

pensioners will augment, respectively by circa 25 percent until 2040, and then will remain constant. But in fact no increase has been registered so far, so escalation becomes less and less plausible. The difference in the total number of pensioners, between AR18 and the present projections, comes entirely from the renouncing to this assumption. Here is how the real figures have departed from the AR15 projections:

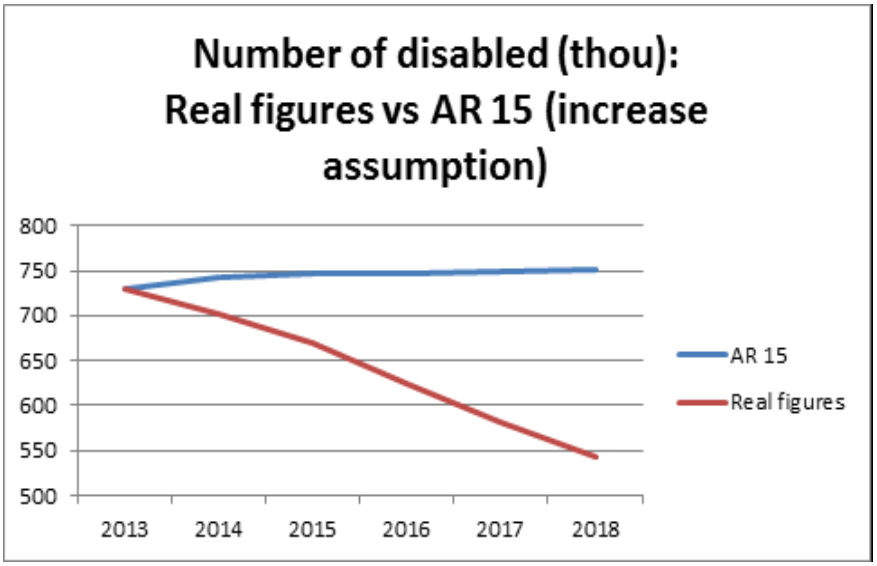


Table A2: Disability rates by age groups (%)

	2010	2016	2020	2030	2040	2050	2060	2070
Age group -54	1.8	1.7	2.0	2.3	2.3	2.1	2.1	2.1
Age group 55-59	22.5	18.4	18.8	19.6	21.5	21.4	21.3	21.7
Age group 60-64	9.8	11.5	13.8	20.1	21.2	21.2	21.2	21.4
Age group 65-69	0.0	0.8	0.8	0.9	1.1	1.0	1.1	1.1
Age group 70-75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Age group 75+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Here is an alternative version of this table, which takes into account the age brackets eligible for disability pension in Romania:

Table A2bis: Disability rates by age groups (%)-alternative version

	2010	2016	2020	2030	2040	2050	2060	2070
Age group 18-54 M	2.2	2.2	2.5	2.7	2.6	2.4	2.5	2.4
Age group 55-59 M	20.8	15.7	16.1	15.7	16.0	16.1	15.9	16.2
Age group 60-64 M	21.3	20.3	20.8	20.3	20.7	20.4	20.6	20.8

Age group 18-54 F	2.7	2.3	2.7	3.0	2.8	2.5	2.6	2.6
Age group 55-59 F	24.0	19.8	20.3	19.8	20.2	20.1	19.9	20.3
Age group 60-64 F	0.0	4.0	7.0	17.5	17.2	17.4	17.1	17.3

Survivor pensions

The assumption used is that the percentage of the number of survivors among total population, for each age and gender, is kept constant along the projection horizon.

Non-earnings related minimum pension

The new pension law introduces the minimum pension, as described in page 4 above. The development of the minimum pension number of beneficiaries and volume of expenditures was simulated as follows:

- The present income brackets of the pensioners develop in line with the pension indexation formula.
- The threshold of the minimum pension goes in line with the average economy wide wage, on the assumption that the minimum wage stays at the actual 40% of the average wage level.

Table A3: Factors behind the change in public pension expenditures between 2016 and 2070 using pension data (in percentage points of GDP) - pensions

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70
Public pensions to GDP	0.9	2.7	1.7	0.9	-0.4	-1.3	4.6
Dependency ratio effect	1.0	1.5	3.5	2.6	0.8	-1.2	8.3
Coverage ratio effect	-0.5	-0.1	-0.5	-0.2	0.1	0.4	-0.9
Coverage ratio – old age*	-0.3	-0.2	-0.3	0.1	0.2	0.2	-0.3
Coverage ratio – early age*	-0.6	-0.1	0.8	1.4	0.5	0.6	2.6
Cohort effect*	-0.3	0.2	-1.8	-1.5	-0.4	0.3	-3.6
Benefit ratio effect	0.7	0.9	-0.6	-0.6	-0.6	-0.7	-1.0
Labour market / Labour intensity effect	-0.2	0.2	-0.1	-0.1	-0.1	0.1	-0.1
Employment ratio effect	-0.2	0.3	0.1	-0.1	-0.1	0.0	0.0
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Career shift effect	0.0	-0.1	-0.2	0.0	0.1	0.0	-0.1
Residual	-0.1	0.2	-0.6	-0.9	-0.6	0.1	-1.8

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

Table A4: Factors behind the change in public pension expenditures between 2016 and 2070 using pensioners data (in percentage points of GDP) - pensioners

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70
Public pensions to GDP	0.9	2.7	1.7	0.9	-0.4	-1.3	4.6
Dependency ratio effect	1.0	1.5	3.5	2.6	0.8	-1.2	8.3
Coverage ratio effect	-0.5	-0.6	-0.5	-0.3	-0.1	0.1	-1.8
Coverage ratio – old age*	-0.3	-0.5	-0.3	0.0	0.1	0.0	-0.9
Coverage ratio – early age*	-0.7	-0.8	0.5	0.6	-0.2	0.1	-0.5
Cohort effect*	-0.3	0.2	-1.8	-1.5	-0.4	0.3	-3.6
Benefit ratio effect	0.7	1.5	-0.6	-0.5	-0.5	-0.5	0.1
Labour market / Labour intensity effect	-0.2	0.2	-0.1	-0.1	-0.1	0.1	-0.1
Employment ratio effect	-0.2	0.3	0.1	-0.1	-0.1	0.0	0.0
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Career shift effect	0.0	-0.1	-0.2	0.0	0.1	0.0	-0.1
Residual	-0.1	0.0	-0.6	-0.9	-0.6	0.2	-1.9

Tables A3 and A4 mathematically normalize the figures from Tables 18, which depend on the magnitude of the pension expenditures. Hence, a comparison between two rounds of projections can be carried out on the basis of tables A3 and A4.

Here is the total change 2016-2070 in the public pension expenditures, using pension/pensioners data, 2019 projections vs AR18 (Tables A3, A4):

	Table A3 pensions		Table A4 pensioners	
	2019 projections	AR18	**2019 projections**	AR18
Public pensions to GDP	**4.6**	0.7	**4.6**	0.7
Dependency ratio effect	**8.3**	8.3	**8.3**	8.3
Coverage ratio effect	**-0.9**	-1.7	**-1.8**	-1.7
Coverage ratio – old age*	**-0.3**	-0.9	**-0.9**	-0.9
Coverage ratio – early age*	**2.6**	0.6	**-0.5**	0.1
Cohort effect*	**-3.6**	-3.6	**-3.6**	-3.6
Benefit ratio effect	**-1.0**	-2.5	**0.1**	-2.5
Labour market / Labour intensity effect	**-0.1**	-0.2	**-0.1**	-0.2
Employment ratio effect	**0.0**	0.0	**0.0**	0.0
Labour intensity effect	**0.0**	0.0	**0.0**	0.0
Career shift effect	**-0.1**	-0.1	**-0.1**	-0.1
Residual	**-1.8**	-3.3	**-1.9**	-3.3

As one may see, the dependency ratio effect is unchanged, as compared to AR18 (the demographic assumptions being identical). The main difference comes from the benefit ratio, mainly due to the large increases from the beginning years.

Some methodological assumptions considered in respect of the pension categories projected separately from the model

The structure on gender for social pensions is kept at the present values (45% M / 55% F) all along the projection horizon, while for the military we considered a constant ratio male/female.

As for the pension expenditures of the categories projected outside the model, the assumption used is that the farmers' average pension will follow the same evolution as the old age average pension projected inside the model and the military pensioners' average new pension keeps its ratio of circa 2.9:1 as compared to the new old age average pension projected in the model. In the questionnaire attached to the present Country Fiche, the militaries and the farmers are included under "Other pensions".

Military – as from 2017 on, their pension is indexed only by the inflation rate. Before the shift of contribution burden in the beginning of 2018, their rates of contribution for the public pension system were 5.5% from the employer and 0% from employee. Now their contribution rate to the first pillar is 25%, the same as the civilians' one (with the corresponding increase of their gross wage). Their participation into the 2nd pillar was, and still is, facultative, so they are generally not interested in this option.

For 2016, the total pension's expenditures with the special pension's category (as defined in 2017 AWG's Special Pension Survey) were as follows:

- Security and defence, 0.7% of GDP
- Disability and survivor, 1% of GDP
- Farmers. 0.3% of GDP
- State employees, 0.08% of GDP
- Revolutionaries and war veteran, 0,06% of GDP
- Atypical 0.01%

As these special pensions were not included in AR18, the same methodology was kept in the present projection, for comparability reasons.

Special pensions

According to the Romanian domestic definition, these pensions, also known as service pensions, are those to which the following categories are entitled: military, police and intelligence (currently about 150 thou persons) and six categories of civilians: magistrates, auxiliary Court personnel, aeronautic personnel, Court of Accounts, Diplomacy, Parliamentarians (currently about 10 thou persons). Usually, the amount of these pensions exceeds the level calculated according to the contributions paid by the persons. The part

corresponding to the contributory requirements is paid, as to the regular pensioners, from the State's Social Insurance Budget, while the difference is paid from the State's Budget. In average, the non-contributory part represents circa 80% of the total pension of these persons.
The pension expenditures (million euro) supported from the State's Budget (hence, not included in our projections) related to these civilians raised from 123 in 2016 to 152 in 2017 and (estimation) 234 in 2018.
The military pensions (included in our projections, yet 100% paid from the State's Budget) amounted to 1096 million euro in 2016, then 1428 in 2017 and (estimation) 1591 in 2018.
The part of the civilians' special pensions paid from the State's budget has not been included in our projections for comparability reasons, considering they weren't included in AR18 as well. But, since in the recent years their volume has become quite significant (0.12 % of GDP in 2018), they will be included in our next projections.

New pensions
Here is how the projections looked like, according to **the old pension law**:

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

New pension	2016	2020	2030	2040	2050	2060	2070
I. Projected new pension expenditure old age and early retirement (millions EUR)	255.5	296.8	413.6	876.1	1203.0	1298.1	1789.4
II. Number of new pensions ('000)	215.7	187.4	143.7	199.0	176.5	131.7	129.9
Average annual pension	2.4	3.2	5.8	8.8	13.6	19.7	27.5
III. Standard contributory period	32.3	33.0	35.0	35.0	35.0	35.0	35.0
IV. Point value (EUR)	194.1	254.5	346.5	422.3	514.8	627.6	765.0
V. Total average pension points at retirement	30.2	27.1	29.1	27.8	28.2	27.7	26.9
VI. Average number of months paid the first year	6	6	6	6	6	6	6
VII. Correction index	1.1	1.3	1.7	2.2	2.7	3.3	3.9
VIII. II*IV*V*VI*VII/III	255.5	296.8	413.6	876.1	1203.0	1298.1	1789.4
Additional information							
IX. Average contributory period	31.0	31.2	32.1	31.5	32.3	32.8	32.5
Monthly average pensionable earnings / Monthly economy-wide average wage	1.06	1.07	1.10	1.13	1.14	1.12	1.11
Average new pension over economy wide average wage	32%	34%	35%	34%	35%	34%	33%

Calculation of pensions: numeric example:

Let's consider the case of a pensioner receiving a pension amount of 1000 RON in August 2019.

The point value in August 2019 was 1100 lei. Thus, the average number of points of this person is 1000/1100 = 0.91.

Now, it's also important when this person retired. Let's say it's about a woman who retired in 2015. The correction index set for 2015 was 1.07, while the statutory contribution period for women was (in 2015) 30.1 years.

According to the old law, the effective average number of points of this person was adjusted by the correction index (1.07), to get to the "final" average number of points (0.91). Thus, this lady effectively accumulated 0.91/1.07 = 0.85 average points throughout her career. While the total accumulated number of points is 0.85 x 30.1 = 25.55.

Note: this was technically a reverse calculation; in reality, the average number of points (0.85) is known and the pension amount is the result.

Note: The amount of her pension at retirement (back in 2015) was Point Value (2015) x Total points accumulated x Correction index (2015) / Statutory contributory period (2015) = 830.2 x 25.55 / 30.1 x 1.07 = 830.2 x 0.85 x 1.07 = 830.2 x 0.91 = 755.5 RON.

- According to the old law, her pension amount in the future would have equalled to 0.91 x PV (each year). According to the old formula of PV indexation, at the beginning of 2022, PV would have been 1236.1 lei. Hence, the lady's pension would have been 0.91 x 1236.1 (=PV OLD of 2022) = 1124.9 RON.
- According to the new law, her recalculated pension as in January 2022 will be: 25.55 (total number of points accumulated) x RPV (reference point value of 2022). RPV is defined as the ratio between PV and the average effective level of the contribution periods provided for by the previous legislation, respectively 25. At the date when the new law enters into force, RPV = 1875 (=PV ad hoc set as from September 1st, 2021) / 25 = 75. Hence, this woman's pension will change to 25.55 x 75 = 1916.25 in 2022. Then, this amount will develop in line with the RPV (or, equally, PV) indexation.
- Note: in this numeric example we compared AR18 baseline with the new legislation frame (thus, including the PV assumptions from back in 2016). For comparability reasons, we can start the exercise as from the updated level of PV in 2022, which is 1875. Hence, her pension under the old rules would equal in 2022 with 0.91 x 1875 = 1706.25 RON. The increase up to the new value (1916.25) is by 12%. As we mentioned, such increase differs according to the year when the person retired. We carried out a simulation over the whole mass of pensioners, and the average resulted rise will be 20%.

Along the entire projection horizon, the ratio between the amount of her pensions (NEW vs OLD law), will be:

Pension benefit NEW = RPV_Y* N = PV new $_Y$/25*N

Pension benefit OLD = PV old $_Y$ *N*CI / T

where N = 25.5, T = 30.1, CI = 1.07, Y = current year

NEW/OLD = (PV new / PV old) $_{Y}$ * T[2015]/CI[2015]/25
NEW/OLD [(Y+1)/Y] =(PV new $_{Y+1}$ / PV new $_{Y}$) / (PV old $_{Y+1}$/PV old $_{Y}$) =
= (1+inflation + 50% x wage growth $_{Y}$) / (1+ inflation + 50% falling to 0% x wage growth $_{Y}$),

Hence, as numerator is higher than the denominator, the gap between NEW and OLD augments continuously. If this lady is lucky enough to reach the year 2070, her pension under the new law will be three times the one under the old law, at the end of the projection horizon The reason is that the new pension law is generous with the existing pensioners (recalculated pension amount formula plus 100% inflation + 50% wage growth indexation of the point value), while, on the other hand, the new streams will not benefit of the correction index (which connected the new pension amount with the wages) anymore.