Greek Pension System Fiche

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NATIONAL
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1. OVERVIEW OF THE GREEK PUBLIC PENSION SYSTEM

1.1. Description

The Greek public pension system comprises:

- ✓ Main pension provision – includes a main insurance fund (EFKA), which covers, on a mandatory basis, salaried employees, self-employed persons, seamen and agricultural workers;
- ✓ Auxiliary pension provision – includes an insurance fund (ETEAEP), which covers a big part of insured; Also, additional benefits are provided to specific professions, such as : lump sum benefits (ETEAEP - civil servants, military staff, engineers, lawyers, etc.) and dividends (civil servants, military staff).
- ✓ Means-tested benefits a) Uninsured elderly benefits b) Social solidarity grant provision (EKAS, which will be abolished as of 2020).

Table A shows insured individuals in main and auxiliary pension by type of occupation/profession.

TABLE A
Correspondence of main and auxiliary pension funds

	Main Fund	Occupational type	Auxiliary Fund
I.	EFKA (Unified Social Insurance Fund)	Private sector employees	ETEAEP (Private & Public sector employees)
I.a.		Public electricity company employees	
II.		Civil servants & Military (Firefighters-Policemen-Air Force-Army-Navy)	ETEAEP & Dividend Funds
III.		Self-employed	ETEAEP (on voluntary basis)
IV.		Agricultural workers	-
V.		Lawyers- Notaries - Engineers	ETEAEP
		Doctors	-
VI.		Media Employees	ETEAEP
VII.		Seamen	ETEAEP

A brief description of social pension system is given below.

1.1.1 Main pension provision

The most important laws over social pension system before the latest reform were 2084/1992, 3029/2002, 3655/2008, 3863/2010, 3865/2010 and 4336/2015.

In May 2016, the Greek Parliament adopted a comprehensive pension reform (law 4387/2016).

New law:

- ✓ Integrates all social insurance pension funds, including former OGA social insurance fund (for agricultural workers) and NAT (for seamen), into one single social insurance pension fund (EFKA) with common governance, administration and accounting framework.
- ✓ Harmonizes contribution rates and pension benefit rules for all (a small transition period is provided). A greater transition period is only allowed for former OGA fund.
- ✓ Affects the already accrued rights of both pensioners (except former OGA) and active insured (for former OGA insureds a 15 years transition period is provided) by applying the common pension benefit rules on those as well.

The key elements for main pension provision are:

(i) Immediate application of the main pension reform as of May 2016 (entry into force of law 4387/2016).

(ii) The introduction of a flat-rate pension (national pension) set at 384€/month (12 yearly payments) for at least 20 years of contributions. The amount of 384€ is decreased by 2% yearly for contributory period between 19 and 15 years (reduces to 345,60€ for 15 years). National pension is financed by the state.

(iii) The system introduces marginally applied accrual rates with the same profile for all workers that depend only on the length of the career. The new accrual rates are in broad terms lower than those in the old system.

(iv) Pensionable earnings are calculated based on the full-earnings history. The valorisation mechanism for the calculation of pensionable earnings is based on change in the average annual general consumer price index up to 2020 and for the period from 2021 onwards is based on the salary change index (calculated by ELSTAT).

(v) Pro-rating pension benefits:

a. A 3 years transition period for new retirees (except of former OGA), during which a pro-rata pension is granted. Two amounts are calculated. One amount is calculated on the basis of the old system and the other one based on the new system. If the amount resulting from the provisions of new system falls the amount resulting from the old calculation method by more than 20% then a proportion of the difference is paid as a personal difference to the retiree. (Proportion for 2016 : 50%, 2017 : 33%, 2018 : 25%).

   From 2019 onwards, new pensions are calculated based on the new rules for the whole insurance period (including also accrued rights up to the adoption of the reform).

   According to 2017 legislation, the above personal differences are eliminated from 1.1.2019.

b. For former OGA, there is a 15 years transition period for new retirees. During this period a pro-rata pension is granted, as the sum of a decreasing proportion of the old system pension and an increasing proportion of the new system pension.

(vi) Pension indexation (national and contributory part) is equal to the minimum of CPI and the sum of 50% CPI and 50% GDP growth [min(50% GDP growth +50% CPI, CPI)]. Indexation is frozen up to 2022.

(vii) All main pensions granted up to the entry into force of the law 4387 are recalibrated according to the new system's rules. Each pension consists of the following components: a) National pension, b) Contributory pension according to the new rules and c) Personal difference, as the difference between the total pension amount according to the old and new rules.
Personal differences that correspond to pensions with lower pension amount according to the new rules are fully or partially eliminated in 2019. Pension cut cannot exceed 18% of the pension paid (calculated according to the old rules). The remaining personal differences are compensated with future pension indexation starting from 2023 onwards. Personal differences that correspond to pensions with higher pension amount according to the new rules are granted in 5 installments starting from 2019 onwards.

(viii) The full contributory period is set 40 years.

(ix) Unified statutory retirement ages are set for all (67 years). The minimum age for retirement was set initially at 62. (L.4093/2012 & L.4336/2015)

(x) As from 2021, the minimum and statutory retirement ages are adjusted in line with changes in life expectancy every three years.

(xi) For those with less than 15 years of contributions, and thus not eligible for pension, a flat rate means-tested benefit (360€) is provided which constitutes an important social safety net.

(xii) The legislation includes a sustainability clause, which stipulates that if long-term projections show a rise in public pension expenditure over 2.5 percentage points of GDP in reference to 2009 expenditure, then relevant parameters of the pension system are changed to bring the increase of expenditure below the targeted threshold.

1.1.2 Auxiliary pension provision

The auxiliary pension provision began forming in the 1930s, based on the legislation of the main pension provision which had already come into effect. The employees of many different professions and companies founded several auxiliary funds. As of 1983 the auxiliary pension extended to the majority of employees.

Nevertheless, the defragmentation of the auxiliary pension provision bore the need of drastically reducing the number of auxiliary pension funds so that they could be better organized, managed and financially monitored. Initially, in 1992 law 2084 unified the pension formula for all people first insured from 1/1/1993, since each fund had its own provisions until then. Law 3655/2008 merged and incorporated many of these funds into newfound ones, according to the type of professions of their insured population.

The auxiliary pension provision works in parallel to the main pension provision and is mandatory for most people. Auxiliary pension is financed separately from the main pension from both employer and employee, without any state contribution. It is awarded under the prerequisite of receiving a main pension.

On February 2012 the Parliament adopted a reform of auxiliary pension system by law 4052/2012, which established a unified auxiliary pension fund aiming to incorporate all employees' funds, and introduced a pay-as-you-go (PAYG) notional defined contribution system (NDC). On May 2016 law 4387/2016 mainly introduced a unified calculation method for already accrued rights.

The key elements of the reform are:

i) A pro-rata pension calculation is applied for those insured before 1.1.2014. The new system is implemented starting on 1.1.2015 and pension comprises of two components: a) The first component part is using the arrangements of the DB system (accrual rate 0,45% and pensionable earnings calculated according to the method of the main pension) for as many years as the insured worked before 1.1.2015. b) The second component is using the NDC arrangements for as many years as the insured worked after 1.1.2015.

Those insured after 1.1.2014 are fully encompassed in the new NDC system.

ii) All auxiliary pensions granted up to 31.12.2014 are recalibrated according to the new system's rules. Each pension consists of the following components:

- ✓ Contributory pension according to the new rules.
- ✓ Personal difference, as the difference between the pension amount according to the old and new rules, only for the cases the new pension amount is lower than the old one.

Personal differences are completely eliminated starting from the 2nd half of 2016 in the case that the sum of pension amounts (main and auxiliary) is higher than €1300.
Remaining personal differences (for the cases that the sum of pension amounts -main and auxiliary - is lower than €1300) is eliminated fully or partially in 2019. Pension cut cannot exceed 18% of the pension paid (calculated according to the old rules).

ii) A balancing mechanism is applied to guarantee the system's financial stability, (no pension indexation in case of deficit). Any deficits are covered by fund's assets.

1.1.3 Lump sum benefits

A reform is also adopted regarding the lump sum benefits. The benefit consists of two parts. The first part concerns accrued rights up to 31.12.2013 and is calculated based on DB rules unified for all insured. The second part corresponds to accrued rights as from 1.1.2014 and is calculated based on NDC rules.

1.1.4 Means-tested benefits

Social solidarity grant (EKAS) is paid to already existing pensioners who legally reside in Greece. It is gradually eliminated up to 2019 and completely eliminated from 2020 onwards.
It is a non-contributory, flat-rate, means tested benefit. Its value depends on the pensioner's annual income from pensions, as well as the total annual personal and family taxable income.

Law, also provides means-tested benefits for uninsured elders under specific conditions.

1.1.5 Eligibility rules

Laws 3863/2010, 3865/2010, 4093/2012 and 4336/2015 increased retirement ages significantly by: i) unifying age thresholds for males and females, ii) imposing longer career prerequisites iii) closing paths to early retirement gradually up to 2021(more details in Annex I) and iv) introducing the life expectancy factor.

According to recent legislation the age thresholds are re-determined in line with the change in life expectancy of the country's population with the age of 65 years' as point of reference. That comes into effect as of 1.1.2021 and upon its first implementation the change within the 2010 - 2020 ten-year period will be taken into account. After the first implementation the change in life expectancy will be re-examined every three years.

Table 1 below shows the evolution of the statutory retirement age, earliest retirement age and penalties for early retirement over the projection period 2013-70.

TABLE 1 Qualifying condition for retiring

			2016	2020	2030	2040	2050	2060	2070
Qualifying condition for retiring with a full pension	Minimum requirements	Contributory period - men	40	40	40	40	40	40	40
		Retirement age - men	62,0	62,0	62+	62+	62+	62+	62+
		Contributory period - women	40	40	40	40	40	40	40
		Retirement age - women	62	62	62+	62+	62+	62+	62+
	Statutory retirement age - men		67	67	67+	67+	67+	67+	67+
	Statutory retirement age - women		67	67	67+	67+	67+	67+	67+
Qualifying condition for retirement WITHOUT a full pension	Early retirement age - men		62	62	62+	62+	62+	62+	62+
	Early retirement age - women		62	62	62+	62+	62+	62+	62+
	Penalty in case of earliest retirement age*		1/200	1/200	1/200	1/200	1/200	1/200	1/200
	Bonus in case of late retirement		-	-	-	-	-	-	-
	Minimum contributory period - men		15	15	15	15	15	15	15
	Minimum contributory period - women		15	15	15	15	15	15	15
	Minimum residence period – men**		15	15	15	15	15	15	15
	Minimum residence period – women**		15	15	15	15	15	15	15

* applied on national pension
** required for the national pension

If the estimations regarding the change in life expectancy of the population, according to the 2015-based population projections released by Eurostat, are materialized, then table 1 will be revised as follows (table 1a):

TABLE 1a Qualifying condition for retiring***			2016	2020	2030	2040	2050	2060	2070
Qualifying condition for retiring with a full pension	Minimum requirements	Contributory period - men	40	40	40	40	40	40	40
		Retirement age - men	62,0	62,0	63.7	64.6	65.5	66.7	67.6
		Contributory period - women	40	40	40	40	40	40	40
		Retirement age - women	62	62	63.7	64.6	65.5	66.7	67.6
	Statutory retirement age - men		67	67	68.7	69.6	70.5	71.7	72.6
	Statutory retirement age - women		67	67	68.7	69.6	70.5	71.7	72.6
Qualifying condition for retirement WITHOUT a full pension	Early retirement age - men		62	62	63.7	64.6	65.5	66.7	67.6
	Early retirement age - women		62	62	63.7	64.6	65.5	66.7	67.6
	Penalty in case of earliest retirement age*		1/200	1/200	1/200	1/200	1/200	1/200	1/200
	Bonus in case of late retirement		-	-	-	-	-	-	-
	Minimum contributory period - men		15	15	15	15	15	15	15
	Minimum contributory period - women		15	15	15	15	15	15	15
	Minimum residence period – men**		15	15	15	15	15	15	15
	Minimum residence period – women**		15	15	15	15	15	15	15

* applied on national pension
** required for the national pension
*** Estimated according to the 2015-based population/life expectancy projections released by Eurostat

1.1.6 Administrative data of new retirees by age group

The actual distribution of new retirees by age group and pension category, based in administrative data for 2015 is given in tables 2a, 2b & 2c (men, women & total respectively).

TABLE 2a Number of new pensioners by age group - administrative data 2015 (MEN)					
Age group	All	Old age	Disability	Survivor	Other (including minimum)
15 - 49	3,447	943	2,504		
50 - 54	4,171	2,744	1,427		
55 - 59	12,919	10,867	2,052		
60 - 64	22,749	21,336	1,413		
65 - 69	12,216	11,765	451		
70 - 74	1,666	1,639	27		

TABLE 2b Number of new pensioners by age group - administrative data 2015 (WOMEN)					
Age group	All	Old age	Disability	Survivor	Other (including minimum)
15 - 49	2,299	595	1,704		
50 - 54	11,433	10,583	850		
55 - 59	13,695	12,832	863		
60 - 64	9,974	9,359	615		
65 - 69	13,026	12,766	260		
70 - 74	1,048	1,016	32		

TABLE 2c Number of new pensioners by age group - administrative data 2015 (TOTAL)					
Age group	All	Old age	Disability	Survivor	Other (including minimum)
15 - 49	5,746	1,538	4,208		
50 - 54	15,604	13,327	2,277		
55 - 59	26,614	23,699	2,915		
60 - 64	32,723	30,695	2,028		
65 - 69	25,242	24,531	711		
70 - 74	2,714	2,655	59		

In the last years including 2015, there were massive retirements due to increased unemployment and the expected reform regarding eligibility rules (in order to avoid to be blocked in the system).

In 2016 the number of new pensions declines compared to previous years as the impact of the 2015 reform is evident. Relevant administrative data regarding 2016 new pensions are included in table 2d.

TABLE 2d Number of new pensioners by age group - administrative data 2016 (TOTAL)					
Age group	All	Old age	Disability	Survivor	Other (including minimum)
15 - 50	4,736	1,305	3,431		
51 - 55	10,720	8,785	1,935		
56 - 60	19,704	17,170	2,534		
61 - 65	24,787	23,249	1,538		
66 - 70	19,661	19,172	489		
71 - 75	1,851	1,774	77		

1.2. Recent reforms of the pension system included in the projection

All recent reforms are included in the projection exercise.

1.2.1. Main pension provision

A summary of main provisions of the new legislation (l.4336/2016 and l.4387/2017), which applies to all main pensions, is provided below.

The pension amount consists of two components, namely the:

National pension: It is a flat-rate pension which is granted only if at least 15 years of contributions are accrued (for old age pensions). Initially, it is set at €384 per month for at least 20 years of contributions (payable 12 times a year). The national pension is reduced :

- ✓ by 2% for each year of contributions below 20 years, between 19 and 15 years (reduces to 345,60€ for 15 years),
- ✓ by 2.5% for each year of residence below 40 years, and
- ✓ by 0.5% for each month the insured is younger than the normal retirement age.

Also, pensioners receiving a reduced pension due to disability, with a disability rate of:

- ✓ 67% up to 79.99%, 75% of the national pension is granted,
- ✓ 50% up to 66.99%, 50% of the national pension is granted
- ✓ Especially for the Public Sector for a percentage disability up to 49.99%, 40% of the national pension is granted.

The cost of national pension is financed by the state through annual transfers to the social insurance system.

NOTE : Pensioners with two or more pensions by own rights are entitled to only one national pension. This, however, was not taken into account in the estimations, which makes results prudent.

Contributory pension: The amount of pension which is in proportion to the amount of insurance contributions pertaining to the years of insurance. The contributory pension amount aims at rewarding insured people who choose to prolong their working lives.

Accrual Rates of contributory pension:

Law 4387/2016 introduces accrual rates (table B), for the contributory part of the pension that depend only on the length of the career (for all pension categories), with the same profile for all workers. Rates are applied marginally and not on the entire contributory career:

TABLE B
Statutory Accrual Rates for the contributory pension component

Years of Insurance		ANNUAL ACCRUAL RATE
FROM	TO	
0	15	0.77%
15.01	18	0.84%
18.01	21	0.90%
21.01	24	0.96%
24.01	27	1.03%
27.01	30	1.21%
30.01	33	1.42%
33.01	36	1.59%
36.01	39	1.80%
39.01+		2.00%

Average pensionable salary:

For calculating the contributory component of the pension, the pensionable earnings are derived taking into account the average monthly earnings of the insured for the whole of his insurance life. This average is calculated as the total earnings divided by his total insurance period. Total earnings are the sum of the monthly earnings subject to contributions throughout his insurance life.

For all self-employed the monthly earnings are the actual income on which contributions have been paid throughout their insurance life. For the period up to the entry into force of the law 4387, monthly earnings are resulting from dividing the monthly contribution paid (based mainly on insurance classes) by the rate of the

contribution. Any social sources in favor of the corresponding funds and any contributions paid by the employer is taken into account on an individual basis.

For insured retiring from the entry into force of the law 4387 until the end of 2016 the pensionable earnings are derived taking into account monthly earnings of the insured from 2002 until the end of his insurance life. From 2017 onwards this reference period is increased by one year.

Max pensionable earnings (for all insureds)	:	5.860 euro
Min pensionable earnings (for all except former OGA insureds)	:	586 euro
Min pensionable earnings (for OGA insureds)	:	70%*586 euro

For the period up to 2020, pensionable earnings are valorized by the change in the average annual general consumer price index (CPI) while from 2021 onwards the increase in pensionable earnings is carried out on the basis of the salary change index (which will be calculated by ELSTAT).

Harmonization of contribution rate:

Under the law 4387, all social insurance contribution rates are gradually harmonized with those of IKA-ETAM. Average contribution rate will increase in the future, mainly because for ex.OGA fund (farmers) the contribution rate gradually increases from 7% to 20% and for the Public Sector the contribution rate gradually increases from 6,67% to 20%. In cases of insured persons who have paid or will pay contributions higher than those of IKA-ETAM, the contributory pension is increased by an additional amount. This amount is calculated with an annual replacement rate of 0.075% for each percentage point (1%) of additional contribution. The pensionable salary in this case is derived taking into account the basis for calculating the additional contribution.

Pro-rating pension benefits:

a. There is a 3 years transition period for new retirees (except of former OGA retirees), during which a pro-rata pension is granted. Two amounts are calculated. One amount is calculated on the basis of the old system and the other one based on the new system. If the amount resulting from the provisions of law 4387 falls the amount resulting from the old calculation method by more than 20% then:
    i) For insured retiring from the entry into force of the law 4387 until the end of 2016, half of this difference is paid to the retiree as a personal difference.
    ii) For the new retirees of 2017, then the one-third of this difference is paid to the retiree as a personal difference.
    iii) For the new retirees of 2018, then 25% of this difference is paid to the retiree as a personal difference.

    NOTE: According to the provisions of law 4472/2017, the above personal differences are eliminated from 1.1.2019.

There is a 15 years transition period for new retirees of OGA, during which a pro-rata pension is granted. For insured retiring from 1.1.2017 until the end of 2030 the amount of pension is derived from the sum of two sub-amounts: by a% of the amount resulting from the old provisions of OGA and by b% of the sum of the national and the contributory pension according to l.4387. Table III below shows the values for a% & b%.
For insured of OGA retiring during 2016 the old provisions of OGA are applied.

Table C - % PRO RATA						
2017	6.20%	New System		2017	93.80%	Old System
2018	12.90%			2018	87.10%	
2019	19.60%			2019	80.40%	
2020	26.30%			2020	73.70%	
2021	33.00%			2021	67.00%	
2022	39.70%			2022	60.30%	
2023	46.40%			2023	53.60%	
2024	53.10%			2024	46.90%	
2025	59.80%			2025	40.20%	
2026	66.50%			2026	33.50%	
2027	73.20%			2027	26.80%	
2028	79.90%			2028	20.10%	
2029	86.60%			2029	13.40%	
2030	93.30%			2030	6.70%	
2031	100.00%			2031	0.00%	

Pension indexation:

Pension indexation is fully linked to a uniform adjustment index which cannot exceed CPI. In particular, the index is equal to the minimum of CPI and the sum of 50% CPI and 50% GDP growth [min (50% GDP growth +50% CPI, CPI)].

Minimum/maximum pension amount:

The new law does not include provisions on either minimum or maximum pensions.

Invalidity pensions:

Current legislation provides unified eligibility rules for Invalidity pensions.

Survivor pensions:

The eligibility rules for survivor pensions have been modified with Law 4387/2016. Pension is awarded to the surviving spouse, provided he/she has completed the 55th year of age at the time of death of the pensioner or of the insured person. If he/she has completed the 52nd year of age at the above time, he/she is entitled to a pension for a period of three (3) years, after the lapse of which the payment of the pension will be suspended until the completion of the 67th year of age. If he/she has not completed the 52nd year of age at the above time, he/she is entitled to a pension for a period of three (3) years.

For children, pension is awarded under the condition that: a) they are not married and they have not completed the 18th year of their age. This limit is extended until the 24th year of their age, provided they are studying.

Life expectancy:

The legislation stipulates a retirement age increase mechanism from year 2021 onwards, that will adjust the retirement age in line with life expectancy every three years.

1.2.2. Auxiliary pension provision

NDC system

Auxiliary pension scheme provides old-age pensions as well as pensions to disabled and survivors. Before 1.1.2014 a defined benefit system was implemented.

A pay-as-you-go (PAYG) notional defined contribution system (NDC) is introduced with the following elements:

(i) The notional rate of return, which is the annual growth in pensionable earnings (contributory earnings) of all insured with the Fund, applied for the accumulation of contributions.

(ii) The life expectancy at retirement, applied for the calculation of the amount of pension.

(iii) A balancing mechanism applied to guarantee the system's financial stability (no pension indexation in case of deficit).

Benefits Calculation:

The amount of pension paid must be entirely linked to the pensioner's age. All insured after 1.1.2014 are fully encompassed in the new system.

In order to calculate the amount of old-age pension, a whole life annuity is used, taking into account the transfer of pension rights to Assignees (survivors).
Disability pensions are calculated using the proper age annuity for each case.
Whole life annuities are recalculated every three years (change in life expectancy).

Pro-rating pension benefits :

For those insured before 1.1.2014, the new system is implemented pro rata starting on 1.1.2015 and they are awarded a pension which consists of two components:

- ✓ The first component part is using the arrangements of the DB system (accrual rate 0,45% and pensionable earnings calculated according to the method of the main pension) for as many years as the insured worked before 1.1.2015.
- ✓ The second component is using the NDC arrangements for as many years as the insured worked after 1.1.2015.

Indexation:

The formula for auxiliary pensions benefit indexation is: $\gamma_t = \min\left(\left[1+g_{t-2}-r\right]-1, \mathrm{CPI}_{t-1}\right)$

Where

g_{t-2} : notional rate of return,

r :discount rate=1,3% (used in annuities calculation)

CPI_{t-1} : Consumer Price Indexation

The indexation can take negative values.

1.2.3. Other welfare benefits

a) Uninsured elders benefits

A social allowance is granted to the uninsured elders if they meet the following conditions:

- ✓ They have reached the age of 67.
- ✓ They do not receive or are not entitled to a pension.

The allowance is a non-contributory, flat-rate, means tested benefit. Its current value is €360 per month, payable 12 months per year.

b) Pensioners' Social Solidarity Allowance (EKAS)

EKAS is a non-contributory, flat-rate, means tested benefit. Its value depends on the pensioner's income from pensions. It is paid to already existing pensioners.

1.2.4. Additional measures to control expenditure

Measures implemented in 2016 to control expenditure:

- ✓ Reduction of MTPY dividend fund benefit expenditures
- ✓ Reduction of EKAS benefit expenditures

Other measures to control expenditure include:

A. Main Pension

i. Benefits indexation is frozen up to 2022.

ii. Main Pensions Recalibration

All pensions granted up to the entry into force of the law 4387 are recalibrated according to the new system's rules. Each pension is captured in the IT System files with the following components:

- ✓ National pension
- ✓ Contributory pension according to the new rules
- ✓ Personal difference, as the difference between the pension amount according to the old and new rules.

Personal differences that correspond to pensions with lower pension amount according to the new rules is eliminated fully or partially in 2019. Pension cut cannot exceed 18% of the pension paid (calculated according to the old rules). The remaining personal differences are compensated with future pension indexation starting from 2023 onwards.

Personal differences that correspond to pensions with higher pension amount according to the new rules are granted in 5 installments starting from 2019 onwards.

B. Auxiliary Pension

Auxiliary Pensions Recalibration

All pensions granted up to 31.12.2014 are recalibrated according to the new system's rules. Each pension is captured in the IT System files with the following components:

- ✓ Contributory pension according to the new rules.
- ✓ Personal difference, as the difference between the pension amount according to the old and new rules, only for the cases the new pension amount is lower than the old one.

Personal differences are completely eliminated starting from the 2nd half of 2016 in the case that the sum of pension amounts (main and auxiliary) is higher than €1300. The measure's result is fully captured on an annual basis in the benefit expenditure in 2017.
Remaining personal differences (for the cases that the sum of pension amounts -main and auxiliary - is lower than €1300) are eliminated fully or partially in 2019. Pension cut cannot exceed 18% of the pension paid (calculated according to the old rules).

C. EKAS benefit
EKAS benefit is gradually eliminated up to 2019.

2. DEMOGRAPHIC AND LABOUR FORCES PROJECTIONS

2.1. Demographic Development

The evolution of main demographic variables is given in table 3. The population is projected by EUROSTAT and decreases from 10.759 million in 2016 to 7.660 million in 2070. Furthermore, the old-age dependency ratio increases from 33.4 in 2016 up to 71.0 in 2050 and then decreases to 63.1 in 2070.

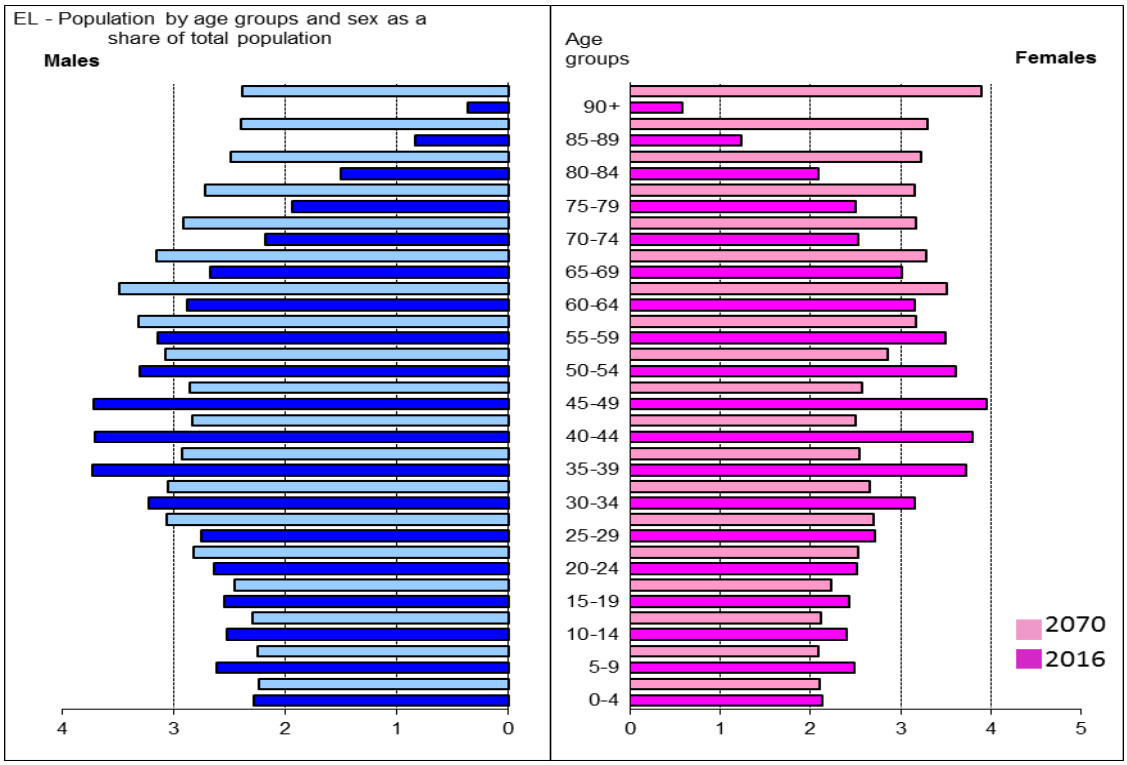
Life expectancy at birth, for men increases from 78.8 in 2016 to 86.5 in 2070 and for women, also increases from 83.9 in 2016 to 90.3 in 2070. Life expectancy at 65 for men, goes from 18.7 in the base year to 23.8 at the end of the projection period, while for women goes from 21.4 to 26.6. Increased life expectancy at 65 is an important factor for the projection, as statutory retirement ages are automatically linked with this factor.

Net migration is forecasted to be negative up to 2031, which is considered important factor for the projected population shrinkage.

Table 3 - Main demographic variables evolution

	2016	2020	2030	2040	2050	2060	2070	Peak year*
Population (thousand)	10,759	10,531	9,916	9,396	8,890	8,262	7,660	2016
Population growth rate	-0.6	-0.6	-0.6	-0.5	-0.6	-0.8	-0.7	2017
Old-age dependency ratio (pop65/pop15-64)	33.4	36.1	44.9	59.2	71.0	67.2	63.1	2051
Ageing of the aged (pop80+/pop65+)	30.8	32.2	32.1	34.2	39.4	48.6	49.1	2064
Men - Life expectancy at birth	78.8	79.6	81.2	82.6	84.0	85.3	86.5	2070
Men - Life expectancy at 65	18.7	19.2	20.2	21.2	22.1	23.0	23.8	2070
Women - Life expectancy at birth	83.9	84.5	85.8	87.0	88.2	89.3	90.3	2070
Women - Life expectancy at 65	21.4	21.9	22.9	23.9	24.8	25.7	26.6	2070
Men - Survivor rate at 65+	85.1	86.1	88.2	90.0	91.5	92.8	93.8	2070
Men - Survivor rate at 80+	57.4	59.8	64.7	69.2	73.2	76.7	79.9	2070
Women - Survivor rate at 65+	93.0	93.5	94.4	95.2	95.8	96.4	96.9	2070
Women - Survivor rate at 80+	75.7	77.3	80.4	83.2	85.5	87.6	89.4	2070
Net migration	-23.9	-16.8	-4.1	7.9	13.3	10.5	11.0	2048
Net migration over population change	0.4	0.3	0.1	-0.2	-0.2	-0.2	-0.2	2017

GRAPH 1 shows the age pyramid comparison between 2016 and 2070 for men and women.



2.2. Labour Force

Labor force participation is projected to increase for workers aged 55-64 (from 45.2% in 2016 to 75.3% in 2070 – table 4). The largest increase will occur until 2066 (reaching 75.6%). Labor force participation is projected to increase significantly also for workers aged 65-74 (from 6.2% in 2016 to 34.7% at the end of the projection).

Employment rate for workers aged 65-74, increases from 5.4 in 2016 to 33.6 in 2070, which affects the projection results.

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	45.2	48.8	65.0	71.3	74.6	75.3	75.3	2066
Employment rate for workers aged 55-64	36.5	42.2	59.1	65.8	69.9	70.6	70.6	2066
Share of workers aged 55-64 on the labour force 55-64	80.8	86.4	90.9	92.3	93.7	93.7	93.7	2070
Labour force participation rate 65-74	6.2	5.9	10.3	18.0	23.4	28.8	34.7	2070
Employment rate for workers aged 65-74	5.4	5.3	9.7	17.1	22.5	27.7	33.6	2070
Share of workers aged 65-74 on the labour force 65-74	87.1	91.1	93.9	95.1	96.3	96.4	96.6	2070
Median age of the labour force	40	42	45	44	43	44	44	2030

Due to pension reforms the average contributory period will reach 37.8 years for men and 37.1 for women by 2070 (tables 5a & 5b respectively). Percentage of adults life spent at retirement decreases for both men and women.

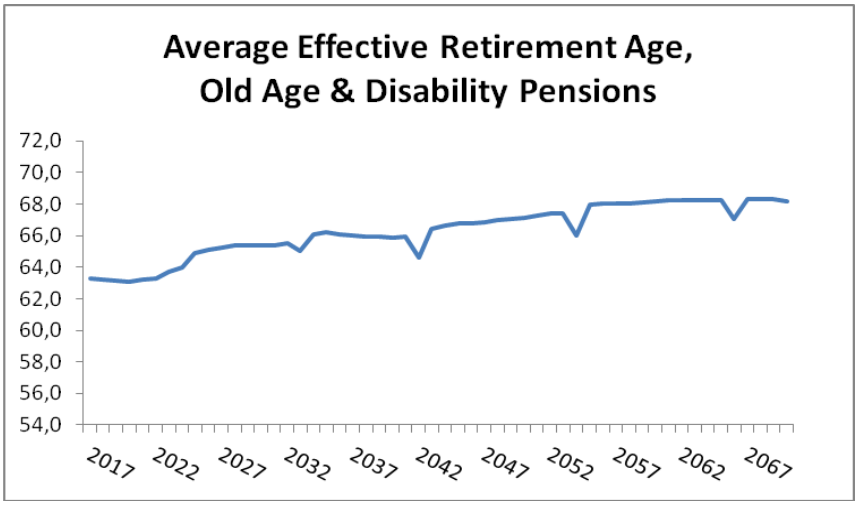
TABLE 5a
Labour market effective exit age and expected duration of life spent at retirement - MEN

	2017	2020	2030	2040	2050	2060	2070	Peak year
Average effective exit age (CSM) (II)	62.3	63.0	65.0	66.3	67.0	67.2	67.8	2070
Contributory period	31.6	31.5	31.8	33.8	35.6	37.1	37.8	:
Duration of retirement	21.1	20.7	20.2	20.4	20.4	21.3	21.2	2065
Duration of retirement/contributory period	0.7	0.7	0.6	0.6	0.6	0.6	0.6	:
Percentage of adult life spent at retirement	32.3	31.5	30.1	29.7	29.4	30.2	29.8	2017
Early/late exit	5.0	5.3	7.2	5.2	2.4	5.2	15.2	2069

TABLE 5b
Labour market effective exit ahe and expected duration of life spent at retirement - WOMEN

	2017	2020	2030	2040	2050	2060	2070	Peak year
Average effective exit age (CSM) (II)	61.6	62.8	64.7	66.0	66.9	67.6	68.3	2070
Contributory period	29.3	28.9	30.6	32.3	34.6	35.7	37.1	:
Duration of retirement	24.3	23.7	22.9	23.0	23.0	22.9	23.8	2019
Duration of retirement/contributory period	0.8	0.8	0.7	0.7	0.7	0.6	0.6	:
Percentage of adult life spent at retirement	35.8	34.6	32.9	32.4	32.0	31.6	32.1	2017
Early/late exit	5.5	4.9	8.2	4.5	2.3	3.7	8.2	2030

GRAPH 2 shows the evolution of the average retirement age over the projection period.



3. PENSION PROJECTION RESULTS

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

This projection covers the pension expenditure of the main, auxiliary and social solidarity grant provision.

In table 6, the total public pension expenditure is presented as defined by Eurostat (ESSPROS)and AWG.

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

	2007	2008	2009	2010	2011	2012	2013	2014
1 Eurostat total pension expenditure	12.3	13.1	14.3	14.8	16.4	17.7	16.7	17.2
2 Eurostat public pension expenditure	12.3	13.1	14.3	14.8	16.4	17.7	16.6	17.1
3 Public pension expenditure (AWG)	:	:	:	:	:	:	16.2	:
4 Difference (2) - (3)	:	:	:	:	:	:	0.4	:
5 Expenditure categories not considered in the AWG definition, please specify:	:	:	:	:	:	:	:	:
5.1 …	:	:	:	:	:	:	:	:
5.2 …	:	:	:	:	:	:	:	:
5.3 …	:	:	:	:	:	:	:	:

In line 2 of the above table, benefit expenditure of main and auxiliary pension as well as dividends are included. The difference between Eurostat and AWG pension expenditure in 2013 is due to the revision of both GDP (denominator) and national accounts expenditure (numerator).

3.1.1. Main pension provision

The schemes modelled cover 99.6% of the 2016 main pension benefit expenditure. The total main benefit expenditure is14.74%, of GDP in 2016, from which 14.68% is analytically modelled.

In order to guarantee the full (100%) coverage in the projections, there has been a loading of 0.06% of GDP for the year 2016 (for former ETAP-MME) on the amount of total benefits.

3.1.2. Auxiliary pension provision

ETEAEP public auxiliary scheme was modeled.

The total auxiliary benefit expenditure is 2.06% of GDP in 2016.

The pension expenditure of ETEAEP is approximately 84.5% (1.74% of GDP) of the total auxiliary benefit expenditure for the year 2016.

In order to guarantee the full (100%) coverage in the projections, there has been a loading on the amount of total benefits (0.32% of GDP in 2016) for the rest of the funds which are not explicitly modeled. The loading covers dividend schemes (public sector/MTPY, army, navy, and air force).

3.2. Overview of projection results

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 expenditure	17.3	13.4	12.0	12.9	12.5	11.5	10.6	2016
Private occupational pensions	:	:	:	:	:	:	:	:
Private individual pensions	:	:	:	:	:	:	:	:
Mandatory private	:	:	:	:	:	:	:	:
Non-mandatory private	:	:	:	:	:	:	:	:
Gross total pension expenditure	17.3	13.4	12.0	12.9	12.5	11.5	10.6	2016
Net public pension expenditure	:	:	:	:	:	:	:	:
Net total pension expenditure	:	:	:	:	:	:	:	:
Contributions	2016	2020	2030	2040	2050	2060	2070	Peak year*
Public pension contributions	13.7	12.6	12.3	12.6	12.2	11.5	10.8	2016
Total pension contributions	13.7	12.6	12.3	12.6	12.2	11.5	10.8	2016

The main points in relation to table 7 are:

- ✓ Overall, the total public pension expenditure amounted to 17.3% of GDP in 2016 while the respective amount for 2070 reaches 10.6%. This represents a total decrease of 6.7% of GDP over the projection period 2016-70. The maximum value of 17.3% of GDP is obtained in 2016.
- ✓ The total amount of contributions from employers, employees and state for the public pension funds decreases from 13.7% of GDP in 2016 to 10.8% of GDP in 2070.

NOTES:

1) Legislated state contribution is included in the projections. Other revenues, like income from property, additional government grants e.t.c. are not included in this study.
2) Table 7 includes :
   i) Main, auxiliary, EKAS and uninsured benefit expenditure and the respective contributions.
   ii) Outstanding claims (new awards) for both main and auxiliary and the respective benefit expenditures.
   iii) Loadings for benefits/contribution for main and auxiliary funds.
3) a) In base year 2016 the gross benefit expenditure is subject to
   i) Social Solidarity Contribution for pensioners (2,4% average)
   ii) 6% Health contribution
   iii) Taxes (6.9% average)
   b) According to the above, net expenditure is about 86% of the gross expenditure. Above tax revenues correspond to 2.1% of GDP in the base year.
   c) Taxation system is going to change in 2020 and the average effective tax rate is estimated to be 10.7%. A detailed description of taxation can be found in Annex II.
4) According to legislation, no state funding is provided for possible deficits of the auxiliary pension (ETEAEP). Deficits are covered by fund's assets. At the end of the base year, assets (securities, cash and deposits) amount about 2.7 billion €.

5) Lump sum benefits for the base year amounted to 660mil. (i.e. 0.38% GDP). Due to existing arrears the expenditure for the next two years is expected to be around 950mil. Afterwards it will stabilize around 750mil. yearly (0.4% GDP). The respective contributions amount yearly around 950mil. (0.5% GDP).

3.2.1. Projection results disaggregation

TABLE 7a Projection results disaggregation (%GDP)								
	2016	2020	2030	2040	2050	2060	2070	Peak year
Gross public pension expenditure	17.3	13.4	12.0	12.9	12.5	11.5	10.6	2016
Main pension expenditure	14.7	11.8	10.5	11.3	11.0	10.0	9.2	2016
Auxiliary pension expenditure	2.1	1.6	1.4	1.5	1.4	1.4	1.4	2016
Uninsured benefits	0.1	0.1	0.1	0.1	0.1	0.1	0.0	2043
EKAS	0.4	0.0	0.0	0.0	0.0	0.0	0.0	2016
Public pension contributions	13.7	12.6	12.3	12.6	12.2	11.5	10.8	2016
Main Employer & Employee	5.2	5.5	6.0	6.1	6.0	6.0	6.1	2035
Auxiliary	1.7	1.6	1.5	1.5	1.5	1.5	1.5	2016
State	6.8	5.5	4.8	5.0	4.7	4.0	3.3	2016

Table 7a gives the disaggregation of benefit expenditure and contributions into main and auxiliary pensions and also to means-tested benefits (uninsured benefits and EKAS).

It is noted that the total pension expenditure is reduced by 3.9% from 2016 to 2020. This drop is due to the following reasons :

- ✓ Elimination of EKAS
- ✓ Reduction (2016/2017) of existing pre-reform auxiliary pensions in the case that the sum of pension amounts -main and auxiliary- is higher than €1300.
- ✓ Reduction (2019) of existing pre-reform auxiliary pensions in the case that the sum of pension amounts -main and auxiliary - is lower than €1300, (cut up to the 18% of the pension paid).
- ✓ Reduction (2019) of existing pre-reform main pensions with lower pension amount according to the new rules than the paid pension, (cut up to the 18% of the pension paid).
- ✓ Elimination of personal differences of new main pensions awarded after the adoption of law 4387/2016 up to 2018.
- ✓ Impact of the reform regarding eligibility rules (unified for men and women) by closing paths to early retirement gradually up to 2021.
- ✓ Freezing of pensions (numerator) in parallel to a GDP (denominator) cumulative growth of 14% in the period 2016-2020.

The benefit expenditure continues to drop in the period 2020-2030 due to:

- ✓ Impact of the reform on the new main pensions
- ✓ Compensation of the remaining personal differences of main pensions, awarded up to May 2016, with future pension indexation starting from 2023 onwards.
- ✓ Impact of the reform on the new auxiliary pensions, (gradually application of NDC system).
- ✓ Freezing of pensions up to 2022.

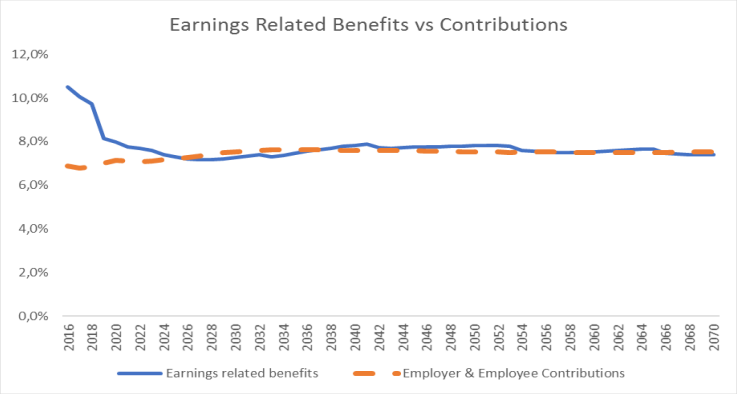
In the period 2030-2040 the benefit expenditure increases mainly due to the increasing number of pensions in the same period, which results from the increasing employment in the first years of the projection.

From 2042 onwards the benefit expenditure is gradually decreasing due to :

- ✓ the decreasing number of pensions, resulting from the decreasing population,
- ✓ the impact of the reform regarding eligibility rules (retirement age linked to life expectancy) and
- ✓ pension calculation rules (i.e. whole career pensionable salary, full introduction of NDC system combined with the application of balancing mechanism).

Expenditure includes earnings related and flat components benefits. From 2026 onwards the earnings related component of main and auxiliary benefits is financed by employers and employees contributions.

GRAPH 3 shows the evolution of the earnings related benefits without flat component, versus employers and employees contributions.



3.2.2. Projection results by scheme

Table 8 gives the analysis of the expenditure results by pension scheme.

TABLE 8 Projected gross public pension spending by scheme (% of GDP)								
Pension scheme	2016	2020	2030	2040	2050	2060	2070	Peak year *
Total public pensions	17.3	13.4	12.0	12.9	12.5	11.5	10.6	2016
of which								
Old age and early pensions:	12.9	10.2	9.1	9.9	9.8	9.0	8.3	2016
Flat component	4.8	4.1	3.6	4.0	3.8	3.2	2.6	2016
Earnings related	8.1	6.1	5.5	6.0	6.0	5.8	5.7	2016
Minimum pensions (non-contributory) i.e. minimum income guarantee for people above 65	:	:	:	:	:	:	:	:
Disability pensions	1.22	1.00	0.93	0.95	0.95	0.93	0.87	2016
Survivor pensions	2.39	1.88	1.73	1.66	1.47	1.30	1.14	2016
Other pensions	:	:	:	:	:	:	:	:
Loading (Main and auxiliary)	0.38	0.34	0.29	0.30	0.30	0.30	0.30	
EKAS	0.42	0.0	0.0	0.0	0.0	0.0	0.0	
of which								
country-specific scheme 1	:	:	:	:	:	:	:	:
country-specific scheme 2	:	:	:	:	:	:	:	:
country-specific scheme 3	:	:	:	:	:	:	:	:

Old-age benefits, decline from 12.9% at 2016 to 9.1% to 2030 and then increase to 9.9% up to 2040 and finally decline to 8.3% at the end of the projection period, due to the reasons referred in paragraph 3.2.1.

Survivors' pensions benefits are also decreasing (from 2.4% of GDP in 2016 to 1.1% in 2070) due to :

- ✓ new stricter eligibility criteria for survivor's pensions (new age limit for spouses 52 & 55)
- ✓ lower transfer rate 50%. In the first part of the projection survivors receive 70% of the deceased's pension, according to the old system rules, while new survivors, who gradually replace the existing ones, receive 50% of the deceased's pension.

For disability pensions, expenditure decreases from 1.2% of GDP in 2016 to 1% in 2020, due to the reasons referred in paragraph 3.2.1, and stabilizes to 0.9% of GDP from 2030 and afterwards.

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

This part provides more details about the development of public pension expenditures (Table 8a and Table 8b). It uses a standard arithmetic decomposition of a ratio of pension expenditures to GDP into the dependency, coverage, benefit ratio, employment rate and labour intensity.

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

The coverage ratio is further split with the scope of investigating the take-up ratios for old-age pensions and early pensions as below:

$$\overbrace{\frac{\text{Number of Pensioners}}{\text{Population } 65+}}^{\text{Coverage Ratio}} =$$

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

The labour market indicator is further decomposed according to the following:

$$\overbrace{\frac{\text{Population } 20-64}{\text{Hours Worked } 20-74}}^{\text{Labour Market / Labour Intensity}} =$$

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

The decomposition, which is calculated using both data on pensions (Table 9a) and pensioners (Table 9b), is shown below.

The following tables describe the disaggregation of the total cost into its major components. These are: benefit ratio, dependency ratio, coverage ratio and ratio of labor market and labor intensity. The impact of these components to the GDP change between 2016 and 2070 varies depending on the importance of each one of them.

Pension expenditure as a percentage of GDP is lower at the end of the projection period compared to the starting year.

It is evident that the major strike of the dependency ratio due to ageing is tackled by the reform.
In particular:

i) The coverage ratio change by -0.2/pensions and -1.9/pensioners pp of GDP, which mainly comes from an impressive decrease of coverage ratio early-age (-17.2/pensions). This results due to the enforcement of much stricter criteria for old-age pension acquisition and the increase of the retirement ages by as many years as the life expectancy is estimated to be increased.
ii) The improved employment effect.
iii) The reduced benefit ratio.

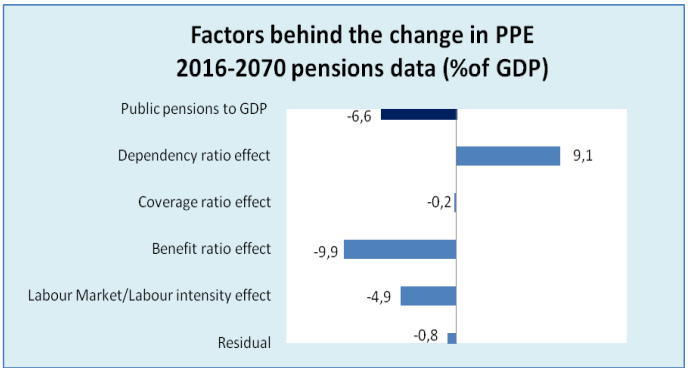
TABLE 9a Factors behind the change in public pension expenditures between 2016 and 2070 using pension data (in percentage points of GDP) - pensions								
	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70	Average annual change
Public pensions to GDP	-3.9	-1.4	0.8	-0.3	-1.0	-0.9	-6.6	-0.01%
Dependency ratio effect	1.4	3.0	3.5	2.6	-0.6	-0.8	9.1	15.7%
Coverage ratio effect	-0.4	-1.2	0.0	0.1	0.8	0.6	-0.2	-0.3%
Coverage ratio old-age*	0.5	0.4	0.4	0.4	0.9	0.6	3.2	5.7%
Coverage ratio early-age*	-3.1	-7.9	-0.9	-1.0	-2.9	-1.4	-17.2	-33.8%
Cohort effect*	0.0	-1.2	-3.6	-3.8	1.5	1.1	-6.0	-12.3%
Benefit ratio effect	-3.3	-1.6	-1.3	-1.9	-1.4	-0.5	-9.9	-18.5%
Labour Market/Labour intensity effect	-1.6	-1.4	-1.0	-0.8	0.1	-0.2	-4.9	-9.0%
Employment ratio effect	-1.7	-1.2	-0.6	-0.5	0.1	0.0	-4.0	-7.2%
Labour intensity effect	0.04	0.03	-0.01	-0.01	0.00	0.00	0.05	0.1%
Career shift effect	0.0	-0.2	-0.4	-0.3	0.1	-0.2	-1.0	-1.9%
Residual	0.0	-0.2	-0.3	-0.2	0.0	0.0	-0.8	11.9%

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

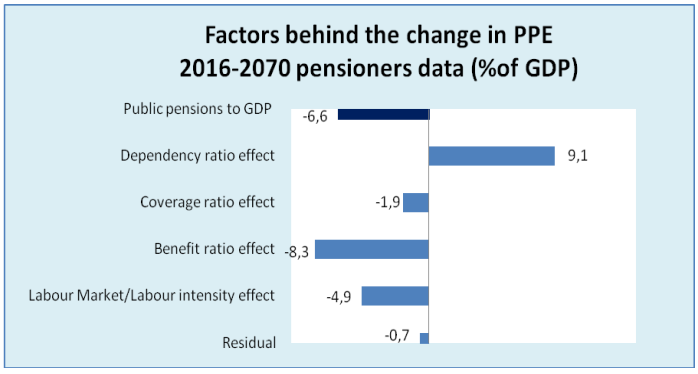
TABLE 9b Factors behind the change in public pension expenditures between 2016 and 2070 using pensioners data (in percentage points of GDP) - pensioners								
	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70	Average annual change
Public pensions to GDP	-3.9	-1.4	0.8	-0.3	-1.0	-0.9	-6.6	-0.01%
Dependency ratio effect	1.4	3.0	3.5	2.6	-0.6	-0.8	9.1	15.7%
Coverage ratio effect	-0.8	-1.6	-0.3	-0.3	0.5	0.4	-1.9	-3.5%
Coverage ratio old-age*	:	:	:	:	:	:	:	:
Coverage ratio early-age*	:	:	:	:	:	:	:	:
Cohort effect*	0.0	-1.2	-3.6	-3.8	1.5	1.1	-6.0	-12.3%
Benefit ratio effect	-3.0	-1.2	-1.1	-1.6	-1.1	-0.3	-8.3	-15.4%
Labour Market/Labour intensity effect	-1.6	-1.4	-1.0	-0.8	0.1	-0.2	-4.9	-9.0%
Employment ratio effect	-1.7	-1.2	-0.6	-0.5	0.1	0.0	-4.0	-7.2%
Labour intensity effect	0.04	0.03	-0.01	-0.01	0.00	0.00	0.05	0.1%
Career shift effect	0.0	-0.2	-0.4	-0.3	0.1	-0.2	-1.0	-1.9%
Residual	0.1	-0.2	-0.3	-0.2	0.0	0.0	-0.7	12.0%

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

GRAPH 4a



GRAPH 4b



Benefit ratio and coverage ratio effects differ, when calculated in terms of pensions or pensioners because a large number of pensioners receive more than one pension (mainly auxiliary, survivor pension e.t.c.), causing the difference observed in the results.

Table 10 shows the evolution of the overall replacement rates for the main and auxiliary pension provision over the projection period 2016-70.

TABLE 10
Replacement rate at retirement (RR), benefit ratio (BR) and coverage by pension scheme (in %)

	2016	2020	2030	2040	2050	2060	2070
Public scheme (BR)	0.77	0.64	0.59	0.54	0.47	0.43	0.42
Public scheme (RR)	:	0.52	0.52	0.51	0.47	0.45	0.44
Coverage	100	100	100	100	100	100	100
Public scheme old-age earnings related (BR)	0.80	0.67	0.64	0.58	0.51	0.47	0.46
Public scheme old-age earnings related (RR)	:	0.66	0.62	0.59	0.56	0.54	0.54
Coverage	72.1	71.4	69.8	72.0	72.6	72.7	73.2
Private occupational scheme (BR)	:	:	:	:	:	:	:
Private occupational scheme (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Private individual scheme (BR)	:	:	:	:	:	:	:
Private individual scheme (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Total (BR)	0.77	0.64	0.59	0.54	0.47	0.43	0.42
Total (RR)	:	0.52	0.52	0.51	0.47	0.45	0.44

The replacement rate (RR) of old age pension in the period 2016-2027 is decreasing as :

- ✓ contributory period remains almost stable due to the unemployment impact at the years of the crisis,
- ✓ pensionable salary is affected by a long transition period for its calculation (15 years salaries/income at the beginning combined with higher salaries for the pre-crisis period, moving to full career salaries/income).

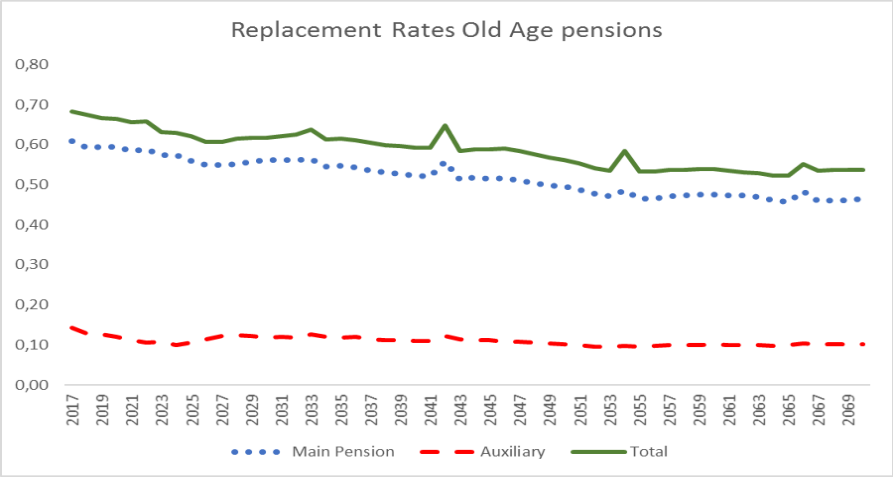
In the period 2028-2070 the old age pension replacement rate (RR) remains almost stable as the impact of the increase of the contributory period is compensated by the evolution of the pensionable salary (moving to a full career calculation), and also the full introduction of NDC system.

The benefit ratio (BR) is expected to drop as it is affected by the measures applied in the period 2016-2030 described in paragraph 3.2.1 (personal differences elimination, freezing indexation, e.t.c.)

Especially the decline of self-employed insurable base between 2016 and 2017 due to the reform (moving from notional to real income) affects the replacement rate (RR) and gradually the benefit ratio (BR) evolution.

For the calculation of the figures of table 10 dividend benefits (apply to certain professions, see paragraph 3.1.2.) are not taken in account.

GRAPH 5 shows the Replacement Rate development of main, auxiliary and total old-age pension.



Dependency Ratios

Table 11 analyses the impact of demographic factors on the financial sustainability of public pension schemes.

TABLE 11
System dependency ratio and old-age dependency ratio

	2016	2020	2030	2040	2050	2060	2070
Number of pensioners (thousand) (I)	2,619.3	2,615.2	2,608.8	2,900.7	2,974.9	2,799.9	2,580.0
Employment (thousand) (II)	3,640.2	3,890.5	3,955.7	3,750.3	3,460.4	3,242.6	3,131.0
Pension System Dependency Ratio (SDR) (I)/(II)	72.0	67.2	65.9	77.3	86.0	86.3	82.4
Number of people aged 65+ (thousand) (III)	2,303.4	2,404.2	2,717.0	3,092.7	3,244.9	2,926.7	2,598.8
Working age population 15 - 64 (thousand) (IV)	6,903.8	6,666.5	6,049.9	5,228.5	4,568.9	4,356.7	4,118.4
Old-age Dependency Ratio (ODR) (III)/(IV)	33.4	36.1	44.9	59.2	71.0	67.2	63.1
System efficiency (SDR/ODR)	2.2	1.9	1.5	1.3	1.2	1.3	1.3

The number of pensioners and pensions covered by public schemes remains almost stable up to 2030 (due to reforms legislated over the previous years) and afterwards increases up to 2050 (due to the increasing employment in the first years of the projection).
From 2050 onwards the number of pensioners and pensions is gradually decreasing due to the decreasing population.
Pension system dependency ratio (SDR) follows the same trend.

Old-age dependency ratio (ODR) increases also up to 2050 mainly because working population 15-64 decreases fast, while the number of people aged 65+ increases. The ratio between the SDR and ODR as a measure of 'System Efficiency', shown in table 11, indicates a significant decrease from 2.2 to 1.3 over the projection period, highlighting the effectiveness of the pension reform.

Pensioners compared with inactive and total population

Tables 12a and 12b show the evolution of the total number of pensioners, as a percentage of the total inactive population and as percentage of the total population respectively. Tables 13a and 13b provide the same information for female pensioners.

TABLE 12a
Pensioners (public scheme) to inactive population ratio by age group (%)

	2016	2020	2030	2040	2050	2060	2070
Age group -54	5.7	4.6	3.3	2.6	2.2	2.0	1.8
Age group 55-59	56.1	48.3	28.4	28.9	35.2	28.3	24.6
Age group 60-64	69.2	63.2	45.8	46.1	47.0	37.7	29.9
Age group 65-69	75.1	78.6	73.3	79.1	74.4	73.7	64.2
Age group 70-74	87.2	86.8	91.7	93.1	95.9	110.7	102.8
Age group 75+	94.8	95.0	96.3	99.0	98.1	99.4	112.0

TABLE 12b
Pensioners (public schemes) to total population ratio by age group (%)

	2016	2020	2030	2040	2050	2060	2070
Age group -54	2.4	1.9	1.3	1.1	0.9	0.8	0.8
Age group 55-59	23.5	18.0	6.8	6.2	7.0	5.6	4.8
Age group 60-64	47.8	41.5	21.1	16.2	14.4	11.3	8.8
Age group 65-69	67.5	71.2	60.0	54.0	43.3	38.8	30.7
Age group 70-74	86.0	84.9	90.0	89.3	89.5	98.5	86.1
Age group 75+	94.8	95.0	96.3	99.0	98.1	99.4	112.0

TABLE 13a
Female pensioners (public scheme) to inactive population ratio by age group (%)

	2016	2020	2030	2040	2050	2060	2070
Age group -54	5.8	4.6	3.6	3.0	2.5	2.2	1.9
Age group 55-59	47.4	42.9	21.8	23.4	27.9	21.4	18.9
Age group 60-64	56.6	54.0	36.0	32.2	36.6	30.7	22.8
Age group 65-69	63.1	67.2	64.4	65.7	61.2	64.2	54.9
Age group 70-74	76.1	76.4	81.7	85.1	86.9	104.7	102.5
Age group 75+	90.0	91.1	93.9	96.9	96.7	99.3	114.3

TABLE 13b
Female pensioners (public scheme) to total population ratio by age group (%)

	2016	2020	2030	2040	2050	2060	2070
Age group -54	2.7	2.1	1.6	1.3	1.1	1.0	0.9
Age group 55-59	26.5	21.3	6.8	6.1	6.8	5.2	4.5
Age group 60-64	43.8	40.0	18.7	13.3	12.7	10.5	7.6
Age group 65-69	58.1	62.3	54.2	46.9	37.4	34.6	27.0
Age group 70-74	75.5	75.2	80.4	81.8	81.9	92.4	84.1
Age group 75+	90.0	91.1	93.9	96.9	96.7	99.3	114.3

In the first years of the projection paths to early retirement (based on special provisions for those first insured before 1993, especially for women, more details in Annex I) are gradually eliminated up to 2021, thus the ratio of pensioners in the age brackets up to 64 years is reduced.

As also expected, due to the increase of the statutory retirement ages in line with the increase of life expectancy from 2021 onwards, the pensioners move to higher age groups during the projection period.

In the last part of the projection, the number of pensioners in the 60-64 bracket is low due to increased statutory ages as they are linked with changes of life expectancy. In the same period, since the statutory retirement age is expected to become 72.6 years, ratios in the 70-74 bracket are decreased accordingly.

In the base year the ratios of the female to inactive population for the age-groups 70+ fall below 100%, as in Greece there are women that do not receive any pension or welfare benefit and live with the family (spouse) income. These ratios are gradually increasing and reach 100% or more at the end of the projection period, following the trend of the increasing participation/employment rates for women during the forecasting period.

The coverage ratio (pensioners to population, pensioners to inactive population) for age group 70-74 and 75+ exceeds 100% in the last years of the projection, due to the increasing employment in the first years of the projection and the constant coefficients used for estimating pensioners throughout the projection.

NOTE
The Greek national projection model is based on the number of pensions and not on the number of pensioners. The number of pensioners is estimated approximately, based on coefficients derived from data of "HELIOS" system in the base year.

New Pensions expenditure

- Main Pensions

Table 14a shows the specific factors related to new pensions under the main pension provision. Tables 14b and 14c give the same factors for male and female pensioners.

New pensions' expenditure is analyzed to its components which are:

✓ Average contributory period
✓ Average pensionable earnings
✓ Average accrual rates (including flat component)
✓ The number of new pensioners

The product of these factors is approximately equal to the new old-age pensions expenditure (including both earnings related and flat rate components).

TABLE 14a Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions)							
New pension	2017	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	607.6	692.1	1,131.7	1,693.0	2,113.0	2,753.0	3,119.8
II. Average contributory period	30.6	30.5	31.2	33.1	35.1	36.4	37.4
III. Monthly average pensionable earnings	1,314.1	1,412.1	1,631.5	2,111.3	2,917.2	4,167.8	5,893.5
IV. Average accrual rates (%)	1.9	1.8	1.8	1.7	1.6	1.5	1.5
V. Sustainability/Adjustment factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0
VI. Number of new pensions ('000)	66.2	72.9	100.3	117.1	105.5	98.4	79.8
VII Average number of months paid the first year	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Monthly average pensionable earnings / Monthly economy-wide average wage	1.1	1.1	1.0	0.9	0.9	0.9	0.9

TABLE 14b Disaggregated new public pension expenditure (old-age and early earnings-related pensions) - MEN							
New pension	2017	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	364.5	465.3	666.5	948.4	1,152.6	1,505.0	1,665.7
II. Average contributory period	31.6	31.5	31.8	33.8	35.6	37.1	37.8
III. Monthly average pensionable earnings	1,432.1	1,531.1	1,740.2	2,235.3	3,125.2	4,549.3	6,332.4
IV. Average accrual rates (%)	1.8	1.8	1.8	1.7	1.6	1.5	1.5
V. Sustainability/Adjustment factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0
VI. Number of new pensions ('000)	36.8	45.4	56.1	62.0	54.2	49.5	39.8
VII Average number of months paid the first year	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Monthly average pensionable earnings / Monthly economy-wide average wage	1.2	1.2	1.1	1.0	0.9	0.9	0.9

TABLE 14c Disaggregated new public pension expenditure (old-age and early earnings-related pensions) - WOMEN							
New pension	2017	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	243.1	226.8	465.1	744.7	960.4	1,247.9	1,454.1
II. Average contributory period	29.3	28.9	30.6	32.3	34.6	35.7	37.1
III. Monthly average pensionable earnings	1,154.6	1,197.5	1,488.5	1,965.2	2,691.0	3,766.8	5,449.5
IV. Average accrual rates (%)	2.0	2.0	1.9	1.8	1.7	1.6	1.5
V. Sustainability/Adjustment factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0
VI. Number of new pensions ('000)	29.4	27.5	44.3	55.1	51.3	49.0	40.0
VII Average number of months paid the first year	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Monthly average pensionable earnings / Monthly economy-wide average wage	0.9	0.9	0.9	0.9	0.8	0.8	0.8

The contributory period remains almost stable in the first decade due to the unemployment impact at the years of the crisis. Afterwards the contributory period is increasing (for both men and women) due to the linkage of statutory retirement ages to life expectancy.

In the first part of the projection, the average accrual rate appears to drop mainly due to the 15 years transition period of the former OGA to the new system. From 2030 onwards the contributory period is increasing significantly, thus the weight of National Pension in total pension is reduced, which also affects the evolution of accrual rates.

Pensionable earnings are affected by a long transition period for its calculation (15 years salaries/income at the beginning combined with higher salaries for the pre-crisis period, moving to full career salaries/income).

According to 2016 reform, pensionable earnings are derived taking into account the average monthly earnings of the insured for his entire insurance life. For insured retiring from the entry into force of the new law until the end of 2016 the pensionable earnings are derived taking into account monthly earnings of the insured from 2002 until the end of his insurance life. From 2017 onwards this reference period increases by one year. So, the number of years taken into account for the pensionable earnings calculation is only 15 years in the first year, which number is gradually increasing in order to achieve a full career calculation.

Also, according to the 2016 reform the insurable base of self-employed changed from notional (based on insurance classes) to actual income, with starting year 2017, therefore there is a decline of self-employed insurable base between 2016 and 2017. This decrease of self-employed insurable base affects the evolution of the

pensionable earnings up to the middle of the projection, when full career calculation based only on real income starts.

Additionally, the higher salaries in the pre-crisis period (2002-2008) for private sector employees, affect the evolution of pensionable earnings up to the middle of the projection.

- Auxiliary Pensions

Table 14d shows the specific factors related to new pensions under the auxiliary pension provision.

Tables 14e and 14f give the same factors for male and female pensioners.

New pension expenditure is analyzed to its components which are:

✓ The number of new pensions

✓ Average contributory period

✓ Average accrual rates

✓ Average pensionable earnings

TABLE 14d

Projected and disaggregated new public pension expenditure AUXILIARY FUNDS (old-age and early earnings-related pensions)

New pension	2017	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	74.4	83.0	112.3	226.1	287.8	364.9	486.1
II. Average contributory period	26.5	24.7	27.2	31.7	35.3	36.0	36.9
III. Monthly average pensionable earnings	1,541.2	1,541.4	1,906.0	2,388.8	3,320.7	4,740.3	6,666.2
IV. Average accrual rates (%)	0.4	0.4	0.4	0.3	0.3	0.3	0.3
Notional-accounts contribution rate (c)	:	:	:	:	:	:	:
Annuity factor (A)	:	:	:	:	:	:	:
V. Sustainability/Adjustment factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0
VI. Number of new pensioners ('000)	34.6	43.5	47.1	73.8	70.3	61.6	57.2
VII Average number of months paid the first year	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Monthly average pensionable earnings / Monthly economy-wide average wage	1.2	1.2	1.2	1.1	1.0	1.0	1.0

TABLE 14e Disaggregated new public pension expenditure AUXILIARY FUNDS (old-age and early earnings-related pensions) - MEN							
New pension	2017	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	55.4	62.5	65.5	124.1	152.4	187.6	235.5
II. Average contributory period	26.1	24.4	26.8	32.5	35.5	36.3	37.1
III. Monthly average pensionable earnings	1,581.6	1,569.3	1,954.6	2,536.0	3,582.7	5,173.5	7,420.9
IV. Average accrual rates (%)	0.4	0.4	0.4	0.3	0.3	0.3	0.3
Notional-accounts contribution rate (c)	:	:	:	:	:	:	:
Annuity factor (A)	:	:	:	:	:	:	:
V. Sustainability/Adjustment factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0
VI. Number of new pensioners ('000)	25.5	32.6	27.4	36.8	33.6	28.4	24.5
VII Average number of months paid the first year	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Monthly average pensionable earnings / Monthly economy-wide average wage	1.3	1.2	1.2	1.1	1.1	1.1	1.1

TABLE 14f Disaggregated new public pension expenditure AUXILIARY FUNDS (old-age and early earnings-related pensions) - WOMEN							
New pension	2017	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	19.0	20.5	46.8	102.0	135.4	177.3	250.6
II. Average contributory period	27.6	25.5	27.8	30.9	35.1	35.7	36.7
III. Monthly average pensionable earnings	1,434.6	1,462.2	1,841.0	2,235.3	3,078.1	4,363.8	6,097.1
IV. Average accrual rates (%)	0.4	0.4	0.4	0.3	0.3	0.3	0.3
Notional-accounts contribution rate (c)	:	:	:	:	:	:	:
Annuity factor (A)	:	:	:	:	:	:	:
V. Sustainability/Adjustment factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0
VI. Number of new pensioners ('000)	9.2	10.9	19.7	37.1	36.7	33.2	32.8
VII Average number of months paid the first year	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Monthly average pensionable earnings / Monthly economy-wide average wage	1.2	1.1	1.1	1.0	0.9	0.9	0.9

The direct impact of the reforms is evident on auxiliary pensions also.

Average years of service for new pensioners increase gradually (for both men and women) due to the linkage of statutory retirement ages to life expectancy.

Average accrual rate declines from 0,4% up to 2030 to 0,3% at 2040. This is due to the phase out of the pro-rata calculation period and the full transition to NDC system.

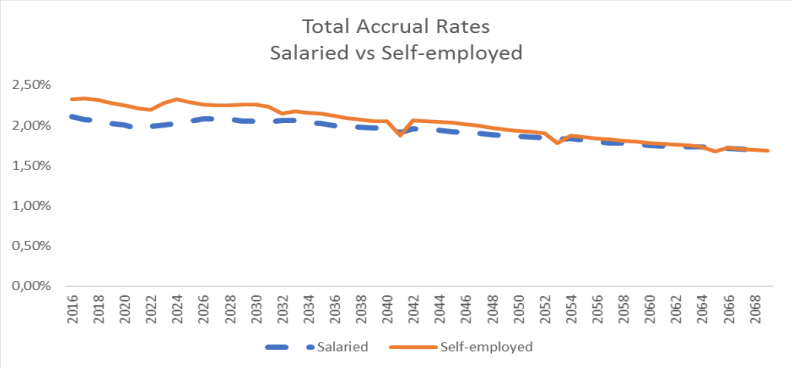
Pensionable earnings evolution is affected by the same reasons as referred to main pension (i.e. transition period from last 15 to full career, higher salaries for the pre-crisis period).

- **Total accrual rates for public pension**

Graph 6 below shows the evolution of total accrual rate for two groups of insured :

- ✓ Those with main and auxiliary pension (mainly salaried insured)
- ✓ Those with only main pension (mainly self-employed)

GRAPH 6



The above accrual rates include both earnings related and flat rate components.

Due to the 2016 reform the insurable base of self-employed ranges at lower levels, therefore national pension weighs considerably in total pension, formulating accrual rates of at least 1.7% in the last decade of the projection.

For salaried insured accrual rates are formulated at the same level of 1.7% in the last decade, as they are entitled to main and auxiliary benefits but due to their higher insurable base, national pension weighs less compared to self-employed.

3.4. Financing of the pension system

Table 15 shows the sources for financing the pension schemes.

TABLE 15 Financing of Public Pension System			
	Public employees	**Private employees**	**Self-employed**
Contribution base (millions)	25,655.3	9,165.1	13,528.3
Contribution rate /contribution			
Employer	Main*pensions majority: 13.33%; Auxiliary** pensions: 3%	Main*pensions majority: 13.33%; Auxiliary** pensions: 3%	0.2
Employee	Main*pensions majority: 6.67%; Auxiliary** pensions: 3%	Main*pensions majority: 6.67%; Auxiliary** pensions: 3%	
State***	-	-	-
Other revenues	National budget / other sources	National budget / other sources	National budget / other sources
Maximum contribution €****	5,860	5,860	5,860
Minimum contribution €*****	586	586	586

* Main Pensions : Unified rates from 2022 onwards.
**Auxiliary pensions : 2016 – 2018 : 3.5% & 2019 – 2021 : 3.25%
*** State is financing national pension & means-tested benefits
****Maximum monthly insurable earnings for full employment
***** Minimum monthly insurable earnings for full employment

There is an additional contribution rate for insured in arduous professions (3,6% main pension/2% auxiliary pension).

Table 16 presents the evolution of contributions, number of contributors and employment.

TABLE 16 Revenue from contribution (Millions), 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	24,041.3	25,201.9	31,816.8	42,562.6	55,866.5	71,464.9	92,778.7
Employer contribution	5,494.3	7,363.7	9,854.5	12,872.4	17,157.9	23,251.2	32,319.7
Employee contribution	6,011.2	6,293.3	8,852.2	11,689.8	15,733.2	21,413.9	29,720.1
State contribution	11,923.9	10,932.7	12,334.2	16,951.6	21,520.1	24,818.1	28,001.8
Other revenues	:	:	:	:	:	:	:
Loading (main & Auxiliary)	612.0	612.3	775.8	1,048.8	1,455.4	1,981.8	2,737.0
Number of contributors (I)	4,518.5	4,834.4	4,920.9	4,664.9	4,303.2	4,031.5	3,892.3
Employment (II)	3,640.2	3,890.5	3,955.7	3,750.3	3,460.4	3,242.6	3,131.0
Ratio of (I)/(II)	1.2	1.2	1.2	1.2	1.2	1.2	1.2

All contribution rates are gradually harmonized with those of IKA-ETAM up to 2022.

Average contribution rate increases, mainly because :

- ✓ for ex.OGA fund (farmers) the contribution rate gradually increases from 7% to 20%,
- ✓ for the Public Sector the contribution rate gradually increases from 6,67% to 20% (due to employer contribution).

In the above table, state contribution includes the financing of national pension and means-tested benefits.

A loading of 0.35% of GDP for the year 2016 for main and auxiliary pension is included, for the rest schemes which are not explicitly modeled.

3.5. Sensitivity analysis

Table 17 shows the evolution of total pension expenditure under different scenarios.

TABLE 17
Public and total pension expenditure under different scenarios (p.p. deviation from the baseline)

	2016	2020	2030	2040	2050	2060	2070
Total Pension Expenditure							
Baseline	17.3	13.4	12.0	12.9	12.5	11.5	10.6
Higher life expectancy (2 extra years)	0.0	0.0	-0.3	-0.4	-0.2	-0.2	0.0
Higher TFP (+0.4 p.p.)	0.0	0.0	0.0	-0.3	-0.8	-1.0	-1.1
Lower TFP (-0.4 p.p.)	0.0	0.0	0.0	0.4	1.0	1.3	1.4
Higher emp. rate (+2 pp.)	0.0	-0.1	-0.3	-0.3	-0.3	-0.2	0.0
Lower emp. rate (-2 pp.)	0.0	0.1	0.3	0.3	0.3	0.2	0.0
Higher emp. of older workers (+10 pp.)	0.0	-0.2	-0.7	-0.8	-0.7	-0.5	-0.1
Higher migration (+33%)	0.0	0.1	0.2	0.2	0.1	0.0	-0.3
Lower migration (-33%)	0.0	-0.1	-0.2	-0.2	-0.1	0.1	0.3
Lower fertility	0.0	0.0	0.0	0.1	0.6	0.9	1.3
Risk scenario	0.0	0.1	0.5	0.9	1.0	1.0	1.0
Policy scenario: linking retirement age to increases in life expectancy	0.0	0.0	0.0	0.0	0.0	0.0	0.0

On the "Higher Life Expectancy" scenario no difference is observed regarding the pension spending compared to the baseline scenario in 2070. The increase in life expectancy and consequently increase in the retirement age results to a reduction in the number of new pensioners. On the other hand the increase in life expectancy results to lower mortality rates, which gradually increase the number of total pensioners. The two previously referred reasons have as a consequence a zero difference in 2070 between the two scenarios.

Pension expenditure on "Higher TFP" scenario is projected to drop by 1.1 p.p. of GDP until 2070 compared to the baseline scenario. The increase of the average pension, caused by the higher wage growth, is offset by the increase in GDP side. Conversely, the "Lower TFP" scenario, leads to the opposite direction result. In other words, the drop in wages (and thus GDP) is larger than the drop of average pension, which raises pensions expenditure by 1.4 p.p. of GDP until 2070 compared to the baseline

scenario. The results of these scenarios are affected by the weight of national pension on total pension during the projection (contributory component is increasing due to the increasing contributory period).

Moreover, on the "Higher/Lower employment rate" scenarios, the impact is relatively symmetric during the entire projection. Change in the employment rate leads to a same direction change (increase/decrease) of GDP growth. As a result, the ratio of pension expenditure to GDP is decreased/increased compared to baseline scenario up to 2060. Afterwards this difference is shrinking.

On the "Higher emp. of older workers" scenario, a decrease of pension expenditure appears in the middle of projection compared to the baseline scenario. Afterwards this decrease is gradually shrinking.

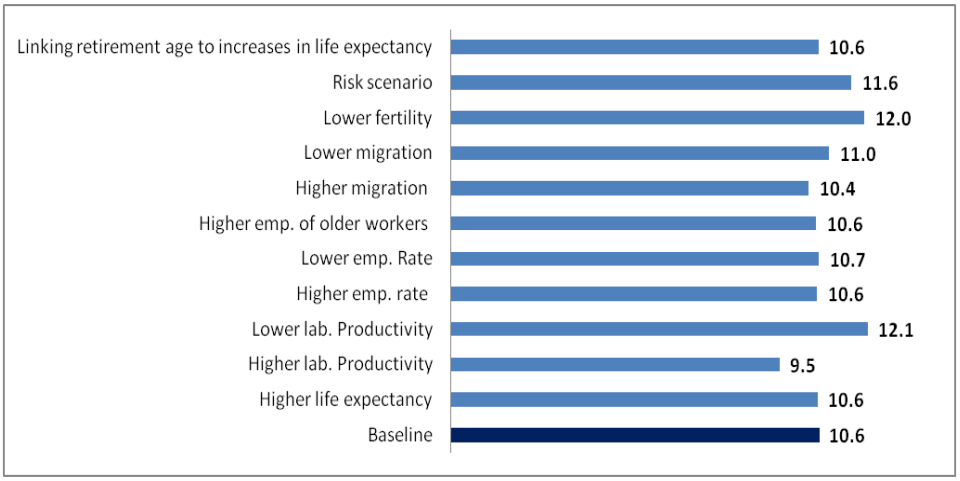
The impact on pension expenditure for "Higher/Lower Migration" scenario is symmetric during the entire projection period. Pension expenditure is decreased/increased by 0.3 p.p. of GDP compared to the baseline projection in 2070. As net migration for Greece under baseline scenario is negative up to the middle of the projection, in the Higher Migration scenario net migration is further negative. This results to lower employment and GDP level and therefore increased benefit expenditure. For the remaining part of the projection, net migration turns positive in the baseline scenario, so further positive in the Higher Migration scenario resulting to higher employment and GDP level and therefore decreased benefit expenditure. For Lower Migration scenario the behavior is symmetrical.

On the "Lower fertility" scenario, an increase of pension expenditure by 1.3 p.p. of GDP appears in 2070, compared to the baseline scenario. The effect of this scenario on pensions appears in the last part of the projection. This result is explained by a decrease in the number of employees, and consequently to the GDP level.

On the "TFP Risk" scenario, an increase of pension expenditure by 1 p.p. of GDP appears in 2070, compared to the baseline scenario.

The macroeconomic assumptions of "Policy scenario" are the same with those of baseline scenario, thus no difference is observed.

GRAPH 7 shows pension expenditure under different scenarios (as % of GDP)



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

In all last three rounds pension expenditure would increase due to the demographic, but reforms adopted regarding eligibility conditions and rules for pension calculation as well as the employment effect tackled/reverted expenditure increase.

The 2018 round projection results are mainly affected by the extra measures adopted to control expenditure in the period 2016-2025, as well as the 2016 reform.

TABLE 18

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

	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
2006 *	:	:	:	:	:	:	:
2009 **	:	:	:	:	:	:	:
2012 ***	1.0	10.4	-3.4	-1.9	-3.6	0.1	-0.6
2015****	-1.9	10.6	-0.9	-5.5	-4.4	0.0	-1.9
2018*****	-6.6	9.1	-0.2	-4.0	-9.9	0.1	-1.8

* 2004-2050; ** 2007-2060; *** 2010-2060; **** 2013-2060; *****2016-2070

Note: In 2006 the Hellenic Republic did not prepare comprehensive projections for the Ageing Working Group. In 2009 the projections incorporated separate results of four main pension schemes (IKA, OAEE, Public Sector and OGA) and aggregate results for the rest of the main and auxiliary pension schemes.

The decomposition of the difference in pension projections between 2015 and 2018 rounds is reported in Table 19. The difference is due to the change in assumptions as well as the comprehensive pension reform (policy related changes). The change in the base year is included in the changes due to assumptions.

TABLE 19

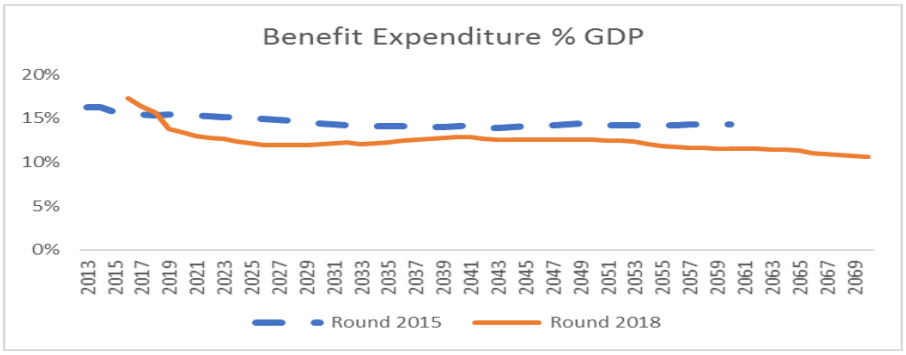
Decomposition of the difference between 2015 and the new public pension projection (% of GDP)

	2016	2020	2030	2040	2050	2060	2070
Ageing report 2015	15.6%	15.5%	14.4%	14.1%	14.4%	14.3%	
Change in assumptions	1.7%	0.4%	1.0%	1.8%	1.3%	0.7%	
Improvement in the coverage or in the modelling							
Change in the interpretation of constant policy							
Policy related changes	0.0%	-2.5%	-3.4%	-3.0%	-3.2%	-3.6%	
New projection	17.3%	13.4%	12.0%	12.9%	12.5%	11.5%	10.6%

3.7. Differences between 2015 and 2018 rounds

Graph 8 shows the evolution of benefit expenditure as a share of GDP between round 2015 and 2018.

GRAPH 8



The difference in the evolution between the two rounds results from changes in assumptions regarding the demographic development, employment, GDP growth and policy/reform changes.

Between round 2015 and 2018, the following are observed:

- ✓ According to the realized figures the nominal GDP decreased by 3% from 2013 to 2016.
- ✓ The realized 2016 nominal GDP is 7% lower than the 2015 round provision for 2016 nominal GDP

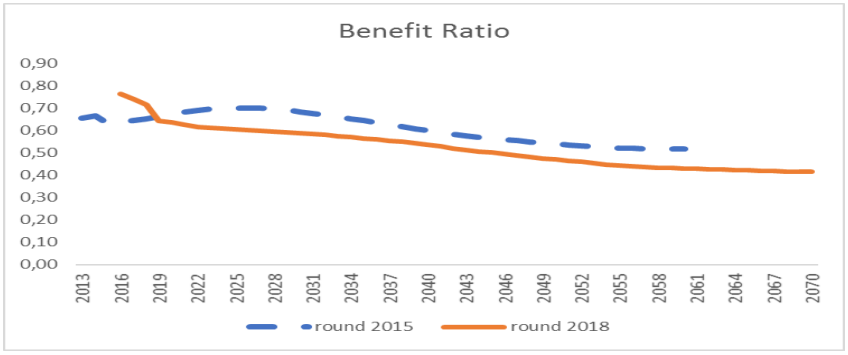
The increase in the 2016 pension expenditure as percentage of GDP is mainly due to:

- ✓ The decrease of the Greek GDP
- ✓ The massive retirements because of the high unemployment and the concern of insured due to forthcoming reforms

The 2018 round projection results are lower compared to 2015 round because of the extra measures adopted to control expenditure in the period 2016-2025, as well as the adopted reforms (L.4336/2015 & L.4387/2016).

Graph 9 shows the evolution of benefit ratio between 2015 and 2018 rounds, which is also affected by the pre-referred reasons (measures to control expenditure, reforms).

GRAPH 9



4. DESCRIPTION OF THE PENSION PROJECTION MODEL AND ITS BASE DATA

4.1. Institutional context

The 2018 round projections for the main and auxiliary pension provision were undertaken by the National Actuarial Authority of Greece.

4.2. Assumptions and methodologies applied

The pension projections were carried out based on the agreed AWG 2018 macroeconomic framework.

General Population:

General population starts with the current data and it is projected applying the mortality, fertility and migration assumptions, which are in line with the 2015-based population projections released by Eurostat. In addition, existing pensioners and new pensioners are projected according to the mortality rates of Eurostat, retirement rates, invalidity rates, family statistics and legal provisions of each pension scheme.

Labor Force, employment:

AWG assumptions on labor force participation rates, employment rates have been taken into account. According to the analytical data of the schemes in the base year, the total number of insured workers is higher than that of AWG given. However the evolution of employees is assumed proportional to the evolution given by AWG. There are also some other assumptions made, regarding the evolution of three groups of employed population.

- ✓ The public sector insured population remains stable up to 2034 and thereafter follows the evolution of total employment.
- ✓ The insured population of former OGA follows the evolution of total employment up to 2018, afterwards it is shrinking by 0,3% yearly up to 2041 and then by 0,45% yearly on average.
- ✓ The evolution of former IKA-ETAM employees is assumed proportional to the evolution given by AWG, adding up the population, per sex, who move from groups of former OGA and former Public Sector.

Wages:

The wage growth is obtained as the product of inflation and labor productivity. No negative growth is applied.

Salary valorization for the calculation of pensionable earnings is adjusted by the inflation and labor productivity. Needless to say that this adjustment is higher than the actual increase in the salaries observed in the past years. For the period up to 2020, CPI is used for salary valorization.

Benefit Indexation:

Main pensions benefit indexation is fully linked to a uniform adjustment index which cannot exceed CPI. In particular, the index is equal to the minimum of CPI and the sum of 50% CPI and 50% GDP growth [min (50% GDP growth +50% CPI, CPI)]. No nominal increase in pensions up to 2022 is applied.

The indexation percentages actually applied in the projections are as follows :

Period	2016-2022	2023-2070
Benefits indexation rate	0.00%	2.00%

The formula for auxiliary pensions benefit indexation according to legal provision is

$$\gamma_t = \min\left(\left[1 + g_{t-2} - r\right] - 1, \text{inflation}_{t-1}\right)$$

where
g : notional rate of return,
r : discount rate=1,3%,
This indexation can take negative values.

No pension indexation is applied in case of deficit (balancing mechanism).

Period	2016-2020	2021-2030	2031-2040	2041-2050	2051-2060	2061-2070
Indexation applied on auxiliary pensions, taking into account balancing mechanism (average)	0,00%	1,00%	1,10%	0,50%	1,30%	1,60%

Age thresholds:

Law provides that age thresholds will be re-determined according to the change in life expectancy of the country's population with the age of 65 years as point of reference. This will come into effect as of 1.1.2021 and upon its first implementation the change within the 2010 - 2020 ten-year period will be taken into account. After the first implementation the change in life expectancy will be re-examined every three years.

In the projections, age thresholds are increased by the integral part of the estimated increase in life expectancy. Age thresholds are increased by one additional year on 2024, 2033, 2042, 2054 and 2066.

4.3. Data used to run the model

Data used to run the model for the main and auxiliary pension provision was provided by pension funds and HDIKA.

The database includes person-by-person information, from which all required inputs for the model are produced. The analytical information is aggregated by age, gender, group of similar characteristics, and by legal provisions, for producing the required inputs such as: distribution of active insured and inactive insured, distribution of past service, distribution of wages/income, density of payments, entry age, distribution of pensions in-payment, average pension, family statistics, disability statistics.

4.4. Reforms incorporated in the model

The reforms incorporated in the modeling exercises for the main and auxiliary pension provision, are those described in the previous sections of this report.

4.5. General description of the model

The present version of ILO pension model has been developed to support actuarial reviews or studies of statutory social security pension funds. It thus helps to provide the quantitative basis for making policy decisions on social security pension funds. The model estimates future cost on the basis of the cohort decomposition method

and various statuses of a person and associated values (average wage, average pensions) are provided year by year. To the extent possible, a distribution is considered for income level. For each generation, the transition of a status of a person (active person, inactive person, pensioners) is mapped onto the next year's status by using actuarially assumed transition probabilities (mortality rate, retirement rate, invalidity rate) and applying the eligibility conditions and pension formula. This cycle is iterated until the end of the projection period. By summarizing age-specific results, global future costs are obtained. Additional information can be found in the ILO Pension Model manual.

4.6. Additional features of the projection model

The general description of features of the projection model is given in previous paragraphs.

Methodological annex

• Economy-wide average wage at retirement

Economy-wide average wage at retirement evolution (in thousant euros)									
	2010	2016	2017	2020	2030	2040	2050	2060	2070
economy-wide average wage	20.7	14.5	14.8	15.8	19.8	27.2	39.9	57.9	82.9
Economy-wide average wage at retirement	-	-	15.1	16.0	20.1	27.7	40.5	58.8	84.2

The economy-wide average wage at retirement on base year, is the wage at the age corresponding to the effective retirement age. In the projection it was evolved in accordance to the economy-wide average wage evolvement.

• Pensions vs Pensioners

The number of pensioners was estimated approximately, based on data of "HELIOS" system for base year.

• Pensions taxation

Pension taxes were not projected as they depend on the income of every source.

• Disability pension

Invalidity pensions are under tight scrutiny by a committee of independently and randomly chosen doctors (KEPA authority). Also a new and more precise disability percentage table was introduced.

Invalidity incident rates are based on data from EFKA (new invalidity pensions awarded). Disability rates by age groups (%) are given in table A2.

TABLE A2 Disability rates by age group (%)			
	2016	2020	2030-2060
Age group -54	0.0015	0.0014	0.0013
Age group 55-59	0.0068	0.0056	0.0049
Age group 60-64	0.0086	0.0076	0.0067
Age group 65-69	0.0089	0.0085	0.0073
Age group 70-74	0.0091	0.0091	0.0091

• Survivors pensions

Survivors pensions are estimated using family statistics based on data provided by EFKA. The following parameters regarding family statistics are estimated by age of the deceased:

- ✓ probability of having a spouse and the respective average age of spouse,
- ✓ average number of children and the respective average age of the children.

- Alternative pension spending decomposition

Table A3 and Table A4 are equivalent to Table 9a and Table 9b. Tables contained in the body of the country fiche are calculated by dividing into sub-intervals so to have smaller residual effect (interaction effect). Reduction of the residual is not allowed for tables A3 and A4.

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	-3.9	-1.4	0.8	-0.3	-1.0	-0.9	-6.6
Dependency ratio effect	1.4	4.6	7.1	6.4	-1.8	-2.3	15.6
Coverage ratio effect	-0.4	-1.5	0.0	0.1	1.0	0.8	0.0
Coverage ratio old-age*	0.5	0.6	0.6	0.5	1.5	1.1	4.8
Coverage ratio early-age*	-3.1	-7.4	-0.6	-0.5	-1.3	-0.5	-13.4
Cohort effect*	0.0	-1.6	-4.3	-3.2	1.0	0.9	-7.1
Benefit ratio effect	-3.3	-1.6	-1.3	-1.6	-1.0	-0.3	-9.2
Labour Market/Labour intensity effect	-1.6	-1.7	-1.1	-0.8	0.1	-0.2	-5.3
Employment ratio effect	-1.7	-1.5	-0.7	-0.5	0.1	0.0	-4.3
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Career shift effect	0.0	-0.3	-0.6	-0.4	0.1	-0.3	-1.4
Residual	0.0	-1.2	-3.8	-4.4	0.6	1.2	-7.7

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	-3.9	-1.4	0.8	-0.3	-1.0	-0.9	-6.6
Dependency ratio effect	1.4	4.6	7.1	6.4	-1.8	-2.3	15.6
Coverage ratio effect	-0.8	-1.9	-0.3	-0.3	0.6	0.5	-2.2
Coverage ratio old-age*	:	:	:	:	:	:	:
Coverage ratio early-age*	:	:	:	:	:	:	:
Cohort effect*	0.0	-1.6	-4.3	-3.2	1.0	0.9	-7.1
Benefit ratio effect	-3.0	-1.3	-1.1	-1.5	-0.9	-0.3	-8.0
Labour Market/Labour intensity effect	-1.6	-1.7	-1.1	-0.8	0.1	-0.2	-5.3
Employment ratio effect	-1.7	-1.5	-0.7	-0.5	0.1	0.0	-4.3
Labour intensity effect	0.04	0.04	-0.01	-0.01	0.00	-0.01	0.06
Career shift effect	0.0	-0.3	-0.6	-0.4	0.1	-0.3	-1.4
Residual	0.1	-1.1	-3.7	-4.2	0.9	1.4	-6.7

Annex I

A. According to provisions applied before last 2015 reform, there were options for early retirement with either fewer years of service or lower retirement age than the statutory one.

Indicative clauses of such pre-reform provisions are given below:

i) Men/Women of Private Sector insured in ex.IKA-ETAM before 1.1.1993, with at least 10.500 service days

MEN / WOMEN (INSURED BEFORE 1993)	10.500 service days completed in YEAR	SERVICE DAYS Required for retirement	AGE LIMIT Required for full pension
	2010	10500	58
	2011	10800	58
	2012	11100	59
	2013	12000	62

The insured is entitled pension upon completing the service days and age limit in force in the year of completing 10500 service days

ii) Women of Private Sector insured in ex.IKA-ETAM before 1.1.1993, with at least 4.500 service days

The insured is entitled pension upon completing the age limit in force in the year of attaining age 60.

YEAR of attaining age 60 for full pension & 55 for reduced	SERVICE DAYS Required for retirement	AGE LIMIT Required for full pension	AGE LIMIT Required for reduced pension
2010	4500	60	55
2011	4500	61	56
2012	4500	62	57
2013	4500	67	62

Insured women with vested rights to an old-age reduced pension before 31.12.2010 (i.e. at that date had the age of 55 and 4500 service days, of which at least 100 per year during the last 5 years), keep the right to a full pension at the age of 60.

iii) Women of Private Sector insured in ex.IKA-ETAM before 1.1.1993/ mothers of minor children

In order to vest pension rights it is required to have at least 5500 service days and the age limit in force in the year of completion of the 5500 service days provided that the child is a minor at the completion of the 5500 service days.

5.500 service days completed in YEAR	SERVICE DAYS Required for retirement	AGE LIMIT Required for full pension	AGE LIMIT Required for reduced pension
2010	5500	55	50
2011	5500	57	52
2012	5500	60	55
2013	5500	67	62

iv) Women in Public Sector insured from 01/01/83 up to 31.12.1992

	Year of vesting rights (1)	Years of service & pension payment age limit (2)	Years of service & reduced pension payment age limit (3)
Women without children or with adult children	2010	25/60	25/55
	2011	25/61	25/56
	2012	25/63	25/58
	2013	15/67	15/62
Women with underage children	2010	25/50	-
	2011	25/52	-
	2012	25/55	-
	2013	15/67	15/62

(1) : It is the year that 25 years of service are completed
(2) : Years of service and age limit required for full pension
(3) : Years of service and age limit required for reduced pension

NOTE: 300 service days correspond to 1 service year

B. According to the 2015 reform all age limits applicable, until the date of publication of law 4336/2015 are gradually increasing according to the tales below until 31.12.2021, in order to reach the statutory age limits. Already vested rights are not affected by this measure.

Statutory eligibility conditions are:

- At least 15 years of insurance and corresponding statutory retirement age of 67 years.
- At least 40 years of insurance and corresponding statutory retirement age of 62.
- Reduced pension with at least 15 years of insurance and corresponding statutory retirement age of 62 years. The penalty is 6% per year for each year of retirement earlier than 67.

Full Pension. Age limit : 67

2015 B' semester		2016		2017		2018	
Age	**Legislated Age**	**Age**	**Legislated Age**	**Age**	**Legislated Age**	**Age**	**Legislated Age**
50	55.0	50	56.7	50	58.4	50	60.1
51	55.0	51	56.7	51	58.4	51	60.1
52	55.0	52	56.7	52	58.4	52	60.1
53	56.5	53	58.0	53	59.5	53	61.0
54	56.5	54	58.0	54	59.5	54	61.0
55	56.5	55	58.0	55	59.5	55	61.0
56	57.4	56	58.8	56	60.1	56	61.5
57	58.3	57	59.5	57	60.8	57	62.0
58	59.1	58	60.3	58	61.4	58	62.5
59	60.0	59	61.0	59	62.0	59	63.0
60	60.9	60	61.8	60	62.6	60	63.5
61	61.8	61	62.5	61	63.3	61	64.0
62	62.6	62	63.3	62	63.9	62	64.5
63	63.5	63	64.0	63	64.5	63	65.0
64	64.4	64	64.8	64	65.1	64	65.5
65	65.3	65	65.5	65	65.8	65	66.0
66	66.1	66	66.3	66	66.4	66	66.5
67	67.0	67	67.0	67	67.0	67	67.0

2019		2020		2021		2022	
Age	Legislated Age	Age	Legislated Age	Age	Legislated Age	Age	Legislated Age
50	61.9	50	63.6	50	65.3	50	67.0
51	61.9	51	63.6	51	65.3	51	67.0
52	61.9	52	63.6	52	65.3	52	67.0
53	62.5	53	64.0	53	65.5	53	67.0
54	62.5	54	64.0	54	65.5	54	67.0
55	62.5	55	64.0	55	65.5	55	67.0
56	62.9	56	64.3	56	65.6	56	67.0
57	63.3	57	64.5	57	65.8	57	67.0
58	63.6	58	64.8	58	65.9	58	67.0
59	64.0	59	65.0	59	66.0	59	67.0
60	64.4	60	65.3	60	66.1	60	67.0
61	64.8	61	65.5	61	66.3	61	67.0
62	65.1	62	65.8	62	66.4	62	67.0
63	65.5	63	66.0	63	66.5	63	67.0
64	65.9	64	66.3	64	66.6	64	67.0
65	66.3	65	66.5	65	66.8	65	67.0
66	66.6	66	66.8	66	66.9	66	67.0
67	67.0	67	67.0	67	67.0	67	67.0

Full Pension.
Age limit : 62

2015 B' semester		2016		2017		2018	
Age	Legislated Age	Age	Legislated Age	Age	Legislated Age	Age	Legislated Age
50	55.0	50	56.0	50	57.0	50	58.0
51	55.0	51	56.0	51	57.0	51	58.0
52	55.0	52	56.0	52	57.0	52	58.0
53	55.9	53	56.8	53	57.6	53	58.5
54	55.9	54	56.8	54	57.6	54	58.5
55	55.9	55	56.8	55	57.6	55	58.5
56	56.8	56	57.5	56	58.3	56	59.0
57	57.6	57	58.3	57	58.9	57	59.5
58	58.5	58	59.0	58	59.5	58	60.0
59	59.4	59	59.8	59	60.1	59	60.5
60	60.3	60	60.5	60	60.8	60	61.0
61	61.1	61	61.3	61	61.4	61	61.5
62	62.0	62	62.0	62	62.0	62	62.0

2019		2020		2021		2022	
age	Legislated age	age	Legislated age	age	Legislated age	age	Legislated age
50	59.0	50	60.0	50	61.0	50	62.0
51	59.0	51	60.0	51	61.0	51	62.0
52	59.0	52	60.0	52	61.0	52	62.0
53	59.4	53	60.3	53	61.1	53	62.0
54	59.4	54	60.3	54	61.1	54	62.0
55	59.4	55	60.3	55	61.1	55	62.0
56	59.8	56	60.5	56	61.3	56	62.0
57	60.1	57	60.8	57	61.4	57	62.0
58	60.5	58	61.0	58	61.5	58	62.0
59	60.9	59	61.3	59	61.6	59	62.0
60	61.3	60	61.5	60	61.8	60	62.0
61	61.6	61	61.8	61	61.9	61	62.0
62	62.0	62	62.0	62	62.0	62	62.0

Annex II

- ## Tax Schedule, Tax Credit and Solidarity Contribution

The current Tax Schedule scheme is progressive and applies a withholding tax on wages and pensions, comprised of four bands of taxable income. The starting band covers incomes ranging from 0 to 20,000 Euros and every successive band consists of 10,000 Euros increments, up until the band for incomes of 40,000 Euros and above. The respective tax rates for each band are 22, 29, 37, and 45 percent. The voted reformed system which will be introduced in 2020 maintains the same income bands and tax rates, except for the first band of incomes ranging from 0 to 20,000 Euros, for which the tax rate is reduced to 20 per cent.

Pensioners, as well as salaried individuals and farmers are eligible to a tax credit varying with the number of children. According to the current scheme, it amounts to 1900 euros for the case of no children, with successive increments of 50 Euros for the cases of one child and two children, and a marginal successive increment of 100 Euros for the case of three children and above, resulting to a 2100 Euros Tax Credit. The reformed scheme imposes a flat reduction of 650 euros to each category.

When all types on personal incomes are pooled, another PIT tax named "Solidarity Contribution" is imposed on the total. The current scheme bands are [0 – 12,000], [12,001 – 20,000], [20,001 – 30,000], [30,001 – 40,000], [40,001 – 65,000], [65,001 – 220,000] and [220,001 and above] with respective rates [0, 2.2, 5, 6.5, 7.5, 9, 10] percent. The reformed scheme for 2020 exempts the first three bands from the Solidarity Contribution. For the rest income bands, rates start from a 2 percent for the band of 30,001 to 40,000 Euros. Subsequent bands get a 5, 9 and 10 percent rates.

Annex II Table 1. Income Tax

	Current		Reformed	
Tax Schedule for pooled Wage - Pensions	22.00%	20,000	20.00%	20,000
	29.00%	30,000	29.00%	30,000
	37.00%	40,000	37.00%	40,000
	45.00%	> 40,000	45.00%	> 40,000

Annex II Table 2. Tax Credit

	Current				Reformed			
No. of Children	**0**	**1**	**2**	**≥3**	**0**	**1**	**2**	**≥3**
Personal Tax Credit	1,900	1,950	2,000	2,100	1,250	1,300	1,350	1,450

Annex II Table 3. Solidarity Contribution

	Current		Reformed	
Tax Schedule for Solidarity Contribution	0	12,000	0	12,000
	2.20%	20,000	0.00%	20,000
	5.00%	30,000	0.00%	30,000
	6.50%	40,000	2.00%	40,000
	7.50%	65,000	5.00%	65,000
	9.00%	220,000	9.00%	220,000
	10.00%	-	10.00%	-

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