Republic of Cyprus

Country Fiche for the Ageing Working Group of the EPC

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MINISTRY OF FINANCE

MINISTRY OF LABOUR, WELFARE AND SOCIAL INSURANCE

1. Overview of the pension system

1.1 Description

The current public pension system in Cyprus comprises of:

- The General Social Insurance Scheme (GSIS), a compulsory earnings-related scheme which covers every person gainfully employed in Cyprus, both in public and private sector, including self-employed;
- The Social Pension Scheme, an income-tested scheme, which covers residents of Cyprus with no or low pension income; and
- The Government Employees Pension Scheme (GEPS), which provide supplementary pensionable benefits to their members.

Appendix 1 gives an overview of the public pension system including the main provisions to pension benefits provided under the above three schemes.

Table 1 below shows the legislated increase in the standard pensionable age for an individual with a 20-year and 40-year career respectively following the adoption of the December 2012 pension reform measures. Standard pensionable age is defined as the earliest age at which an insured person is entitled to a GSIS old-age pension without any exit penalty (or actuarial reduction).

Table [1]: Legislated increase in the standard pensionable age under GSIS for an insured person with a 20-year and 40-year career respectively

Year	Standard pensionable age				Relevant December 2012 reform measure
	Prior to 2012 reform		Post-2012 reform		
	20 years of contributions	40 years of contributions	20 years of contributions	40 years of contributions	
2013	65.0	63.0	65.0	63.5	gradual increase in the minimum age for entitlement to an unreduced old-age pension over 2013-16
2014	65.0	63.0	65.0	64.0	
2015	65.0	63.0	65.0	64.5	
2016	65.0	63.0	65.0	65.0	
2020	65.0	63.0	65.0	65.0	automatic adjustment of the statutory retirement age in line with changes in life expectancy, to be applied in 2018
2025	65.0	63.0	65.5	65.5	
2030	65.0	63.0	66.0	66.0	
2035	65.0	63.0	66.5	66.5	
2040	65.0	63.0	67.0	67.0	
2045	65.0	63.0	67.5	67.5	
2050	65.0	63.0	68.0	68.0	
2055	65.0	63.0	68.5	68.5	
2060	65.0	63.0	69.0	69.0	

1.2 Recent reforms of the pension system included in the projections

The projections incorporate the December 2012 reform measures of the following two public pension schemes:

- The General Social Insurance Scheme (GSIS), the compulsory earnings-related scheme which covers every person gainfully employed in Cyprus, both in public and private sector, including self-employed; and
- The Government Employees Pension Scheme (GEPS), the occupational pension plan which provide supplementary pensionable benefits to civil servants.

1.2.1 General Social Insurance Scheme (GSIS)

The Social Insurance Law N.193(I)/ 2012, which was enacted on 21 December, 2012, refers to the following reform measures that are to be phased in gradually and aim to secure the long-term viability of the GSIS:

1. As of January 1st 2013, actuarial reduction of pension entitlements from the GSIS by 0.5% per month for retirements earlier than the statutory retirement age in line with the planned increase in the minimum age for entitlement to an unreduced pension to reach 65 (by 6 months per year), between 2013 and 2016;
2. Freeze of pensions (all types) under the GSIS for the period 2013-2016;
3. Abolishment of the increase of pensions for a working dependent spouse under the GSIS as of 1 January 2013 (this applies only to new pensioners);
4. Stricter eligibility conditions to old-age pension - as of 1 April, 2013 gradual extension of the minimum contributory period (one year per year) from the current 10 to 15 years over the period 2013-17;
5. Increase of contributions, as of 1.1.2014, of salaried employees and employers to the GSIS by an additional 1 percentage point (p.p.) of the increase which was legislated to take effect in 2014 as per 2009 GSIS reform – the above increase is shared as follows: 0.5 p.p. from salaried employees and 0.5 p.p. from employers and 1 p.p. in the case of self-employed persons; and
6. Introduction of an automatic adjustment of the statutory retirement age every 5 years in line with changes in life expectancy at the statutory retirement age, to be applied in 2018 and the first revision will cover the period 2018-2023.

1.2.2 Government Employee Pension Scheme (GEPS)

The projections incorporate a series of GEPS amendments as a result of the enactment of the Pension Law N.216(I)/ 2012 in December, 2012 which refer to the following reform measures aiming in the containment of the future increase in the GEPS:

- Pension Benefit - the pension calculated for any service after the 1st of January 2013, will be based on the career average salary, revalued based on the changes of the Basic Insurable Earnings under the GSIS;

- Lump Sum Benefit - the factor for calculating the lump sum benefit for service after the 1st of January 2013, will be based on a factor of 14/3, irrespective of the total period of service;

- Normal Retirement Ages - early and normal retirement ages are gradually increased. Normal retirement age is gradually extended by 2 years;

- Early Retirement Reduction Factors - early retirement pensions are actuarially reduced by certain factors, but only the part that corresponds to the service after 1.1.2013 is affected;

- Taxation of Lump Sum Benefit - the portion of the lump sum benefit which corresponds to the service after 1.1.2013 is taxable; and

- Commutation of Lump Sum Benefit - members have the option to commute part or all of their lump sum benefit into an annuity.

Furthermore, as it is currently stipulated by the Budget Law, future increases of GEPS pensions in payment will be awarded in a rate being set at 50% of the rate of increase of the COLA indexation over the previous year.

2. Overview of the demographic and labour force projections

2.1 Demographic Development

A projection of the general population of the country is the basis for determining the number of contributors and beneficiaries of pension system. Eurostat's population projection EUROPOP2013 was the demographic basis for the present exercise. In particular, projections of total population by age, sex and projection year, including detailed assumptions on fertility, mortality and migration, were used. Table [2] shows the expected evolution of population, life expectancy, surviving probabilities and net migration for selected years over the period 2013-2060.

Table [2]: Main demographic variables evolution 2013-60

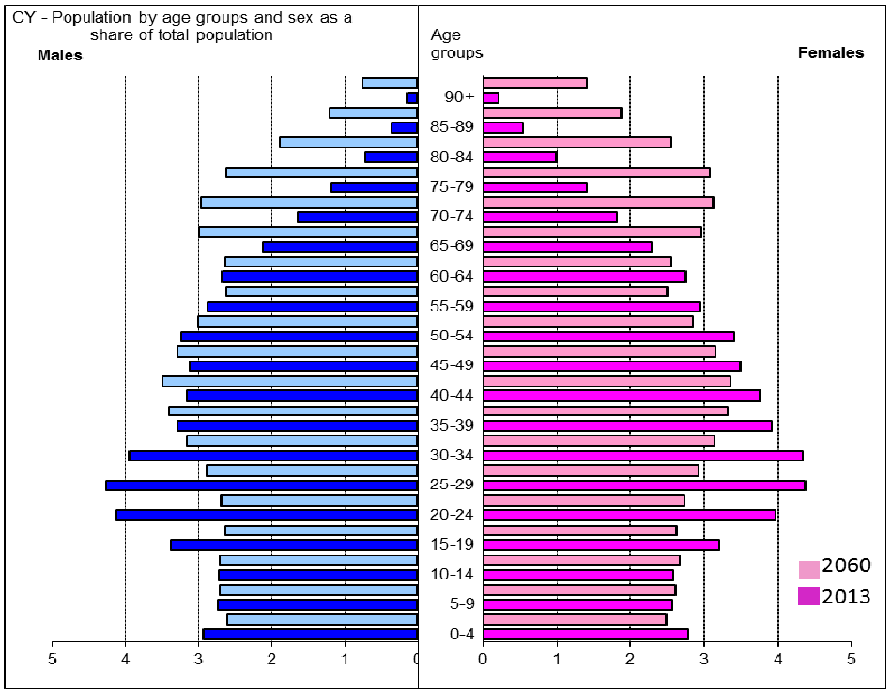
	2013	2020	2030	2040	2050	2060	Peak year*
Population (thousand)	867	892	923	966	1040	1123	2060
Population growth rate	0.4	0.3	0.3	0.6	0.9	0.7	2051
Old-age dependency ratio (pop65/pop15-64)	19.1	24.3	32.1	36.6	42.6	46.5	2059
Ageing of the aged (pop80+/pop65+)	22.2	23.2	27.2	32.1	33.3	35.3	2060
Men - Life expectancy at birth	79.1	80.1	81.5	82.8	84.1	85.2	2060
Men - Life expectancy at 65	18.3	18.9	19.9	20.8	21.7	22.5	2060
Women - Life expectancy at birth	83.3	84.3	85.5	86.7	87.8	88.9	2060
Women - Life expectancy at 65	20.8	21.4	22.4	23.4	24.3	25.2	2060
Men - Survivor rate at 65+	88.1	89.3	90.8	92.0	93.1	94.0	2060
Men - Survivor rate at 80+	60.0	63.3	67.7	71.6	75.2	78.3	2060
Women - Survivor rate at 65+	93.9	94.5	95.3	95.9	96.4	96.9	2060
Women - Survivor rate at 80+	75.4	77.8	80.9	83.6	85.9	87.9	2060
Net migration	-0.6	-0.6	2.8	6.0	8.8	7.9	2050
Net migration over population change	-0.2	-0.2	0.9	1.1	1.0	1.0	2036

* This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2013 to 2060.

It follows from Table [2] that the population of Cyprus is projected to increase from its present level of 867,000 persons in 2013 to 1,123,000 in 2060. Over the same period, the old-age dependency ratio, i.e., the ratio of the number of people aged 65 and over to those aged 15-64, which provides a demographic measure of population ageing, is projected to increase continuously from 19.1% in 2013 to 46.5% in 2060. In other words, in 2060, it is expected to have approximately two working-age people for each person aged 65 and over.

The ageing of population is illustrated in Chart [1], which compares the population age structure by gender in 2013 with the one of 2060.

Chart [1]: Age pyramid comparison: 2013 versus 2060



2.2 Labour force and employment

In the long run, labour supply is basically determined by the development of the population and its structure, and by changes in labour market behaviour of private households.

Table [3]: Participation rate, employment rate and share of workers for the age groups 55-64 and 65-74

	2013	2020	2030	2040	2050	2060	Peak year*
Labour force participation rate 55-64	57.0	68.2	73.7	76.4	77.2	78.4	2060
Employment rate for workers aged 55-64	49.8	59.6	68.1	72.9	73.6	74.8	2060
Share of workers aged 55-64 on the total labour force	87.5	87.3	92.4	95.5	95.4	95.4	2042
Labour force participation rate 65-74	11.7	15.6	22.0	25.3	29.1	29.2	2060
Employment rate for workers aged 65-74	10.9	14.3	21.1	24.8	28.4	28.5	2060
Share of workers aged 65-74 on the total labour force	93.3	92.1	96.0	97.8	97.6	97.6	2041
Median age of the labour force	37.0	39.0	42.0	43.0	42.0	41.0	2032

*This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2013 to 2060.

As shown in Table [3] above, over the period 2013-2060 the average labour force participation rate for the age group 55-64 is assumed to significantly increase from its current level of 57.0% to 78.4% in 2060, while for the age group 65–74 is projected to increase even higher by a factor of 2.5 - from 11.7% in 2013 to 29.2% in 2060.

Changes in the average participation rate result at a great extent from the anticipated increase in the average labour force exit age due to the 2012 GSIS reform, as illustrated in Tables [4a] and [4b], and at a lesser extent from changes in the structure of the active population over time (changing weight of different age groups in the total population) and thus reflect the general ageing process of the Cypriot population.

Tables [4a] and [4b] summarise the estimated evolution of average effective working career, as derived from the labour cohort simulation model, and life spent at retirement. It also provides evidence of the effectiveness of active labour market policies and penalties on early retirement on prolonging working career.

Table [4a]: Labour market entry age, exit age and expected duration of life spent at retirement – MEN

	2013	2020	2030	2040	2050	2060	Peak year*
Average effective entry age (CSM) (I)	21.6	21.3	21.3	21.3	21.3	21.3	2013
Average effective exit age (CSM) (II)	63.6	66.4	66.7	67.0	67.3	67.7	2058
Average effective working career (CSM) (II)- (I)	42.1	45.1	45.4	45.7	46.0	46.4	2058
Duration of retirement **	19.1	18.1	18.2	19.1	20.0	19.9	2052
Duration of retirement/average working career	45.4	40.1	40.1	41.8	43.4	42.9	2013
Percentage of adult life spent at retirement***	29.5	27.2	27.2	28.0	28.8	28.6	2013
Early/late exit****	1.0	0.8	0.9	0.9	0.8	0.6	2013

* This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2013 to 2060.

** Duration of retirement is calculated as the difference between the life expectancy at average effective exit age and the average effective exit age itself.

*** The percentage of adult life spent at retirement is calculated as the ratio between the duration of retirement and the life expectancy diminished by 18 years.

**** Early/late exit, in the specific year, is the ratio of those who retired and aged less than the statutory retirement age and those who retired and are aged more than the statutory retirement age.

Table [4b]: Labour market entry age, exit age and expected duration of life spent at retirement - WOMEN

	2013	2020	2030	2040	2050	2060	Peak year*
Average effective entry age (CSM) (I)	22.2	22.8	22.8	22.8	22.8	22.8	2018
Average effective exit age (CSM) (II)	61.2	65.6	65.9	66.4	66.9	67.4	2058
Average effective working career (CSM) (II)- (I)	39.0	42.8	43.1	43.6	44.1	44.6	2058
Duration of retirement **	24.4	20.5	21.5	22.4	22.4	23.3	2013
Duration of retirement/average working career	62.5	47.9	49.9	51.4	50.8	52.3	2013
Percentage of adult life spent at retirement***	36.1	30.1	31.0	31.7	31.4	32.1	2013
Early/late exit****	2.1	1.5	1.3	1.1	0.8	0.6	2013

* This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2013 to 2060.

** Duration of retirement is calculated as the difference between the life expectancy at average effective exit age and the average effective exit age itself.

*** The percentage of adult life spent at retirement is calculated as the ratio between the duration of retirement and the life expectancy diminished by 18 years.

**** Early/late exit, in the specific year, is the ratio of those who retired and aged less than the statutory retirement age and those who retired and are aged more than the statutory retirement age.

3. Pension projection results

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

As it was the case with the 2012 Ageing Report, the projections of the 2015 AWG pension exercise cover the pension expenditure of the General Social Insurance Scheme (GSIS), Government Employees Pension Scheme (GEPS) and Social Pension Scheme (SPS). Table [5] compares the AWG public pension expenditure with the corresponding expenditure as defined by Eurostat.

Table [5]: Eurostat (ESSPROS) vs. Ageing Working Group (AWG) definition of pension expenditure (as % GDP)

	2005	2006	2007	2008	2009	2010	2011	2012
1. Eurostat total pension expenditure	6.7	6.7	6.6	6.8	7.4	8.3	8.7	9.5
2. Eurostat public pension expenditure	6.4	6.4	6.3	6.5	7.0	7.9	8.4	9.1
3. Public pension expenditure (AWG)	6.4	6.3	6.3	6.4	7.0	7.7	8.9*	9.9*
4. Difference (2) - (3)	0.0	0.1	0.0	0.1	0.0	0.2	-0.5	-0.8

* It includes GEPS retirement lump-sum expenditure.

It follows from Table [5] that the AWG public pension expenditure represents almost 100% of the total public pension expenditure as defined by Eurostat (ESSPROS) in all years up to 2010. For the years 2011 and 2012, the AWG public pension expenditure figures are higher than those under the Eurostat definition by 0.5 and 0.8 percentage points of GDP respectively. This is due to the inclusion of lump-sum benefit expenditure granted to retirees under the GEPS.

3.2 Overview of projection results

Table [6] shows the aggregate results of the projections for public pension expenditure and contributions over the period 2013-2060. All pension expenditure and contributions figures are expressed in percentage of GDP.

Table [6]: Projected public pension spending and contributions (% of GDP)

Public pension	2013	2020	2030	2040	2050	2060	Peak year[1]
Expenditure[2]	10.4	9.9	10.6	10.3	10.1	10.2	2032
Contributions[3]	7.0	8.3	9.2	10.0	9.9	9.8	2039

1 Peak year represents the year in which the particular variable reaches its maximum over the period 2013-60.

2 Expenditure represents pension spending under GSIS, GEPS and SPS.

3 Contributions arising from employee, employer and state GSIS legislated schedule of contribution rates and employee GEPS contribution rate.

The results indicate that over the period 2013-60, the public pension spending, as percentage of GDP, is expected to remain relatively stable, with only small variations ranging from 9.9 per cent to 10.6 per cent. Over the same period, the pension contributions increase significantly by almost three percentage points from 7.0 per cent in 2013 to 9.8 per cent of GDP in 2060, primarily due to the legislated future increases in the GSIS contribution rate over the period 2013-2039.

Table [7] shows how the evolution of total public pension expenditure over the period 2013-60 is decomposed into the three pension schemes covered by this exercise: GSIS, GEPS and SPS.

Table [7]: Projected gross public pension spending by pension scheme (% of GDP)

Public pension	2013	2020	2030	2040	2050	2060	Peak year
Total public pensions	10.4	9.9	10.6	10.3	10.1	10.2	2032
of which:							
GSIS	6.7	7.5	9.0	9.3	9.7	10.0	2057
GEPS	3.4	2.1	1.3	0.7	0.1	0.0	2013
SPS	0.3	0.3	0.3	0.3	0.3	0.2	2042

It follows from Table [7] that, over the period 2013-60, the GSIS expenditure is expected to increase by 3.3 percentage points of GDP. That increase is fully offset by a corresponding reduction in GEPS expenditure, thus maintaining the total public expenditure relatively stable over the above period.

Chart [2] splits the GEPS expenditure into lump sum and annuity expenditure over the projection period 2015-60.

Chart [2]: Breakdown of GEPS expenditures (% of GDP)

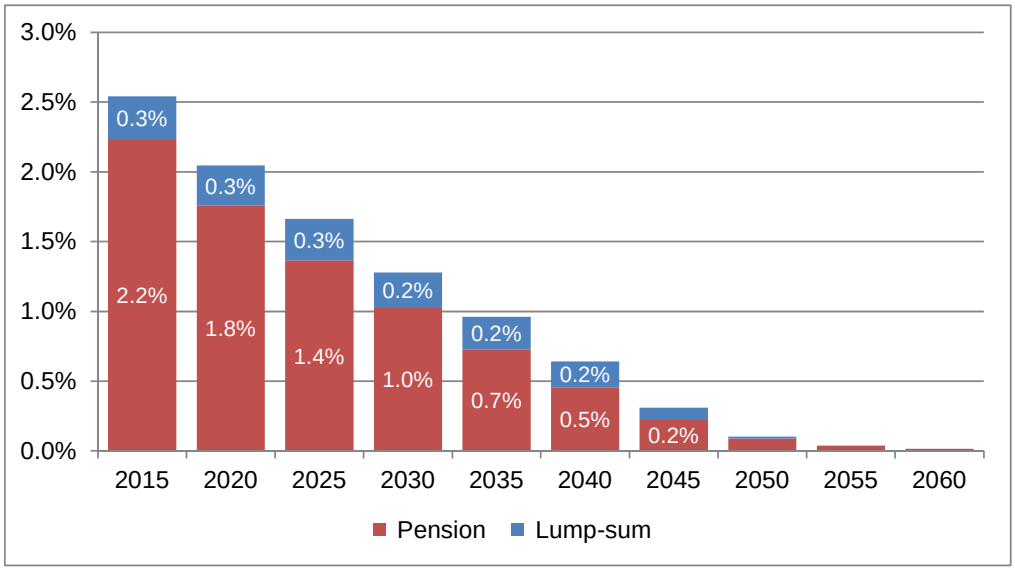


Table [8] shows how the overall evolution of pension expenditure over the period 2013-60 is decomposed, among the following four types of pension, namely "Earnings-related old-age and early", "Earnings-related disability", "Earnings-related Survivors'" and "Non-earnings related old-age and early".

Table [8]: Projected gross public pension spending by type of pension (% of GDP)

Public pension	2013	2020	2030	2040	2050	2060	Peak year
Total public pensions	10.4	9.9	10.6	10.3	10.1	10.2	2032
of which earnings related:							
Old age and early pensions	8.5	7.5	7.9	7.7	7.8	8.1	2013
Disability pensions	0.3	0.4	0.4	0.4	0.4	0.4	2060
Survivors' pensions	1.3	1.7	1.9	1.8	1.6	1.5	2030
of which non-earnings related:							
Old age and early pensions	0.3	0.3	0.3	0.3	0.3	0.2	2042

It is clear from Table [8] that "Earnings-related old-age and early pensions" spending represents the largest category of total spending and is projected to slightly decrease over the projection period, from 8.5 per cent of GDP in 2013 to 8.1 per cent of GDP in 2060. The second largest category of total pension spending is "Earnings-related survivors' pensions", which slightly increases over the same period, from 1.3 per cent of GDP in 2013 to 1.5 per cent of GDP in 2060. The third type of pensions "Earnings-related disability", which represents a very small proportion of total pensions spending, increases marginally over the projection period, from 0.3 per cent in 2013 to 0.4 per cent of GDP in 2060. Finally, the "Non-earnings related old-age and early" pension spending represents a very small proportion of total pension spending and remains relatively stable over the projection period at around 0.3 per cent of GDP.

3.3 Main driving forces behind the projection results

The equation below shows a standard arithmetic decomposition of the ratio of the pension expenditure to GDP into the dependency, coverage, benefit ratio and labour market, as shown in the equation below:

$$\frac{\text{PensionExp}}{\text{GDP}} = \overbrace{\frac{\text{Population}65+}{\text{Population}20-64}}^{\text{DependencyRatio}} \times \overbrace{\frac{\text{Numberof Pensioners(Pensions)}}{\text{Population}65+}}^{\text{CoverageRatio}} \times \overbrace{\frac{\text{Averageincomefrompensions(AveragePension)}}{\frac{\text{GDP}}{\text{HoursWorked}20-74}}}^{\text{Benefit Ratio}} \times \overbrace{\frac{\text{Population}20-64}{\text{HoursWorked}20-74}}^{\text{Labour Market /LabourIntensity}} \quad [1]$$

where 'Average income from pensions' = pension expenditure divided by the number of pensioners

In the above equation [1], the coverage ratio could be further split with the scope of investigating the take-up ratios for old-age pensions and early pensions:

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

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

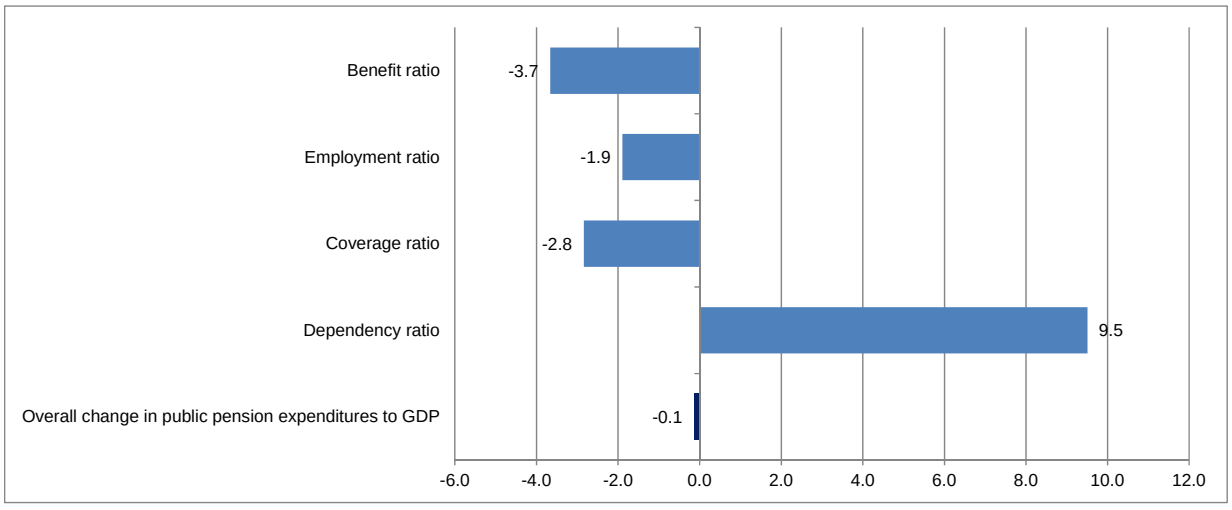
Furthermore, in the above equation [1], the labour market indicator could be further decomposed into employment rate and labour intensity:

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

$$\overbrace{\frac{\text{Population } 20-64}{\text{Working People } 20-64}}^{1/\text{ Employment Rate}} \times \overbrace{\frac{\text{Working People } 20-64}{\text{Hours Worked } 20-64}}^{1/\text{ Labour intensity}} \times \overbrace{\frac{\text{Hours Worked } 20-64}{\text{Hours Worked } 20-74}}^{1/\text{ Career shift}}$$

Chart [3] shows the contribution of each of the above factors to the overall change of -0.1 per cent of GDP in the public pension expenditures between 2013 and 2060.

Chart [3]: Factors behind the overall change in public pension expenditures between 2013 and 2060 (as % of GDP)



Section A2.1 in Appendix 2 shows in detail the drivers of the ratio of public pension expenditures to GDP between 2013 and 2060, as well as during the five 10-year sub-periods over the projection period, using both data on pensions and pensioners.

Following are the main points from Chart [3]:

- The expected decrease in total public pension expenditure of 0.1 per cent over the period 2013-60 mainly stems from:
  - ✓ a decrease in the benefit ratio, primarily due to the closure of GEPS to new members effective 2011, as well as the reduced indexation on GEPS pensions in payment in the longer-term; and
  - ✓ a decrease in coverage ratio, mainly caused by the linkage of statutory retirement age under GSIS with changes in life expectancy and the tightening of the eligibility conditions to GSIS old-age pension, following the December 2012 reform of the GSIS.
- Partially offsetting the above positive contribution towards the aforementioned decrease in total public pension expenditure of 0.1 per cent over the period 2013-60, is a negative contribution resulting from the significant deterioration of the old-age dependency ratio.

Table [9] shows the evolution of the benefit ratio, while Table [10] shows the evolution of the ratio of the average first GSIS pension for new old-age pensioners in a given year over the level of the previous year's gross average wage[1], which is defined as the average economy-wide gross wage including employer's social security contributions.

Table [9]: Benefit ratio (BR) and coverage rate (in per cent)

	2013	2020	2030	2040	2050	2060
Public scheme (BR) – All types of pension and all schemes	64.4	57.3	53.7	48.0	44.1	43.5
Coverage	100.0	100.0	100.0	100.0	100.0	100.0
Public scheme old-age earnings related (BR) – GSIS and GEPS	74.9	61.4	55.4	48.6	43.5	42.4
Public scheme old-age earnings related (BR) - GSIS	46.9	47.4	48.6	45.6	43.2	42.4
Coverage	70.2	70.7	72.7	74.1	78.2	81.1

Table [10]: Ratio of newly-awarded GSIS old-age pension to average economy-wide wage and coverage rate (in per cent)

	2014	2020	2030	2040	2050	2060
Ratio of new GSIS old-age pension to average wage	44.2	48.2	48.3	45.9	43.8	49.2
Coverage	-	70.7	72.7	74.1	78.2	81.1

[1] Such a ratio is useful to assess the projected evolution of the average newly-awarded pension amount in comparison with the development of productivity. However, it should not be considered as replacement ratio because the denominator "average economy-wide wage" does not represent the average wage just before retirement and it differs from the average contributory earnings.

Table [10] illustrates that over the decade 2014-20, as the supplementary part of the GSIS matures, the ratio of newly-awarded GSIS old-age pension to average wage is projected to increase from 44.2 per cent in 2014 to 48.2 per cent in 2020. Thereafter that ratio is anticipated to remain stable over the following decade 2020-30, and decrease gradually from 2030 onwards reaching to the level of 43.8 per cent in 2050. In the final decade 2050-60, the ratio is projected to gradually increase reaching to 49.2 per cent in 2060. The projected evolution of the above ratio is largely driven by the development of the average newly-awarded old-age pension, which is analysed in Table [13].

Table [11] presents pension system dependency ratio (SDR) and old-age dependency ratio (ODR) for a better understanding of the impact of demographic factors on financial sustainability of public pension schemes.

Table [11]: System dependency ratio and old-age dependency ratio

	2013	2020	2030	2040	2050	2060
Number of pensioners (thousand) (I)	142.2	164.0	204.9	242.0	269.5	290.4
Employment (thousand) (II)	376.8	399.1	433.9	471.5	495.3	516.3
System Dependency Ratio (SDR) (I)/(II)	37.8	41.1	47.2	51.3	54.4	56.3
Number of people aged 65+ (thousand) (III)	116.6	145.6	189.4	223.0	264.7	301.5
Working age population 15 - 64 (thousand) (IV)	609.3	598.4	590.9	608.7	621.0	648.1
Old-age Dependency Ratio (ODR) (III)/(IV)	19.1	24.3	32.1	36.6	42.6	46.5
System efficiency (SDR/ODR)	2.0	1.7	1.5	1.4	1.3	1.2

Table [12] shows the evolution of the total number of public pensioners as percentage of inactive population by various age groups.

Table [12]: Pensioners (public scheme) to inactive population ratio by age group (%)

	2013	2020	2030	2040	2050	2060
Age group -54	2.0	2.3	2.7	2.9	2.8	2.6
Age group 55-59	23.0	25.5	32.8	41.9	38.5	56.4
Age group 60-64	43.0	40.3	38.0	35.0	37.4	44.3
Age group 65-69	119.4	108.9	129.9	137.3	115.5	94.9
Age group 70-74	107.7	117.5	110.0	119.8	116.3	100.7
Age group 75+	109.7	107.1	106.4	104.8	106.2	105.5

Table [12] clearly indicates the impact of the reform measure of the increase in the statutory retirement age in line with changes in the life expectancy on the number of pensioners, particularly for the age group 65-69 as well as for the period after 2040, when the effect of the linkage of retirement age and life expectancy dominates.

Section A2.2 of Appendix 2 presents the ratios of total number of pensioners to the inactive population and total population respectively, by age group. Separate ratios are presented for total and female population.

Table [13] shows the evolution of the public pension expenditure for new old-age pensioners under the GSIS and its disaggregation into the factors of 'Number of new pensioners', 'Average number of insurance points', 'Average accrual rate' and 'Point value'.

Table [13]: Projected and disaggregated new public pension expenditure - GSIS: old-age and early earnings-related pensions

New pension	2014	2020	2030	2040	2050	2060
I. Projected new pension expenditure (millions EUR)	49.6	66.6	122.9	173.0	302.1	356.7
II. Number of new pensions (in 1000)	6.3	6.6	9.0	9.2	11.5	8.4
III. Average new pension	7.9	10.1	13.6	18.8	26.5	41.9
IV. Average number of insurance points	64.5	77.9	79.6	79.9	77.5	86.1
V. Average accrual rate	1.36%	1.35%	1.33%	1.28%	1.26%	1.27%
VI. Point value	8,995	9,640	12,829	18,407	27,021	38,948
VII. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VIII. Average number of months paid the first year	13.0	13.0	13.0	13.0	13.0	13.0
Average new pension over economy wide average wage	0.44	0.48	0.48	0.46	0.44	0.49

Following are the main points from Table [13]:

- The *average accrual rate* slightly decreases over the projection period mainly due to the abolishment of the increase of pensions for a working dependent spouse under the GSIS as of 1 January 2013, following the recent reform of the GSIS, and the increasing share of female insured persons, who, compared to male pensioners, are entitled to a lower effective accrual rate under the basic part of the GSIS since they are not typically entitled to a dependents' increase in their basic pension. In addition, effective accrual rate decreases as the insurance period[2] in basic insurance increases in line with the expected increase in statutory retirement age.
- The *average number of insurance points*, which represents the overall paid or credited insurance points under both the basic and supplementary part of the GSIS, increases over the next two decades primarily due to the maturity of the supplementary part of the GSIS and the increasing number of contributory years for females as a result of their increasing participation in the labour

[2] The number of years over the period between 5 October, 1964 (or the first day of the year of attainment of age 16, if later) and the week before the week of old-age pension entitlement.

market. Over the decade 2040-2050, the average number of insurance points slightly decreases primarily due to a cohort effect stemming from the increasing share of insured persons with lower level of insurable earnings, such as migrants, who accumulate lower number of insurance points in the supplementary part of the GSIS. Over the last decade 2050-2060, there is a strong increase in the average number of insurance points because the cohort effect of an increased share of insured persons with lower level of insurable earnings observed in the previous decade, goes away and hence the anticipated increase in the effective retirement age resulting from the linkage of retirement age and life expectancy dominates.

In section A2.3 of Appendix 2, the above information with respect to the projected and disaggregated new GSIS old-age pension expenditure is provided for males and females and the aforementioned comments on Table [13] are further illustrated.

3.4 Financing of the pension system

Table [14] shows the projected development of revenue from contributions arising from employee, employer and state GSIS legislated schedule of contribution rates and employee GEPS contribution rate.

Table [14]: Revenue from contribution (millions), number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)

	2013	2020	2030	2040	2050	2060
Pension contribution	1159.4	1658.0	2684.8	4639.3	7051.1	10405.9
Employer contribution	*418.3*	*622.5*	*1025.4*	*1786.9*	*2720.1*	*4014.5*
Employee contribution	*476.5*	*667.9*	*1052.8*	*1794.4*	*2720.4*	*4014.5*
State contribution	*264.6*	*367.6*	*606.6*	*1058.0*	*1610.6*	*2376.9*
Number of contributors (I)	418.7	445.1	482.9	528.5	560.9	593.6
Employment (II)	376.8	399.1	433.9	471.5	495.3	516.3
Ratio of (I)/(II)	1.1	1.1	1.1	1.1	1.1	1.1

3.5 Sensitivity analysis

Table [15] presents the projected public pension expenditure under the seven different sensitivity scenarios in terms of its deviation in percentage points from the baseline scenario.

Since the current pension legislation already foresees a linkage between the statutory retirement age and movements in life expectancy, to be applied in 2018, for the purposes of this report the sensitivity test on "policy scenario: linking retirement age to increases in life expectancy", which assumes that the linkage is applied from the start of the projection period, was not carried out since it would have produced only

marginal differences compared to the baseline scenario reflecting the earlier application of the linkage.

Table [15]: Public pension expenditure under different scenarios - percentage points deviation from the baseline

	2013	2020	2030	2040	2050	2060
Baseline	10.4	9.9	10.6	10.3	10.1	10.2
Higher life expectancy (2 extra years)	0.0	0.0	0.0	-0.1	-0.1	0.0
Higher labour productivity (+0.25 pp.)	0.0	0.0	-0.1	-0.2	-0.2	-0.3
Lower labour productivity (-0.25 pp.)	0.0	0.0	0.1	0.2	0.2	0.3
Higher emp. rate (+2 pp.)	0.0	-0.1	-0.2	-0.2	-0.2	-0.1
Higher emp. of older workers (+10 pp.)	0.0	-0.2	-0.4	-0.5	-0.5	-0.3
Lower migration (-20%)	0.0	0.0	0.0	0.2	0.4	0.6
Risk scenario	0.0	0.0	0.1	0.2	0.3	0.3

Following are the main points from Table [15]:

- *Higher life expectancy* – the sensitivity of the results to an increase of life expectancy at birth of two years by 2060 seems relatively very limited. Higher number of pensions and increased duration of pension payments in retirement, caused by increases in life expectancy, contribute positively to the above pension expenditure variation. Offsetting this positive contribution is a negative contribution stemming from the anticipated increase in the effective retirement age resulting from the linkage of retirement age and life expectancy.

- *Higher/ lower labour productivity* - Symmetrical changes in labour productivity growth rate of plus/minus 0.25 p.p., compared to the baseline scenario, produce symmetrical deviations from the baseline pension expenditure projection results of minus/plus 0.3 p.p. of GDP respectively. An upward/downward change in labour productivity mainly acts on the denominator and consequently, an increased/decreased level of GDP leads to a lower/higher ratio of pension expenditure to GDP in the long run, compared to that of the baseline.

- *Higher employment rate* – A scenario with an employment rate of 2 p.p. higher than that of baseline scenario reduces slightly the ratio of pension expenditure to GDP in the medium term by 0.2 p.p. when compared to baseline. Indeed, high employment would have fiscal, but also real effects. It would imply a higher employed population and higher economic growth rates.

- *Higher employment rate of older workers* - A scenario with an employment rate of older workers (55-74) of 10 p.p. higher than that of baseline scenario leads to a constant decrease of the expenditure to GDP ratio, particularly in the medium term, due to a constant increase in the effective retirement age and a continuous

increase of employment, resulting to higher potential output over the projection period.

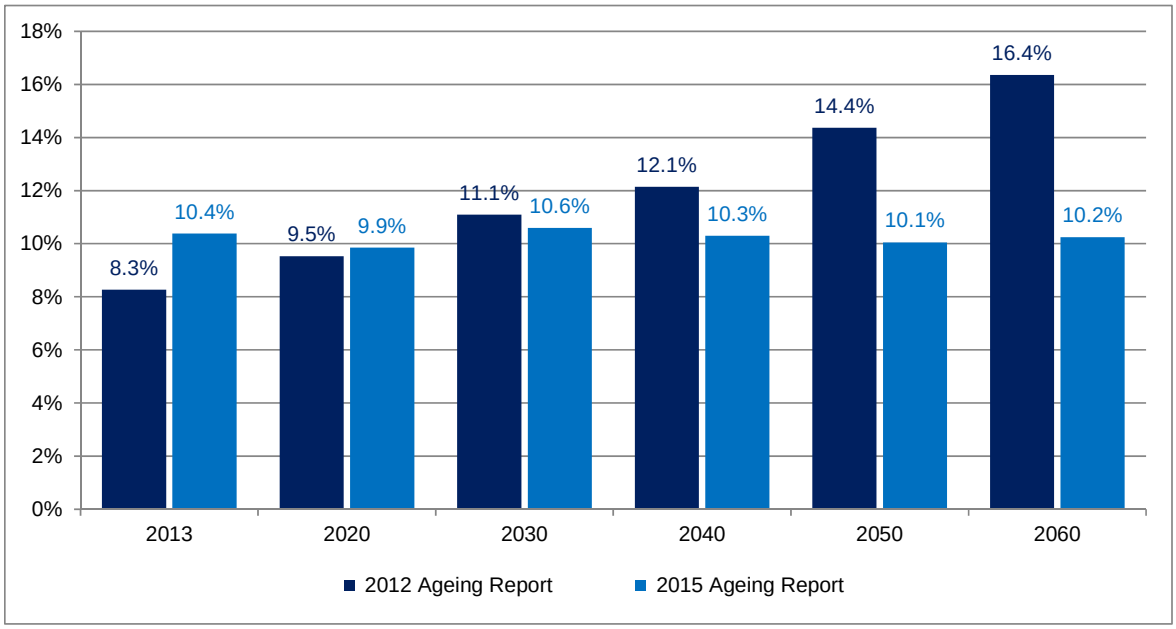
- *Lower migration* – A scenario with net migration being 20% lower than in the baseline scenario, leads to a higher ratio of pension expenditure to GDP of 0.6 p.p. in 2060. In fact, lower migration decreases employment and output, whereas pension expenditure decrease only marginally – in other words, the "denominator effect" dominates the "numerator effect".

- *Risk scenario* – The impact of this scenario, where total factor productivity (TFP) growth converges to 0.8%, is similar to that of lower labour productivity scenario (see above).

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

Chart [4] compares the projected total public pension expenditure figures under the AWG 2015 and the AWG 2012 projections exercise.

Chart [4]: Public pension expenditure (as % GDP) over the period 2013-2060 - AWG 2015 vs AWG 2012 projection exercise



When compared with the 2012 AWG pension projection exercise, the present 2015 AWG exercise represents a very significant improvement in pension expenditure over the projection period through 2060 of the order of 6.2 percentage points of GDP (2012 AWG exercise – 16.4 per cent *versus* 2015 AWG exercise – 10.2 per cent).

Table [16] provides a comparison of the decomposition of the change in public pension expenditure during the projection period among the 2015 AWG projection exercise and previous (2006, 2009 and 2012) AWG exercises.

Table [16]: Overall change in public pension expenditure to GDP under the 2006, 2009, 2012 and 2015 projection exercises

	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. interaction effect)
2006 *	12.8	10.2	1.2	-1.2	2.5	:	0.1
2009 **	11.4	10.8	1.6	-0.5	-0.3	:	-0.2
2012 ***	2.8	9.5	-2.4	-0.6	-2.6	0.0	-1.1
2015****	-0.1	9.5	-2.8	-1.9	-3.7	0.0	-1.3

* 2004-2050; ** 2007-2060; *** 2010-2060 – incorporates the 2012 pension reform; **** 2013-2060

The difference in the percentage points increase of public pension expenditure over the projection period between the present 2015 AWG exercise and previous 2012 AWG exercise, amounts to approximately 3 percentage points of GDP. A more favourable employment ratio and benefit ratio, primarily reflecting the differences in the macroeconomic framework used in the above two exercises, explains the above difference.

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

	2013	2020	2030	2040	2050	2060
Ageing report 2012	8.3	9.5	11.1	12.1	14.4	16.4
Improvement in the coverage or in the modelling	*-0.1*	*-0.1*	*-0.2*	*-0.5*	*-0.8*	*-1.4*
Policy related changes	*-0.1*	*-1.0*	*-1.7*	*-2.5*	*-4.5*	*-5.4*
Change in the interpretation of constant policy	-	-	-	-	-	-
Change in assumptions	*2.3*	*1.5*	*1.4*	*1.2*	*1.0*	*0.6*
New projection	10.4	9.9	10.6	10.3	10.1	10.2

Table [17] shows the results of the reconciliation of the public pension expenditure (as percentage of GDP) of the present 2015 AWG projection exercise with that of the 2012 exercise. The effects of the various factors on the public pension expenditure (as percentage of GDP) are as follows:

- The improvement in the coverage and the methodological improvements made to the projection model used in previous exercises have resulted to a decrease of the public pension expenditures, especially in the medium (-0.5% in 2040) and long term (-1.4% in 2060).
- The GSIS' and GEPS' legislative amendments, mainly following the December 2012 pension reform respectively, had a very significant downward effect on the public pension expenditures in the short term (-1.0% in 2020), medium term (-2.5% in 2040) and long term (-5.4% in 2060).
- Finally, the overall impact of changes in assumptions onto the public pension expenditures is negative, largely driven by a less favourable macroeconomic environment in the period up to 2020, resulting in an increase of the public pension expenditures, particularly in the short term (+1.5% in 2020) and medium term (+1.2% in 2040). After 2020, the macroeconomic framework gradually improves and results to a relatively more favourable set of economic assumptions.

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

4.1 Institutional context in which those projections are made

The present 2015 AWG projections for Cyprus were undertaken by the actuarial unit of the Ministry of Labour, Welfare and Social Insurance. The projection results of the GSIS are produced directly from the actuarial pension model of the Ministry of Labour, Welfare and Social Insurance using an agreed set of demographic and economic assumptions, and based on internationally accepted actuarial projection methodologies and input starting data, including data on GSIS' contributors and pensioners. The present actuarial model is a fully customised version of the International Labour Organisation (ILO) generic pension modelling tool and it now incorporates a number of enhancements to better reflect the parameters of the social security system in Cyprus.

It is noted that the present actuarial valuation of the GSIS was undertaken in accordance with internationally accepted actuarial practice and in particular the International Actuarial Note No. 1 (IAN1 on Actuarial Practice for Social Security Programs) of the International Actuarial Association (IAA), published on 1 January, 2003 and reformatted on 24 January, 2012, and the valuation results were validated by the ILO, as an independent external evaluator.

With respect to GEPS, the actuarial projection results were produced by an external consulting firm, i.e. Muhanna & Co, Actuaries and Consultants.

4.2 Assumptions and methodologies applied

4.2.1 Methodologies applied

Chart [5] presents graphically the methodology used for calculating GSIS revenue from contributions, while Chart [6] shows the methodology used for calculating GSIS pension expenditure.

The valuation starts with a projection of the general population of Cyprus. The projected population, based on the number of persons in each age group, serves to determine both the working population which contributes to the GSIS and the population eligible for the GSIS various pension benefits.

The revenue includes both contributions and investment income. For each year in the projection period, total contributions are derived from the total insurance earnings and the contribution rate prescribed by law. The total amount of insurable earnings is estimated on the basis of the projected rates of participation in the GSIS and future level of insurable earnings.

Expenditures include the pension benefits paid out, which are projected using assumptions based on the population's eligibility rates for the various benefits, the probability of the occurrence of an event giving entitlement to a pension and the historical record of contributors' insurable earnings.

Chart [5]: Methodology – GSIS contribution income

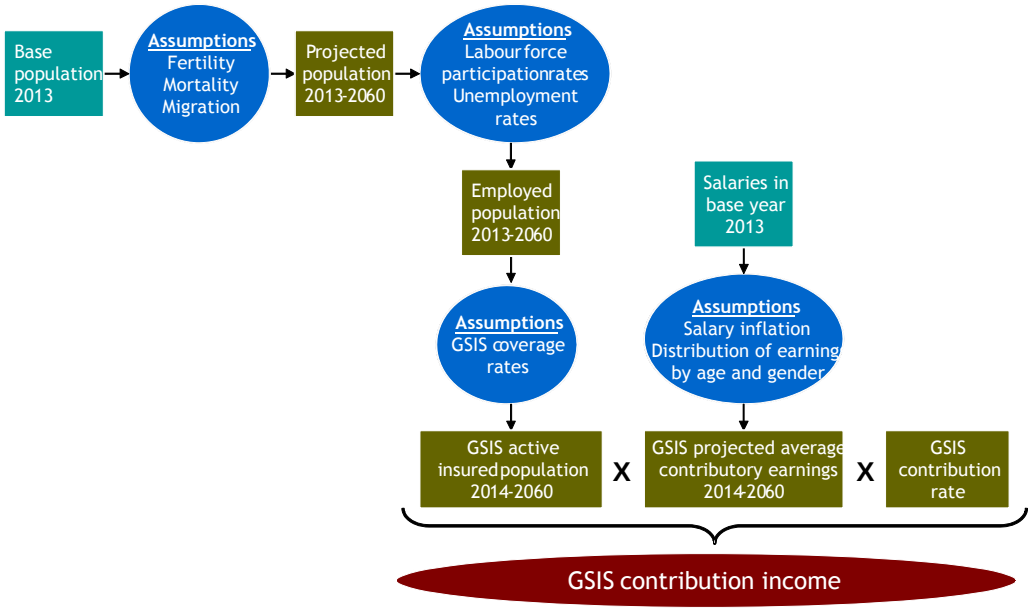
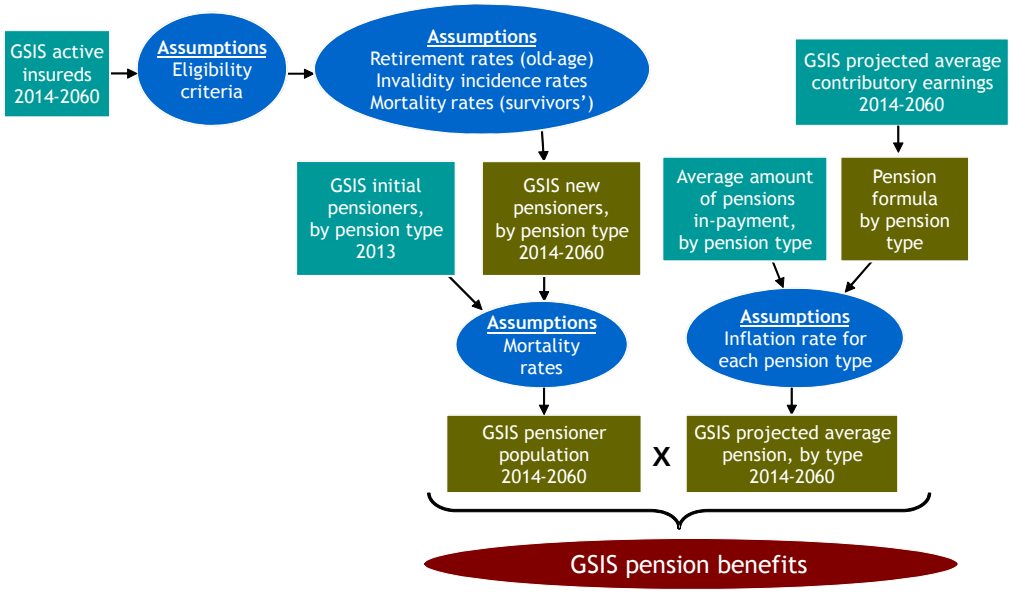


Chart [6]: Methodology – GSIS pension benefits



Details of the methodologies applied for the purposes of conducting the present actuarial valuation for the GSIS are provided in Appendix 3.

Regarding the GEPS actuarial valuation, the actuarial model starts with the demographic projections and in particular the projection of the scheme participants/contributors, pensioners, widows and lump sum recipients. The cohort demographic model forecasts the future group of contributors, based on expected survivals and retirements. Following the 2011 Law amendments, the scheme rules do not allow for new entrants and therefore the model was adjusted accordingly. Similarly, the groups of pensioners and widows are projected from one year to the next, based on the survival of the existing members and the new pensioners/widows expected each year.

The next step of the model is the projection of salaries, period of past service and units earned to the supplementary part of the GSIS. Salaries are projected from one year to the next based on the assumptions for future increases for the cost of living allowance, general increases as well as due to changes in scales. The projections for past service and supplementary units are based on a cohort method.

The demographic and salary/past service/units projections are then used for the projection of benefits. The model projects pension and lump sum benefits. Pensions are based on the benefits paid to existing pensioners and the survival probabilities as well as on the benefits to be paid to members expected to qualify for pension. Benefit projections take into account the deduction of the GSIS supplementary pension.

The GEPS projections were carried out based on the agreed AWG 2015 macroeconomic framework.

4.2.2 Scheme-specific assumptions

In addition to the agreed demographic and economic assumptions made for the purposes of conducting the present actuarial valuation, a certain number of scheme-specific assumptions were also made. Appendix 4 presents the main GSIS scheme-specific assumptions used in this valuation, which include invalidity incidence rates and family structure statistics.

4.3 Data used to run the model

Data used to run the GSIS actuarial model was provided by the Statistics department of the Social Insurance Services of the Ministry of Labour, Welfare and Social Insurance. The database included the insured population by active and inactive status, the distribution of insurable wages among contributors, the distribution of past credited service and pensions in-payment. Data are disaggregated by age and sex.

For the purposes of the GEPS actuarial valuation, it is assumed that GEPS pensions are indexed 50% of COLA, in accordance with the revised COLA framework as stipulated existing legislation.

4.4 Reforms incorporated in the model

The pension reform measures incorporated in the modeling exercise, which refer to both the GSIS and GEPS, are those described in section 1.2 of this report.

4.5 General description of the model

With respect to GSIS pension benefits, this actuarial valuation makes use of an actuarial pension model, which is a fully customised version of the ILO generic pension modelling tool. The model has been customised in order to closely comply with local social insurance legislation and capture national pension peculiarities. In addition, methodological enhancements to the projection model are introduced on a regular basis in the context of continued improvement of the accuracy of the projection results. Following are the key methodological enhancements introduced in the current version of the model:

- The active and inactive insured populations are disaggregated by insurance level (basic only/basic and supplementary) and the following two key variables, which affect the accumulation of basic and supplementary insurance points of the active and inactive insured populations by insurance level, are explicitly modelled:
  - ✓ Distribution of past insurance points (for both active and inactive insured persons) in base year; and
  - ✓ Acquisition of new insurance points (for active insured persons) in subsequent years.
- The projected cost of the minimum pension supplement is projected by the model with higher degree of accuracy since the distribution of pensioners by level of pension is produced by the model. The estimation of the distribution of pensioners by level of pension is possible through the insured population grouping by insurance level (basic only/ basic and supplementary) and the modelling of the distribution of past insurance points and insurable earnings.

The model is operated under the supervision of the Chief Actuarial Officer of the Ministry of Labour, Welfare and Social Insurance who is certified to use it. This model is used primarily for:

- conducting the actuarial valuation of the GSIS, every three years in accordance with the Social Insurance Law; and
- assessing the long-term financial impact of various pension reform alternatives.

The pension model is a standard deterministic cohort-based projection model performing long-term projections of income and expenditure for the public pension schemes.

With respect to GEPS pension benefits, the actuarial projection model used for the valuation is internally developed by the external actuarial consulting firm to be in line with the legal provisions of the GEPS in particular. The actuarial model is a standard deterministic cohort-based projection model performing long-term projections of income and expenditure for the GEPS. A 75-year projection horizon is adopted for the actuarial valuation.

Appendix 1

Overview of the pension system

The current public pension system in Cyprus comprises of:

- The General Social Insurance Scheme (GSIS), a compulsory earnings-related scheme which covers every person gainfully employed in Cyprus, both in public and private sector, including self-employed;
- The Social Pension Scheme, an income-tested scheme, which covers residents of Cyprus with no or low pension income; and
- The Government Employees Pension Scheme (GEPS), which provide supplementary pensionable benefits to their members.

Main GSIS provisions with respect to pension benefits

A1.1 Introduction

The General Social Insurance Scheme (GSIS) was introduced in 1957 and since the 1964 reform extends compulsory insurance to every person gainfully employed in Cyprus, including all categories of self-employed. A major reform in 1980 introduced an earnings-related insurance scheme, replacing the previous scheme of flat-rate contributions and benefits. The GSIS, in its current form, consists of two tiers: the basic and supplementary part. It provides comprehensive benefits, which include:

- Unemployment benefit;
- Other short-term benefits, such as sickness benefit and maternity allowance;
- Employment injury benefits; and
- Long-term benefits, i.e., old age, invalidity and survivors´ pension benefits.

A1.2 Coverage

The GSIS covers compulsorily every person gainfully occupied in Cyprus, either employed or self-employed. Employed persons are entitled to all benefits. Self-employed persons are not entitled to unemployment and employment injury benefits.

A1.3 Contributions

Insurable earnings

Insurable earnings, on which contributions are paid, are the gross earnings up to a maximum of six times the basic insurable earnings. In 2013, basic insurable earnings are fixed at €174.38 per week, or €9,068 per year. The maximum insurable earnings for contribution purposes in 2013 are €54,396.

The total annual insurable earnings of every insured person are converted into insurance points. The conversion of insurable earnings into insurance points is done by dividing the earnings of a given year by the annual basic insurable earnings of the following year (in 2013, one point is credited for every €9,068 of earnings). The first insurance point represents basic insurance and insurance points in excess of one represent supplementary insurance.

For self-employed persons, insurable earnings are fixed by regulations according to occupational category. For each category, a compulsory minimum insurable income is prescribed, but the individual self-employed person has the right to opt for a higher income up to the maximum insurable earnings.

Contribution rate

Table [A1.1] shows the current contribution rate paid by or on behalf of insured persons.

Table [A1.1]: Contribution rate as at 1.1.2013

Employed persons	13.6 per cent of insurable earnings, shared equally between the employer and the employee
Self-employed persons	12.6 per cent of insurable income
State contribution	4.3 per cent of the insurable earnings of employed persons and self-employed

Out of the total 17.9 per cent contribution rate, 15.6 percentage points are allocated to the long-term benefits branch of the GSIS.

Table [A1.2] shows the legislated future contribution rate paid on behalf of an employed person.

Table [A1.2]: Legislated future contribution rate (as % of insurable earnings) for employed persons

Period	Employee	Employer	State	Total
2012-2013	6.8	6.8	4.3	17.9
2014-2018	7.8	7.8	4.6	20.2
2019-2023	8.3	8.3	4.9	21.5
2024-2028	8.8	8.8	5.2	22.8
2029-2033	9.3	9.3	5.5	24.1
2034-2038	9.8	9.8	5.8	25.4
2039-2060	10.3	10.3	6.1	26.7

A1.4 Benefits

Benefit structure

The basic benefit is related to basic insurance. It includes increases for dependants. The supplementary benefit is related to supplementary insurance. No increases for dependants are payable on the supplementary benefit.

Invalidity pension

An invalidity pension is payable to a person who has been incapable of work for at least 156 days and who is expected to remain permanently incapable for work, i.e., unable to earn from work more than 1/3 of the sum usually earned by a healthy person of the same occupation or category and education in the same area.

The insurance conditions are that:

1. the person has been insured for at least 156 weeks and has basic insurance up to the date of invalidity at least 3 insurance points, earned from paid contributions;

2. the total number of insurance points in the basic insurance, earned from paid or credited contributions, is equal to at least 25 per cent of the number of years over the period between 5 October, 1964 (or the first day of the year of attainment of age 16, if later) and the week of invalidation; and

3. the person has paid or been credited with contributions which provided him/her with at least 0.39 of insurance point within the relevant contributions year. This condition is also satisfied if the average number of insurance points earned from paid or credited contributions over the last two years is equal to at least 0.39 of insurance point.

The amount of the pension is equal to the old-age pension in case of full invalidity (100%). When the loss of earnings is partial, the following percentages are payable:

Loss of earning capacity	Percentage of the full pension
up to 66 $^2/_3$ %	60 %
66 $^2/_3$ % to 75 %	75 %
75 % to 99 %	85 %

Old-age pension

As a general rule, the old-age pension is payable at the age of 65 for men and women, provided that the following insurance conditions are met:

1. the person has been insured for at least x weeks and has basic insurance up to the date of old-age pension entitlement at least y insurance points, earned from paid contributions, where

   - ✓ x = 572 weeks and y = 11 insurance points as from 1.4.2013;
   - ✓ x = 624 weeks and y = 12 insurance points as from 6.1.2014;
   - ✓ x = 676 weeks and y = 13 insurance points as from 5.1.2015;
   - ✓ x = 728 weeks and y = 14 insurance points as from 4.1.2016;
   - ✓ x = 780 weeks and y = 15 insurance points as from 2.1.2017; and

2. the total number of insurance points in the basic insurance, earned from paid or credited contributions, is equal to at least 30 per cent of the number of years over the period between 5 October, 1964 (or the first day of the year of attainment of age 16, if later) and the week before the week of old-age pension entitlement.

Old-age pension could be paid at an earlier age on certain conditions:

- At age 63 if the insured person satisfies the above two insurance conditions and the total number of insurance points in the basic insurance, earned from paid or credited contributions, is equal to at least 70 per cent of the number of years over the period between 5 October, 1964 (or the first day of the year of attainment of age 16, if later) and the week before the week of old-age pension entitlement.
- Miners are entitled to the old-age pension one month earlier than the pensionable age of 63 for every 5 months of work in a mine, but in no case before the age of 58, provided that they have at least three years of work in a mine.

An insured person in receipt of the invalidity pension immediately before reaching the age of 63 is eligible to the old-age pension. Also eligible to the old-age pension is the person between the ages of 63 and 65 who would be entitled to an invalidity pension if the person had not completed the age of 63.

The old-age pension consists of the:

- basic pension, which is equal to 60 per cent of the weekly value of the annual average number of insurance points earned in the basic insurance over the period between 5 October, 1964 (or the first day of the year of attainment of age 16, if later) and the week before the week of old-age pension entitlement, increased to 80%, 90% or 100% for one, two or three qualified dependants respectively; and
- supplementary pension, which is equal to 1.5 per cent of the weekly value of the total number of insurance points earned in the supplementary insurance.

The old-age pension amount is subject to an actuarial reduction 0.5 per cent for every month included in the period between the date the person chooses to claim the pension (beyond the age of 63) and

- the age of 63.5 as of 1.1.2013 (max. 3 per cent actuarial reduction);
- the age of 64 as of 1.1.2014 (max. 6 per cent actuarial reduction);
- the age of 64.5 as of 1.1.2015 (max. 9 per cent actuarial reduction); and
- the age of 65 as of 1.1.2016 and onwards (max. 12 per cent actuarial reduction).

A person may ask for postponement of the payment of the pension until the age of 68. In this case, the pension amount is increased by 0.5 per cent for each month of postponement. No deferment possible from age 63 up to:

- the age of 63.5 as of 1.1.13;
- the age of 64 as of 1.1.14;
- the age of 64.5 as of 1.1.15; and
- the age of 65 as of 1.1.16 and onwards.

Survivors' benefits

The survivors' benefits include widow/ widower's pension and orphan's benefit. The widow's pension is payable to the widow (or widower under certain conditions of dependence) of a person who, at the time of death:

- had not reached the pensionable age and satisfied the insurance conditions (1) and (2) for the invalidity pension; or
- was in receipt of old-age pension.

The orphan's benefit is payable for a minor:

1. when both parents are dead and at least one of the parents was an insured person; or

2. when the parent who was taking care of the minor died in case where the parents were separated provided that the parent who died was an insured person; or

3. when one of the parents died and the surviving parent is not entitled to a widow's pension provided that the deceased parent fulfills the insurance conditions for a widow's pension; or

4. when the widowed mother, who was in receipt of widow's pension, remarried.

The widow's pension consists of the:

- basic pension, which is equal to:
  - ✓ if the husband was not in receipt of an old-age pension, 100 per cent of the basic invalidity pension to which the deceased would have been entitled on his death; or
  - ✓ if the husband was in receipt of an old-age pension, 100 per cent of the basic old-age pension which was payable; and
- supplementary pension, which is equal to:
  - ✓ if the husband was not in receipt of an old-age pension, 60 per cent of the supplementary invalidity pension to which the deceased would have been entitled on his death; or
  - ✓ if the husband was in receipt of an old-age or invalidity pension, 60 per cent of the supplementary old-age or invalidity pension which was payable.

The amount of the benefit for cases (1) and (2) above consists of the:

- Basic benefit, which is equal to 40 per cent of the basic insurable earnings for each orphan; and
- Supplementary benefit, which is equal to 50 per cent of the supplementary widow's pension which was or would have been payable for each orphan (calculated for a maximum of two orphans).

The amount of the benefit for cases (3) and (4) is equal to 20 per cent of the basic insurable earnings for each orphan, and is payable for up to three orphans. The orphan's benefit is payable until the orphan attains age 15, or age 23 for a female in full-time education and 25 for male in full time education or in military service.

Pension indexation

The basic pension is reviewed at the beginning of each year in accordance with the percentage change of average earnings and the supplementary pension is indexed to the consumer price index.

Minimum pension

A minimum pension is paid to insured persons who are eligible for a pension and their total basic and supplementary pension is less than that amount of minimum pension. The minimum pension is equal to 85 per cent of the full basic pension. The monthly amount of minimum pension for 2013 was €352.88 (pensioner with no dependants). The minimum pension is paid 13 times a year and is adjusted every year in the same way as the basic pension.

Overview of the Social Pension Scheme

The Social Pension Scheme (SPS) closes the gap in accessibility to pensions by providing income-tested pensions to those residents, of 65 years or more who, for any reason did not participate enough in the labour market and as a consequence have no or low old-age pension income. For the purposes of the test, the total individual pension income coming from the GSIS or any other source is taken into account. The SPS ensures universality in pension provision.

SPS is financed by the Consolidated Fund. The beneficiaries are mostly women (about 97%), especially of older generations with relatively low labour force participation rates. The rate of the Social Pension is equivalent to 81% of the full basic pension under the GSIS, and as a consequence, is automatically indexed to earnings. The monthly amount of social pension for 2013 was €336.28. The social pension is paid 13 times a year.

Overview of the Government Employees Pension Scheme

The Government Employees Pension Scheme (GEPS) provides retirement and survivors pensions to civil servants, members of the educational service, the police and the armed forces. It is financed by employee contributions of 5 per cent of pensionable emoluments and the remaining by general taxation on a pay-as-you-go basis. Effective October 1, 2011, GEPS became closed to newcomers of the public sector.

Prior to the December 2012 reform, GEPS compulsory retirement age was 63 years, with early retirement allowed from the age of 58 without any actuarial reduction of benefits. Following the recent reform, the normal retirement age gradually increases from 63 to 65 over the period 2013-2016 (different increases apply for different types of public servants). Corresponding gradual increases are also applied to the early retirement age, i.e., the minimum age from which the member becomes eligible to a pension.

Furthermore, prior to the December 2012 reform, pensions were calculated on the final salary at an accrual rate of 1.5% per annum that produced a retirement pension equal to 50 per cent of that salary after 33 $^1/_3$ years of service. Post-reform, for benefits accrued based on service after the 1st of January 2013, the pensionable salary used for calculating benefits is the career average of the salaries for the whole period of service (from the day joining the scheme until retirement). This is adjusted using an index based on the change of the basic insurable earnings (BIE) as determined by the GSIS.

Appendix 2

Pension Projection Results

A2.1 Pension spending decomposition

Tables [A2.1] and [A2.2] show in detail the drivers of the ratio of public pension expenditures to GDP between 2013 and 2060, as well as during the five 10-year sub-periods over the projection period, using data on pensions and pensioners respectively.

Tables [A2.3] and [A2.4] are equivalent tables to Tables [A2.1] and [A2.2], but they were produced under the assumption that no reduction in residual (interaction) effect in each sub-interval over the projection period 2013-60 is applied.

Table [A2.1]: Factors behind the change in public pension expenditures between 2013 and 2060 using pensions data (in percentage points of GDP)

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60	Average annual change
Public pensions to GDP	-0.5	0.7	-0.3	-0.2	0.2	-0.1	0.213
Dependency ratio effect	2.4	3.1	1.4	1.5	1.0	9.5	0.190
Coverage ratio effect	-0.8	-0.5	0.0	-0.7	-0.8	-2.8	-0.062
*Coverage ratio old-age**	*-0.3*	*-0.3*	*0.1*	*-0.5*	*-0.8*	*-1.8*	*-0.039*
*Coverage ratio early-age**	*-2.7*	*-1.1*	*-0.4*	*-1.1*	*1.1*	*-4.2*	*-0.092*
*Cohort effect**	*-1.6*	*-1.9*	*-0.1*	*-2.1*	*-2.1*	*-7.8*	*-0.171*
Benefit ratio effect	-1.3	-0.6	-1.2	-0.8	0.1	-3.7	-0.080
Labour Market/Labour intensity effect	-0.6	-1.0	-0.5	-0.2	-0.1	-2.4	-0.052
Employment ratio effect	*-0.5*	*-0.8*	*-0.4*	*-0.1*	*-0.1*	*-1.9*	*-0.040*
Labour intensity effect	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.000*
Career shift effect	*-0.1*	*-0.2*	*-0.1*	*-0.2*	*0.0*	*-0.6*	*-0.012*
Residual	-0.2	-0.3	-0.1	-0.1	0.0	-0.7	-0.216

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

Table [A2.2]: Factors behind the change in public pension expenditures between 2013 and 2060 using pensioners data (in percentage points of GDP)

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60	Average annual change
Public pensions to GDP	-0.5	0.7	-0.3	-0.2	0.2	-0.1	0.213
Dependency ratio effect	2.4	3.1	1.4	1.5	1.0	9.5	0.190
Coverage ratio effect	-0.8	-0.4	0.0	-0.6	-0.6	-2.4	-0.051
*Coverage ratio old-age**	*-0.4*	*-0.1*	*0.1*	*-0.6*	*-0.5*	*-1.5*	*-0.032*
*Coverage ratio early-age**	*-2.0*	*-0.8*	*-0.7*	*0.5*	*1.3*	*-1.7*	*-0.040*
*Cohort effect**	*-1.6*	*-1.9*	*-0.1*	*-2.1*	*-2.1*	*-7.8*	*-0.171*
Benefit ratio effect	-1.3	-0.7	-1.2	-0.8	-0.1	-4.2	-0.090
Labour Market/Labour intensity effect	-0.6	-1.0	-0.5	-0.2	-0.1	-2.4	-0.052
Employment ratio effect	*-0.5*	*-0.8*	*-0.4*	*-0.1*	*-0.1*	*-1.9*	*-0.040*
Labour intensity effect	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.000*
Career shift effect	*-0.1*	*-0.2*	*-0.1*	*-0.2*	*0.0*	*-0.6*	*-0.012*
Residual	-0.2	-0.3	-0.1	-0.1	0.0	-0.7	-0.216

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

Table [A2.3]: Alternative decomposition - Factors behind the change in public pension expenditure between 2013 and 2060 using pension data (in p.p. of GDP)

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60
Public pensions to GDP	-0.5	0.7	-0.3	-0.2	0.2	-0.1
Dependency ratio effect	2.6	4.3	2.4	3.1	2.4	14.7
Coverage ratio effect	-0.8	-0.5	0.0	-0.6	-0.7	-2.6
*Coverage ratio old-age**	*-0.3*	*-0.3*	*0.1*	*-0.5*	*-0.7*	*-1.7*
*Coverage ratio early-age**	*-2.5*	*-0.8*	*-0.2*	*-0.7*	*0.6*	*-3.7*
*Cohort effect**	*-1.6*	*-1.6*	*-0.1*	*-1.4*	*-1.1*	*-5.8*
Benefit ratio effect	-1.3	-0.5	-0.9	-0.6	0.1	-3.2
Labour Market/Labour intensity effect	-0.6	-1.0	-0.4	-0.2	-0.1	-2.3
Employment ratio effect	*-0.5*	*-0.8*	*-0.4*	*0.0*	*-0.1*	*-1.8*
Labour intensity effect	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Career shift effect	*-0.1*	*-0.2*	*-0.1*	*-0.2*	*0.0*	*-0.6*
Residual	-0.4	-1.6	-1.4	-2.0	-1.5	-6.8

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

Table [A2.4]: Alternative decomposition - Factors behind the change in public pension expenditure between 2013 and 2060 using pensioners data (in p.p. of GDP)

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60
Public pensions to GDP	-0.5	0.7	-0.3	-0.2	0.2	-0.1
Dependency ratio effect	2.6	4.3	2.4	3.1	2.4	14.7
Coverage ratio effect	-0.8	-0.4	0.0	-0.6	-0.5	-2.2
*Coverage ratio old-age**	*-0.4*	*-0.1*	*0.1*	*-0.5*	*-0.5*	*-1.4*
*Coverage ratio early-age**	*-1.9*	*-0.7*	*-0.5*	*0.4*	*1.0*	*-1.8*
*Cohort effect**	*-1.6*	*-1.6*	*-0.1*	*-1.4*	*-1.1*	*-5.8*
Benefit ratio effect	-1.3	-0.6	-0.9	-0.6	-0.1	-3.5
Labour Market/Labour intensity effect	-0.6	-1.0	-0.4	-0.2	-0.1	-2.3
Employment ratio effect	*-0.5*	*-0.8*	*-0.4*	*0.0*	*-0.1*	*-1.8*
Labour intensity effect	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Career shift effect	*-0.1*	*-0.2*	*-0.1*	*-0.2*	*0.0*	*-0.6*
Residual	-0.4	-1.6	-1.4	-2.0	-1.5	-6.9

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

A2.2 Evolution of pensioners to population ratio by age group

Tables [A2.5] and [A2.6] show the total number of pensioners, by age group, as percentage to the inactive population in the same age group and to the population by age group respectively. The same analysis is done on female in Table [A2.7] and Table [A2.8].

Table [A2.5]: Pensioners (public scheme) to inactive population ratio by age group (%)

	2013	2020	2030	2040	2050	2060
Age group -54	2.0	2.3	2.7	2.9	2.8	2.6
Age group 55-59	23.0	25.5	32.8	41.9	38.5	56.4
Age group 60-64	43.0	40.3	38.0	35.0	37.4	44.3
Age group 65-69	119.4	108.9	129.9	137.3	115.5	94.9
Age group 70-74	107.7	117.5	110.0	119.8	116.3	100.7
Age group 75+	109.7	107.1	106.4	104.8	106.2	105.5

Table [A2.6]: Pensioners (public schemes) to total population ratio by age group (%)

	2013	2020	2030	2040	2050	2060
Age group -54	0.8	0.9	1.1	1.1	1.1	1.1
Age group 55-59	6.6	6.2	6.5	7.1	6.2	8.7
Age group 60-64	25.1	16.1	12.7	10.9	10.9	12.2
Age group 65-69	102.4	80.8	83.7	80.0	60.4	45.0
Age group 70-74	98.4	112.8	102.5	111.4	107.9	94.2
Age group 75+	109.7	107.1	106.4	104.8	106.2	105.5

Table [A2.7]: Female pensioners (public scheme) to inactive population ratio by age group (%)

	2013	2020	2030	2040	2050	2060
Age group -54	2.5	2.9	3.4	3.7	3.3	3.1
Age group 55-59	18.6	21.6	27.8	36.1	35.4	48.4
Age group 60-64	30.8	33.8	34.0	31.8	38.6	42.6
Age group 65-69	106.4	95.5	121.5	124.0	105.4	94.2
Age group 70-74	106.7	108.4	107.7	113.8	106.2	106.0
Age group 75+	108.7	113.8	112.7	108.6	103.5	104.5

Table [A2.8]: Female pensioners (public scheme) to total population ratio by age group (%)

	2013	2020	2030	2040	2050	2060
Age group -54	1.1	1.2	1.4	1.5	1.4	1.3
Age group 55-59	8.0	7.4	7.4	8.3	7.8	10.2
Age group 60-64	22.2	17.2	13.9	12.0	13.4	14.0
Age group 65-69	97.6	79.8	85.4	78.2	59.9	48.6
Age group 70-74	101.5	105.5	101.6	106.7	99.4	100.0
Age group 75+	108.7	113.8	112.7	108.6	103.5	104.5

A2.3 Projected and disaggregated new public old-age pension expenditure

Table [A2.9]: Disaggregated new public pension expenditure - GSIS: old-age and early earnings-related pensions - MEN

New pension	2014	2020	2030	2040	2050	2060
I. Projected new pension expenditure (millions EUR)	32.0	42.5	75.0	97.0	163.4	194.0
II. Number of new pensions (in 1000)	3.6	3.8	4.9	4.6	5.6	4.1
III. Average new pension	8.8	11.1	15.2	20.9	29.1	47.0
IV. Average number of insurance points	70.9	84.2	86.8	86.0	83.1	92.8
V. Average accrual rate	1.38%	1.37%	1.36%	1.32%	1.29%	1.30%
VI. Point value	8,995	9,640	12,829	18,407	27,021	38,948
VII. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VIII. Average number of months paid the first year	13.0	13.0	13.0	13.0	13.0	13.0
Average new pension over economy wide average wage	0.49	0.53	0.54	0.51	0.48	0.54

Table [A2.10]: Disaggregated new public pension expenditure - GSIS: old-age and early earnings-related pensions - WOMEN

New pension	2014	2020	2030	2040	2050	2060
I. Projected new pension expenditure (millions EUR)	17.6	24.1	47.9	76.0	138.8	162.7
II. Number of new pensions (in 1000)	2.6	2.8	4.1	4.5	5.8	4.3
III. Average new pension	6.7	8.7	11.7	16.8	23.8	38.0
IV. Average number of insurance points	55.9	69.0	70.9	73.5	72.1	79.6
V. Average accrual rate	1.33%	1.31%	1.29%	1.24%	1.22%	1.23%
VI. Point value	8,995	9,640	12,829	18,407	27,021	38,948
VII. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VIII. Average number of months paid the first year	13.0	13.0	13.0	13.0	13.0	13.0
Average new pension over economy wide average wage	0.37	0.42	0.42	0.41	0.40	0.44

Appendix 3

GSIS methodology of the present actuarial valuation

A3.1 Introduction

This actuarial valuation, as it was the case in previous actuarial review exercises, makes use of the comprehensive methodology developed at the Financial and Actuarial Service of the Social Protection Department of ILO for reviewing the long-term actuarial and financial status of national pension schemes. This valuation has been undertaken using an actuarial pension model, which is a fully customised version of the ILO generic pension modelling tools in order to fit the situation of Cyprus and to closely comply with the legal provisions of GSIS in particular. These modelling tools include a population model, an economic model, a labour force model, a wage model, a long-term benefits model and a short-term benefits model.

The actuarial valuation starts with a projection of the future demographic and economic environment of Cyprus. Next, projection factors specifically related to the GSIS are determined and used in combination with the demographic and economic frameworks.

A3.2 Modelling the demographic and economic developments

The use of the ILO actuarial model requires the development of demographic and economic assumptions related to the general population, the economic growth, the labour market and the increase and distribution of wages. Other economic assumptions relate to the future rate of return on investments, the indexation of benefits and the adjustment of parameters like the earnings levels in the basic and supplementary part of the GSIS.

The selection of assumptions takes into account the recent experience of Cyprus to the extent this information was available. The assumptions are selected to reflect long-term trends rather than giving undue weight to recent experience.

General population

General population is projected starting with most current data on the general population, and applying appropriate mortality, fertility and migration assumptions.

Economic growth

Real rates of economic growth, labour productivity increases and inflation rates are exogenous inputs to the economic model.

Labour force, employment and insured population

The projection of the labour force, i.e. the number of persons available for work, is obtained by applying assumed labour force participation rates to the projected number of persons in the general population. Aggregate employment is projected by dividing the real GDP (total output) by the average labour productivity (output per worker). Unemployment is then measured as the difference between the projected labour force and the total employment.

The model assumes movement of participants between the groups of active and inactive insured persons.

Wages

Based on an allocation of total GDP to capital income and to labour income, a starting average wage is calculated by dividing the wage share of GDP by the total number of employed persons.

In the medium-term, real wage development is checked against the labour productivity growth. In specific labour market situations, wages might grow at a pace faster or slower than productivity. However, due to the long-term perspective of the present study, the real wage increase is assumed equal to the increase in real labour productivity. It is expected that wages will adjust to efficiency levels over time. Wage growth is also influenced by an assumed gradual annual increase of the total labour income share of GDP over the projection period, which is concomitant with the assumed GDP growth.

Wage distribution assumptions are also needed to simulate the possible impact of the social protection system on the distribution of income, for example through minimum and maximum pension provisions. Assumptions on the differentiation of wages by age and sex are established, as well as assumptions on the dispersion of wages between income groups. Average career wages, which are used in the computation of benefits, are also projected.

A3.3 Modelling the financial development of the GSIS

The present actuarial valuation addresses all revenue and expenditure items of the long-term pension benefits branch of GSIS.

Purpose of pension projections

The main purposes of the pension model are twofold. First, it is used to assess the financial viability of the long-term benefits branch of the GSIS in the context of the triennial actuarial valuation as required by the Social Insurance Law. This refers to the measure of the long-term balance between revenue and expenditures of the GSIS. In case of imbalance, possible revision of the contribution rate and/or the benefit structure are recommended.

Second, the model may be used to examine the financial impact of different reform options, thus assisting policy makers in the design of benefit and financing provisions. More specifically, the pension model is used to develop long-term projections of expenditures and insurable earnings under the GSIS, for the purpose of:

- assessing the options to build up a contingency or a technical reserve;
- proposing schedules of contribution rates consistent with the funding objective; and
- testing how the system reacts to changing economic and demographic conditions.

Furthermore, the pension model is also used for:

- providing a solid quantitative framework to government authorities that guide future policy decision;
- long-term budgetary planning; and
- performing cash-flow projections between the Consolidated Fund and the Social Insurance Fund.

Pension data and assumptions

Pension projections require the demographic and macro-economic frame already described and, in addition, a set of assumptions specific to the GSIS.

The database as of the valuation date includes the insured population by active and inactive status, the distribution of insurable wages among contributors, the distribution of past credited service and pensions in-payment. Data are disaggregated by age and sex.

GSIS-specific assumptions such as the disability incidence rates and the distribution of retirement by age are determined with reference to the GSIS provisions and the historical experience under the GSIS.

The projection of the annual investment income requires information on the existing assets on the valuation date. An interest rate assumption is formulated on the basis of the nature of the GSIS's assets, the past performance of the fund, the GSIS's investment policy and assumptions on future economic growth and wage development.

Pension projection approach

Pension projections are performed following a year-by-year cohort methodology. The existing population is aged and gradually replaced by the successive cohorts of participants on an annual basis according to the demographic and coverage

assumptions. The projection of insurable earnings and benefit expenditures are then performed according to the economic assumptions and the GSIS's provisions.

Pensions are long-term benefits. Hence the financial obligations that a society accepts when adopting financing provisions and benefit provisions for them are also of a long-term nature: participation in a pension scheme extends over the whole adult life, either as contributor or beneficiary, i.e. up to 70 years for someone entering the scheme at the age of 16, retiring at the age of 65 and dying some 20 or so years later. During their working years, contributors gradually build entitlement to pensions that will be paid even after their death, to their survivors. The objective of pension projections is not to forecast the exact development of revenue and expenditures of the GSIS, but to check its financial viability. This entails evaluating the GSIS with regard to the relative balance between future revenue and expenditures. This type of evaluation is crucial, especially in the case of the Cyprus GSIS, which has not yet reached its mature stage.

A3.4 Pension model

The actuarial pension model deployed for the purposes of this actuarial valuation is a standard deterministic cohort-based projection model performing long-term projections of income and expenditure for the GSIS. It is based on macro-simulation techniques, i.e., the projections rely on grouped data. Each status of an insured person (active person, inactive person and pensioner) is explicitly modelled, distinguishing new persons from initial stock.

The pension model is operated under the supervision of the Chief Actuarial Officer of the Ministry of Labour, Welfare and Social Insurance who is certified to use it.

On a regular basis, the actuarial pension projection model is subject to methodological enhancements in the context of continued improvement of the accuracy of the projection results. The model, at its current version, satisfies the following key methodological features:

- The model is based on standard actuarial mathematics for social security schemes and on actuarially assumed transition probabilities (mortalities rates, incapacity rates, retirement rates, exit rates, etc) which are used to map the transition of an insured person (active person[3], inactive person[4] and pensioner) in a given year onto the next year's status.

[3] Active insured person refers to an individual who has made at least one contribution to the social security scheme during a given year.

[4] Inactive insured person refers to an individual who has made no contribution during last year because was unemployed, or out of the labour force, or emigrant, but is registered in the social security scheme, i.e., made contributions during previous years.

- The development of the active insured population is linked to the evolution of total employed population and earnings assumptions, which, in turn, are explicitly linked to the assumptions on macroeconomic growth and the wage share of GDP.
- The active insured population is disaggregated into the following population groupings:
  - ✓ Age (by single age);
  - ✓ Gender (males/females);
  - ✓ Insurance level (basic only/basic and supplementary);
  - ✓ Community (Cypriots/EU nationals/ third-country nationals); and
  - ✓ Income group (by earnings band).
- For the purposes of projecting insured population by community, the entry/ exit rates applied in the active insured population, as per pension model, are linked to the immigration/emigration rates applied in the Eurostat's population projections.
- Inactive insured persons are explicitly modelled.

Appendix 4

GSIS scheme-specific assumptions

A4.1 Mortality of insured persons

Mortality rates for the insured population have been assumed equal to the mortality rates of the general population, as per EUROPOP2013. This mortality pattern is also used to project survivors' benefits payable on the death of insured persons or pensioners. Mortality rates are assumed to decline continuously during the projection period.

A4.2 Invalidity incidence

Rates of entry into invalidity have been calculated from the GSIS experience over the years 2008, 2009, 2010 and 2011. Invalidity incidence rates are kept constant for the whole projection period. The rates are presented in Table [A4.1].

Table [A4.1]: Rates of entry into invalidity

Age	Males	Females
22	0.00025	0.00020
27	0.00045	0.00035
32	0.00046	0.00037
37	0.00093	0.00073
42	0.00159	0.00125
47	0.00228	0.00178
52	0.00450	0.00351
57	0.00834	0.00640
62	0.01097	0.00826

A4.3 Retirement

The actuarially assumed retirement rates used in the pension model are consistent with the labour force exit rates produced by the DG Ecfin's labour force cohort simulation model.

A4.4 Family structure

Information on the family structure of the insured persons is necessary for the projection of survivors' benefits. In the case of the GSIS, these data are also used to project the dependents' supplement paid in the basic part of the GSIS. Assumptions have to be established on the probability of being married at death, the age difference

between spouses, the average number or children possibly eligible to an orphan's benefit and the average age of orphans.

Data on the percentage of persons married were obtained from tables of the 2011 Census. The age differential between spouses was calculated from data of the Demographic Reports of the Cyprus Statistical Services. The average number of children has been assumed equal to 0.1, considering the stringent eligibility conditions for this benefit and the observed number of orphans' benefits in payment. The average age of orphans has been set with regard to age of the mother at first birth and with some margin for conservatism at older ages. These assumptions are presented in Table [A4.2].

Table [A4.2]: Assumptions on the family structure (for male insured persons)

Age	Probability to be married at death	Average age of the spouse	Average age of orphans
17	0.01	17	1
22	0.05	20	1
27	0.28	24	2
32	0.58	29	4
37	0.73	34	7
42	0.79	39	10
47	0.84	44	13
52	0.87	49	16
57	0.90	54	17
62	0.91	59	18
67	0.91	64	19
72	0.89	69	20
77	0.84	74	20
82	0.74	80	20
87	0.61	85	20