Ministry of Labour and Social Insurance

Actuarial Report

of the Social Insurance Scheme as at 31 December, 2009

Republic of Cyprus

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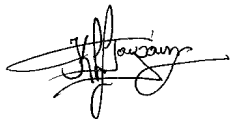
Ms. Soteroula Charalambous
Minister of Labour and Social Insurance

Dear Minister,

I have the honour to present to you the triennial Actuarial Report of the Social Insurance Scheme, prepared as at 31 December, 2009 in accordance with section 76 of the Social Insurance Law.

Respectfully submitted,



Costas Stavrakis FIA, FCAA

Chief Actuarial Officer

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Executive summary

The projected financial status of the Cyprus Social Insurance Scheme (the "Scheme") has significantly improved since last actuarial review, primarily due to the 2009 social insurance reform legislative amendments which included measures for securing the long-term viability of the Scheme. In particular, the period of actuarial equilibrium of the Scheme has widened by 30 years, from 2017 to 2047, as compared to the 2006 actuarial valuation.

In accordance with section 76(2) of the Social Insurance Law, this report presents the results of the 2009 actuarial review of the current and projected financial status of the Scheme, until 2060, and makes recommendations on the financial governance of the Scheme.

ES1. Financial status of the different branches of the Scheme

Unemployment benefit

While the annual level of expenditure on unemployment benefit has experienced important variations during the period 2007-2009, the overall financial status of the Unemployment Account has not changed over the above period. At present, there is no need to amend the financing of that benefit branch and it is recommended to leave the current contribution rate of 1.15 per cent of the earnings of the employed persons unchanged. Nevertheless, given the current experience of relatively high unemployment in Cyprus due to the recent economic downturn, it is recommended that the financial position of the Unemployment Account is being monitored more closely and on a more regular basis.

Other short-term and employment injury benefits

The branch of other short-term and employment injury benefits, which include sickness, maternity and employment injury, has not experienced major variations of its expenditures since the last actuarial review. It is recommended to leave the current contribution rate of 1.15 per cent of insurable earnings in respect of employed persons unchanged.

Administration expenses

The annual level of administration expenses which are currently covered by the Other Benefits Account has been stable over the period 2007-09. It is recommended that that the total administration cost is allocated into the various benefit accounts of the Scheme in accordance with the level of actual administration expenses incurred in each account.

Long-term benefits

The cost of long-term benefits is projected to increase in the future as a result of the ageing of the population and the consequent decrease of the ratio of contributors to pensioners. Currently there are five working-age people for each person aged 65 and over. In 2060, it is projected to have only two working-age people for each person aged 65 and over.

According to the best-estimate assumptions used for this report, contributions alone are projected to be more than sufficient to cover the Scheme's expenditures over the period 2010 to 2031. As of 2032 and until 2043, a proportion of investment earnings is required to make up the difference between contributions and expenditures. From 2044 onwards, Scheme's contributions plus investment earnings are projected to be insufficient to meet total expenditures, and therefore the reserve is expected to start gradually declining.

The Scheme is in actuarial equilibrium for a period of 38 years, i.e., from 2009 to 2047. In 2048, the Scheme's reserve is projected to reach a level lower than the target level in that year, which is set as 2.2 times the annual Scheme's expenditure. In 2055 the reserve is expected to be exhausted.

The rapid increasing cost pattern of long-term benefits after 2040, compared to the growth of the Scheme's revenues over that period, will eventually require an increase of the contribution rates and/or benefit adjustments.

ES2. Financial governance

In order to enhance the financial governance of the Scheme and thus the security of Scheme members' benefits and the inter-generational equity, it is recommended to revise the current investment policy of the Scheme.

In particular, a diversification of the investment portfolio of the Scheme into non-government securities should be contemplated in order to increase the rates of return through these diversified investments. Also, investing part of Scheme's reserves in non-government assets would aid in the containment of future increases in government debt and provide more flexibility to the Scheme in periods of significant economic difficulties or in the longer term, according to this valuation after 34 years when revenues are projected to be insufficient to meet expenditures, allowing the Scheme to draw on these funds, if necessary, from any of the Scheme's borrowers and not necessarily the government, which might itself face cash flow problems at that time.

Any change in the current investment policy of the Scheme should be gradual and the exact amounts from future Scheme's surpluses to be invested in non-government securities each year should be decided in close co-operation with the Ministry of Finance in the context of public finances.

ES3. Sensitivity tests on the results

Tests were performed on the results of the actuarial valuation in order to examine the sensitivity of those results to changes in key assumptions, namely fertility, mortality, net migration, female labour force participation rates, unemployment rate and rate of return on Scheme's assets. Those tests show that, even though the projected financial status of the Scheme is sensitive to those assumptions, the long-term impact of those changes on the financial indicators of "last year of actuarial equilibrium" and "first year expenditures exceed contributions" is relatively small.

1. Introduction

The present actuarial valuation report of the Cyprus Social Insurance Scheme (the "Scheme") is carried out in compliance with the provisions of section 76 of the Social Insurance Law N.59(I)/2010. It presents the financial situation of the Scheme as of 31 December, 2009. The previous triennial report was the Actuarial Report of the Scheme as at 31 December, 2006.

The Scheme was subject to a number of amendments since the 2006 Actuarial Report pursuant to the enactment of various laws, which included the following:

- Social Insurance Law N.110(I)/2007 on 25 July, 2007 – which refers to the amendment of the Laws of 1980 to 2007 with regards to the maternity allowance;
- Social Insurance Law N.22(I)/2009 on 1 April, 2009 – which refers to the reform package for securing the long-term viability of the Scheme;
- Special Defence Tax Law N.23(I)/2009 on 27 March, 2009 – which refers to the amendment of the tax rate paid by the Scheme on the income received from its investment in cash deposits and government bonds; and
- Social Insurance Law N59(I)/2010 on 9 July, 2010 – which refers to amendments and consolidation of the Laws of 1980 to 2009.

This 2009 Actuarial Report incorporates the Scheme amendments as a result of the enactment of the above four Laws. Details of the above amendments are described in detail in Section 5.2 of this report.

The Minister of Labour and Social Insurance appointed Mr. Costas Stavrakis, the Chief Actuarial Officer of the Ministry of Labour and Social Insurance, to undertake this assignment, and the International Labour Organisation (ILO) as the independent external evaluator to perform a Peer Review on the actuarial valuation. For this purpose, ILO appointed Mr. Plamondon, a senior social security actuary, in order to perform a peer review of the results of that exercise. A Peer Review Statement is attached to the present report in Appendix 6.

1.1 Aims of the Valuation

In accordance with section 76(2) of the Social Insurance Law, the main aims of this valuation are to:

1. Review the current and projected financial situation of the Scheme as of 31 December 2009;
2. Assess the long-term financial viability of the Scheme, assuming the legislation remains unchanged and make recommendations on the financial governance; and
3. Assess the sensitivity of the long-term projected financial position of the Scheme to changes in demographic and economic environments.

1.2 Scope of the Report

Section 2 gives a general overview of the methodology used in producing the actuarial projection estimates included in this report, which are based on demographic and economic assumptions described in Section 3. The actuarial projection results are presented in Section 4. Section 5 presents the reconciliation of the results with those presented in the previous 2006 Actuarial Report, whereas Section 6 provides a sensitivity analysis on the projection results of key assumptions. Finally, Section 7 presents a general conclusion about the financial position of the Scheme, while Section 8 provides the actuarial opinion.

1.3 Compilation of data

The compilation of data for the valuation was done under the supervision of Ms. Soula Floridou, head of the Statistics and Information Systems (IS) department at the Social Insurance Services. Ms. Rena Georgiou and Ms. Maria

Chrysostomou, statisticians, worked at the collection of data.

Costas Stavrakis wishes to express his sincere thanks to the Director of the Social Insurance Services, and the Statistics and IS department head for their invaluable collaboration and assistance during all phases of this exercise.

2. Methodology

The actuarial review of the Scheme involves projections of its revenue and expenditures over a long term period so as to be able to estimate changes in the reserve, which varies from one year to the next as a function of the difference between the Scheme's revenue and expenditures. The actuarial projections in this report are based on the current provisions of the Scheme, data regarding the starting point for the projections including data on the Scheme's contributors and pensioners, and assumptions regarding future demographic and economic experience.

Figure 2.1 shows graphically the methodology used in this actuarial valuation. Details of that methodology are provided in Appendix 2.

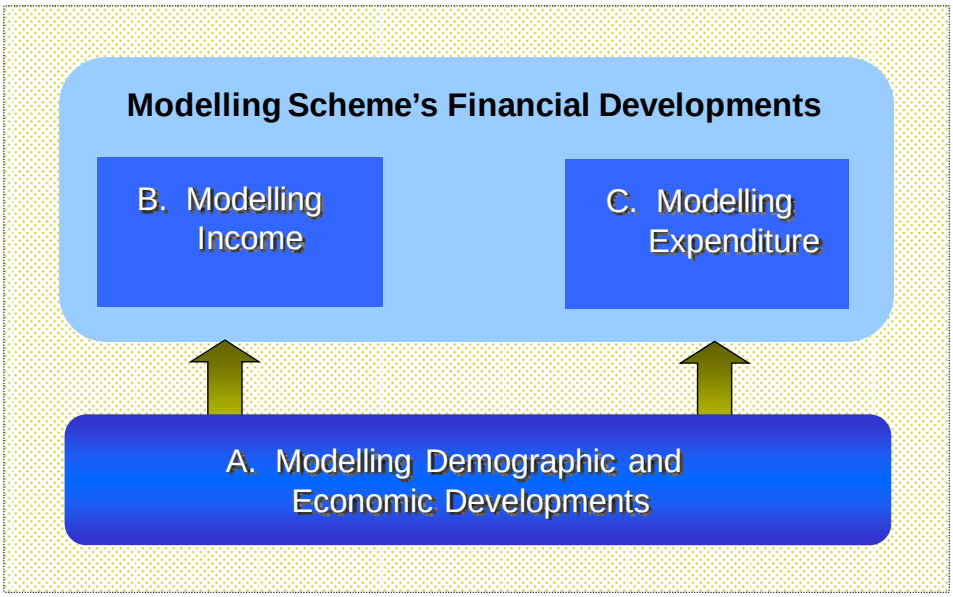
The valuation starts with a projection of the general population of Cyprus. The projected population, based on the number of persons in each age group, serves to determine both the working population which contributes to the Scheme and the population eligible for the Scheme's various benefits.

The revenue of the Scheme 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 Scheme and future level of insurable earnings. Investment income is calculated on the basis of assumptions on rates of return on investments for different types of investment.

Expenditures include the benefits paid out and administrative expenses. Benefits 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. Administrative expenses are projected by considering the historical relationship between expenses and total insurable earnings.

The assumptions and results presented in the following sections make it possible to measure the financial position of the Scheme over the projection period in terms of the:

Figure 2.1: Methodology



- reserve ratio – the ratio of the level of reserves at the end of one year to the level of expenditures for the same year;

- pay-as-you-go contribution (PAYG) rate – the level of expenditures for one year divided by the total insurable earnings of the same year;

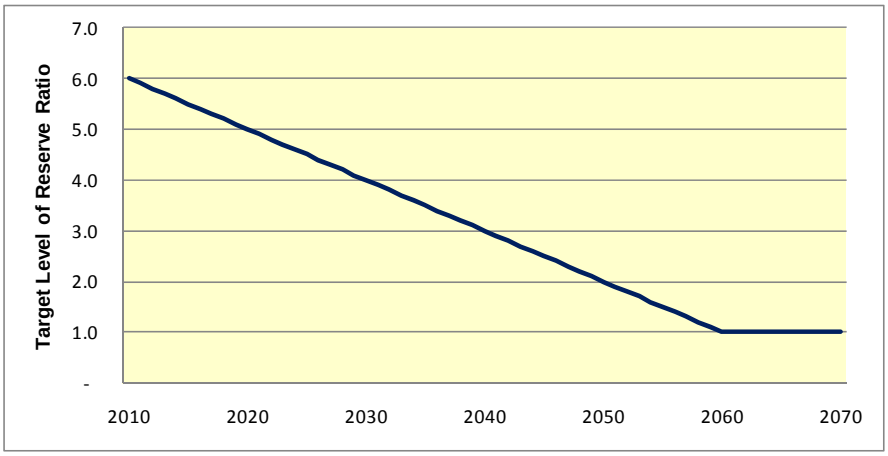
- general average premium – the stable contribution rate needed to be paid over the projection period in respect of current and future insured population in order to finance the Scheme's expenditure over the same period in respect of existing and future beneficiaries; and

- period of actuarial equilibrium – the number of years during which the Scheme's reserve ratio at the end of calendar year t is at least equal to the target level k, where target level k is graphically shown in Figure 2.2 and determined by the following formula:

  $k = 6 - 0.1 * (t - 2010)$ for $2010 < t < 2060$; and

  $k = 1$ for $t = 2060$ and above.

Figure 2.2: Target level of reserve ratio



It follows from Figure 2.2 that the target reserve ratio is set at the level of six times annual expenditure in 2010 and is linearly decreased to one time annual expenditure in 2060, and thereafter remains at that level. A reserve ratio of one time annual expenditures is generally sufficient in mature social security programmes. A reserve of that level provides a sufficient "buffer" to safeguard the programme against bankruptcy even in the event of sudden adverse economic developments, which might lead to a dramatic reduction of contribution income and an increased number of pensioners. It is considered that the basic part of the Scheme is sufficiently mature to operate on the basis of a reserve ratio of one. On the other hand, the supplementary part of the Scheme which was introduced later than the basic part, will not completely mature until around the end of the 2040s. After that period, the supplementary part of the Scheme could be able to operate on the same level of funding as the basic part, but until then there would be a transition phase of several decades during which the reserve ratio of the supplementary part will be progressively reduced to the level of one.

To adequately evaluate the Scheme's future financial situation, a projection period which extends over a period of 51 years to 2060 is selected. In particular, this projection period will allow the inclusion of the effect of the maturity of the supplementary part of the Scheme on its financial status. This period is also consistent with the projection periods of the actuarial reviews of the Scheme produced over the last 20 years, which extended over a minimum 50-year period.

Finally, this projection period is sufficient for the purposes of the actuarial analysis. However, the uncertainty associated with the projections in an actuarial report increases over time since they depend more and more on the assumptions made.

3. The demographic and economic assumptions

The actuarial valuation of the Scheme must be positioned in the specific demographic and economic context of Cyprus. This requires making assumptions on the demographic and economic environment as well as a certain number of Scheme-specific assumptions. This section presents the main demographic and economic assumptions made for the purposes of conducting the actuarial valuation of the Scheme. Appendix 4 presents the Scheme-specific assumptions used in this valuation, which include invalidity incidence rates and family structure statistics.

It should be noted that the demographic and economic framework used as a basis for the present valuation is limited to the government-controlled area of Cyprus, as the Scheme covers almost exclusively persons in that area.

Since the main aim of this valuation is to review the Scheme's financial position until 2060, the assumptions made should reflect a long-term perspective. The assumptions take into account historical trends, the present economic environment and Scheme's situation, and likely future trends. More emphasis is put on historical long-term trends than on more recent short-term trends.

In setting the assumptions, the opinion and forecasts of international organisations, particularly with regards to economic assumptions, such as European Commission, as well as comparisons with the assumptions made by other similar social security schemes at international level were also taken into account.

These assumptions reflect the Chief Actuarial Officer's best estimates of demographic and economic changes. They were chosen to be, independently and in aggregate, reasonable and appropriate, taking into account certain interrelationships between them.

Although assumptions are determined in a reasonable manner, there will be differences between the future reality and assumptions made. These differences may have a positive or negative impact on the financial position of the Scheme, compared with the results of this actuarial review. Nevertheless, they will be analysed and taken into account in subsequent actuarial reviews.

3.1. Demographic framework

A projection of the general population of the country is the basis for determining the number of contributors and beneficiaries. The projection begins with the latest available statistical data on population estimated by the Statistical Service of Cyprus as at 31 December, 2009, to which are applied the assumptions on the future development of fertility, mortality and migration.

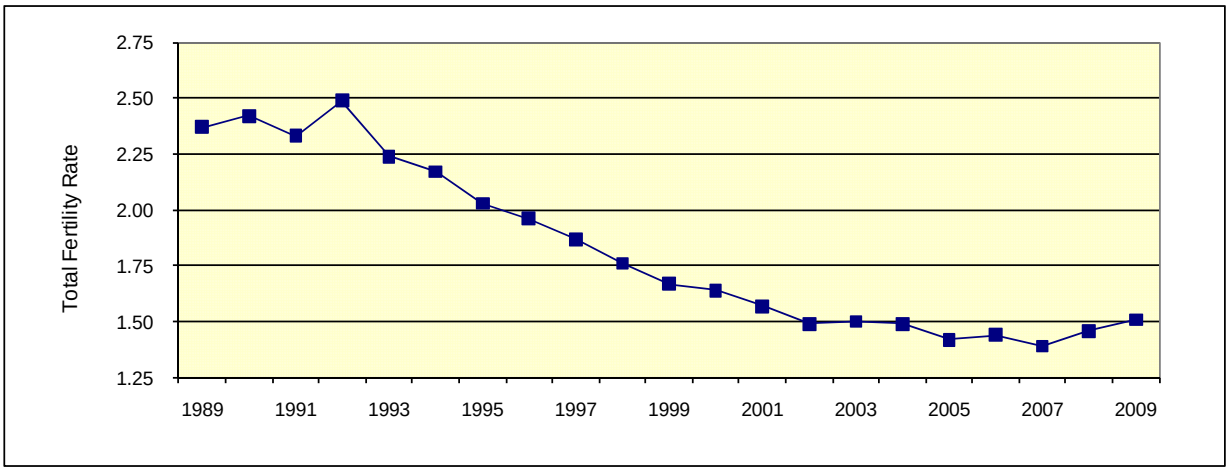
The current population structure strongly influences the results of projections for the coming years. The age distribution of the starting population shows a significant ageing of the population in Cyprus, as it is the case in many other developed countries.

3.1.1. Fertility

The first cause of this ageing is the large drop in the birth rates in the 1990s and a continuing low level thereafter. In particular, the total fertility rate in Cyprus has decreased sharply from an average level of 2.5 children per woman in the early 1990s to a level below 1.4 in 2007.

In more recent years, the total fertility rate for Cyprus has risen to over 1.5. In particular, it increased from 1.39 in 2007 to 1.51 in 2009. Figure 2.1 shows the historical total fertility rates for the period 1989 to 2009.

Figure 3.1: Historical Total Fertility Rates: 1989 - 2009



Source: Cyprus Statistical Services, Demographic Reports

The overall significant decrease in the total fertility rate in the 1990s occurred primarily as a result of changes in a number of social and economic factors. Although total fertility rates have increased in more recent years, it is unlikely that the rates will return to historical levels in the absence of significant societal changes.

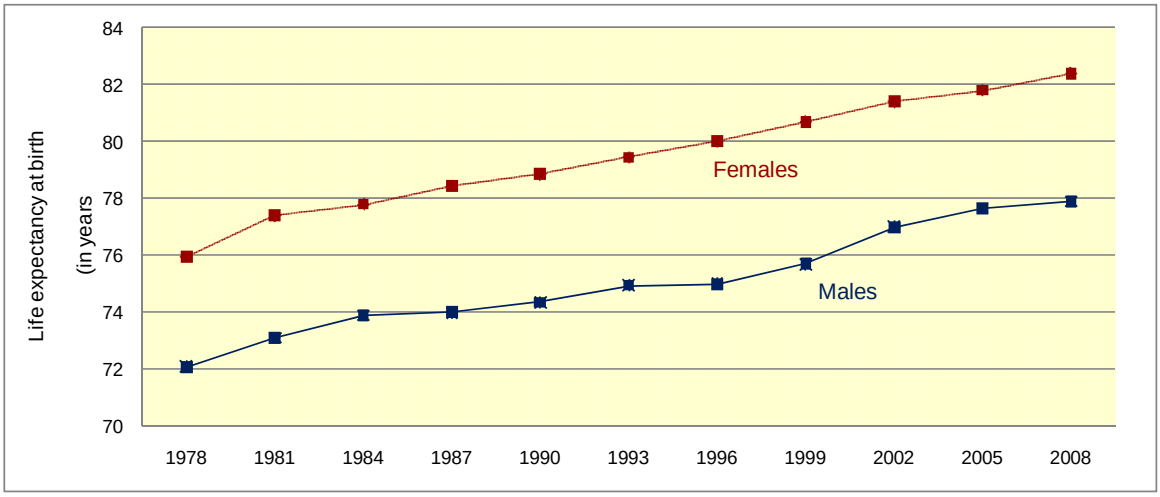
In the present valuation, the total fertility rate is estimated 1.51 children per woman in 2010, increasing gradually to 1.6 in 2036 and remaining constant at this level for the rest of the projection period.

3.1.2. Mortality

The other significant cause of the ageing of the population in Cyprus is the large reduction in age-specific mortality rates. This can be best measured by the increase in life expectancy.

As Figure 3.2 indicates, male life expectancy at birth increased 8.1% between 1978 and 2008, rising from 72.1 to 77.9 years. For females, life expectancy at birth increased from 76.0 to 82.4 years during the same period, representing an increase of 8.5%. Although the overall rates of increase in life expectancy since 1978 are almost identical for males and females, more than 36% of the increase in the life expectancy occurred after 1999 for males, while the corresponding increase for females was only 25% over the same period.

Figure 3.2: Historical Life Expectancies at birth: 1978 - 2008



Source: Cyprus Statistical Services, Demographic Reports and own calculations

For the present valuation, mortality rates are determined with the methodology used for the development of United Nations life tables. For the determination of future mortality rates, it is assumed that mortality improvements continue in the future, but at a slower pace than most recently observed over the 9-year period ending 2008, and that ultimately, mortality improvement rates for males will decrease to the same level as females. In particular, it is assumed that the life expectancies at birth observed in 2008, which were 77.9 for males and 82.4 for females, are gradually increased to 85.0 for males and 88.5 for females in 2060. The overall expected rates of mortality improvement over the projection period for both males and females correspond to approximately 60% the average rates observed over the 9-year period 1999-2008.

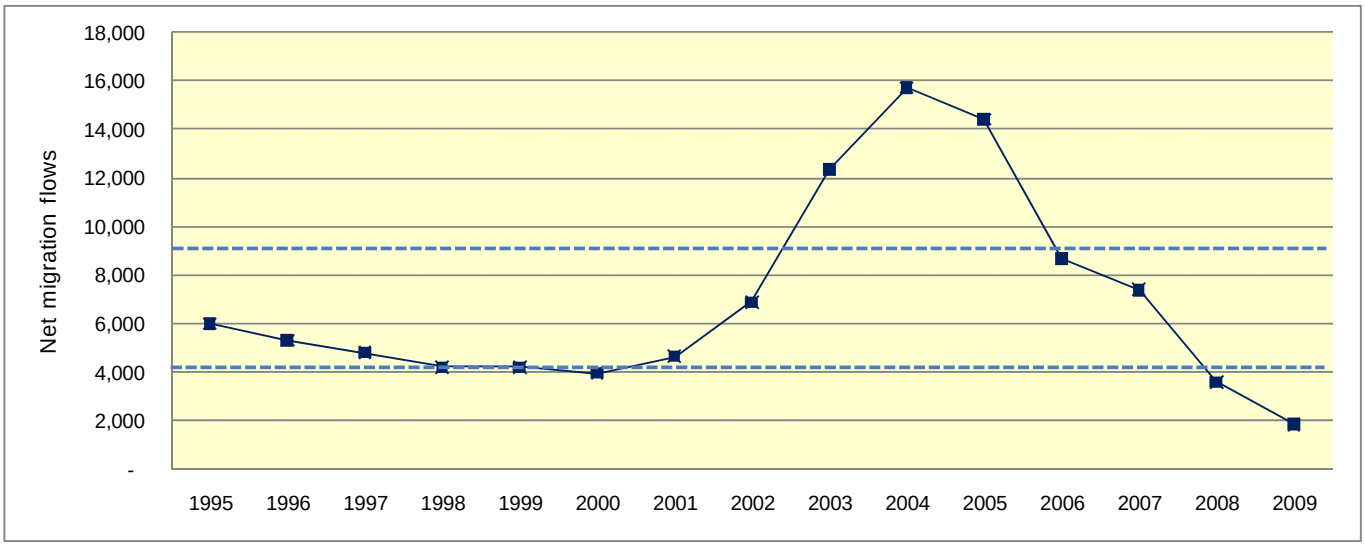
Finally, a closing of the gap between men and women is expected: the difference between them will drop from 4.5 years in 2008 to 3.5 years in 2060. Sample mortality rates can be found in Appendix 4.

3.1.3. Net migration

Net migration (i.e. the excess of immigration over emigration) has been positive in Cyprus over the period 1995-2007, fluctuating between 4,000 and 9,000 net migrants per year, with the exception of the 3-year period 2003-2005 during which the number of net migrants was exceptionally high, fluctuating between 12,000 and 16,000 per year. In years 2008 and 2009 the number of net migrants dropped to approximately 4,000 and 2,000 respectively primarily due to labour oversupply in certain sectors of the economy resulting from the current economic crisis.

It is projected that net migration will continue to be positive in the future. In particular, net migration is projected to gradually increase from 2,000 people in 2010 to 6,000 in 2020 and then it is assumed to gradually decrease to 4,000 people in 2060.

Figure 3.3: Historical Net Migration Flows: 1995 - 2009



Source: Cyprus Statistical Services, Demographic Reports and own calculations

3.1.4. Population projections

According to the above assumptions, the population of Cyprus is projected to increase from its present level of 803,200 persons in 2009 to 1,114,944 in 2060.

Table 3.1 shows the development of population for three age groups (0-14, 15-64 and 65+) throughout the projection period of 2010 to 2060, as well as the old-age dependency ratio, i.e., the ratio of the number of people aged 65 and over to those aged 15-64. This ratio, which provides a demographic measure of population ageing, it is projected to increase continuously from 19% in 2010 to 50% in 2060. In other words, in 2060, it is expected to have two working-age people for each person aged 65 and over.

An increase in the old-age dependency ratio directly affects the demographic ratio of the Scheme, as will be seen in Section 4.4.1.

Table 3.1: Projection of the population of Cyprus: 2010-2060

Year	Number of persons by age groups				Old-age Dependency Ratio
	0-14	15-64	65 and over	Total	
2010	135,022	566,173	107,697	808,892	19%
2011	134,852	569,336	111,009	815,196	19%
2012	135,162	572,338	114,687	822,187	20%
2013	135,989	575,263	118,593	829,846	21%
2014	137,223	578,181	122,641	838,045	21%
2015	138,823	581,100	126,810	846,733	22%
2020	148,804	596,300	149,577	894,681	25%
2025	154,280	610,746	174,877	939,902	29%
2030	153,803	626,699	197,792	978,295	32%
2035	150,846	644,017	215,659	1,010,521	33%
2040	149,428	654,907	234,196	1,038,531	36%
2045	151,369	656,072	255,956	1,063,397	39%
2050	155,209	647,123	282,847	1,085,179	44%
2055	157,810	642,030	303,022	1,102,863	47%
2060	157,574	637,745	319,624	1,114,944	50%

3.2. Economic and labour market framework

The general economic developments and the evolution of the labour market directly influence the financial development of the Scheme. The evolution of the gross domestic product, its primary factor income distribution, labour productivity, employment and unemployment, wages, inflation and interest rates have direct and indirect impacts on the projected revenue and expenditure of the Scheme.

Under the given population projections and the assumptions regarding labour market participation, Cyprus will enter a period of growing labour supply shortages. Further economic growth will then be possible if fuelled out of labour productivity growth. Productivity and GDP growth rates should therefore gradually converge.

As shown in Table 3.2 below, until about 2030 the driving forces behind economic growth will be additional employment and an increase of labour productivity. After 2030, GDP growth will primarily be driven by the productivity growth, implying very low increases in employment. After 2040, a zero employment growth is projected which means that GDP growth would come only from productivity growth.

3.2.1. Economic growth

During the 1980s, the Cyprus economy grew at an average annual (real) rate of 6.3 per cent, while during the 1990s it grew at a much lower rate of 4.1 per cent. Over the period 2001-2008, real GDP grew at an average rate of 3.6 per cent, whereas in year 2009 the economy contracted at a rate of 1.7 per cent.

The real GDP growth is expected to gradually increase from 1.0 per cent in 2010 to 2.4 per cent in 2030, averaging to 1.8 per cent over the period 2010-30. Further we expect GDP real growth rates to remain stable at a level of 2.3 per cent over the period 2031-40. After the year 2040, GDP real growth rates are expected to gradually slow down to levels around 1.6 per cent in 2050 and to remain constant at 1.5 per cent over the period 2050-60.

Table 3.2: Annual growth of GDP, productivity and employment

Period	Annual real GDP growth	Annual increase of productivity per worker	Annual increase of the number of workers
2010-2020	1.6%	0.4%	1.2%
2021-2030	2.0%	1.3%	0.7%
2031-2040	2.3%	1.9%	0.4%
2041-2050	1.8%	1.8%	0.0%
2051-2060	1.5%	1.6%	-0.1%

3.2.2. Labour force, employment and unemployment

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.

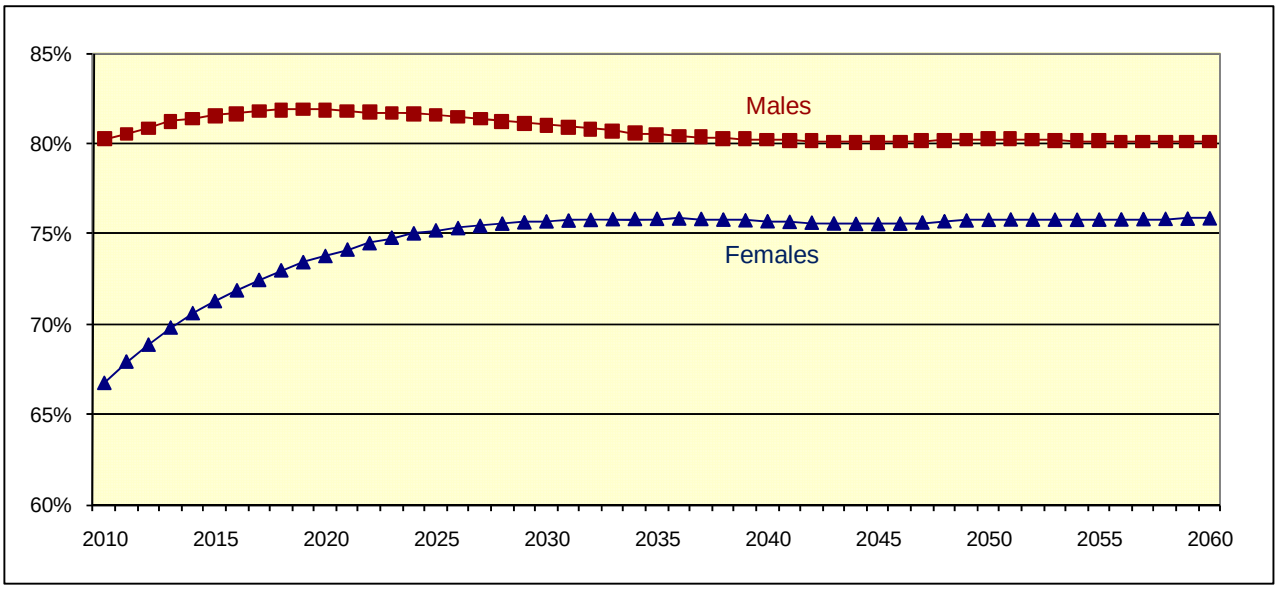
Over the last five years, the female age-specific labour force participation rates grew strongly, particularly for the age group 55 to 64. In particular, the female participation rate for the age groups 15 to 64 increased, on average, by 1 percentage point each year, whereas the rate for the age group 55 to 64 increased, on average, by 2.4 percentage points each year.

For the male population, the average participation rate for the age group 15 to 64 remained relatively stable, experiencing a relatively moderate increase in the participation rate for the older age groups which was offset by a corresponding decrease in the rate for the younger age group 20 to 24.

As shown in Figure 3.4, over the period 2010-2060 the average labour force participation rate for males between 15 and 64 is assumed to remain unchanged at its current level of 80.2%, anticipating a moderate increase in the rate over the period 2010-2020, reaching 81.8% in 2020, which will be offset by a corresponding decrease in the rate over the period 2021-2040.

For the female population, it is anticipated that age-specific participation rates will grow significantly, especially for the period up to the year 2025. In other words, changes in the male average participation rate result mainly 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 male Cypriot population. For females, the average participation rate is assumed to increase quite significantly from its current level of 66.7%, so that it reaches 75.8% in 2060. This increase is primarily driven by the needs of the continuously growing economy.

Figure 3.4: Projected labour force participation rates: 2010-2060



Note: The labour force participation rate is defined as the labour force aged 15 to 64 divided by the population aged 15 to 64.

Once the labour force participation rates are determined on the basis of age group and gender, they are applied to the projected population to obtain the labour force. This projection reveals moderate growth of the labour force up to 2045 and a small decline thereafter.

The projected number of employed persons is then derived by applying the unemployment rates to the projected labour force. As shown in Table 3.3 the unemployment rate for both males and females is anticipated to gradually fall from its current level of 6.3% in 2010 and reach its lower limit of 4.5% in 2036. Thereafter the number of employed persons will vary at the same rate as the labour force.

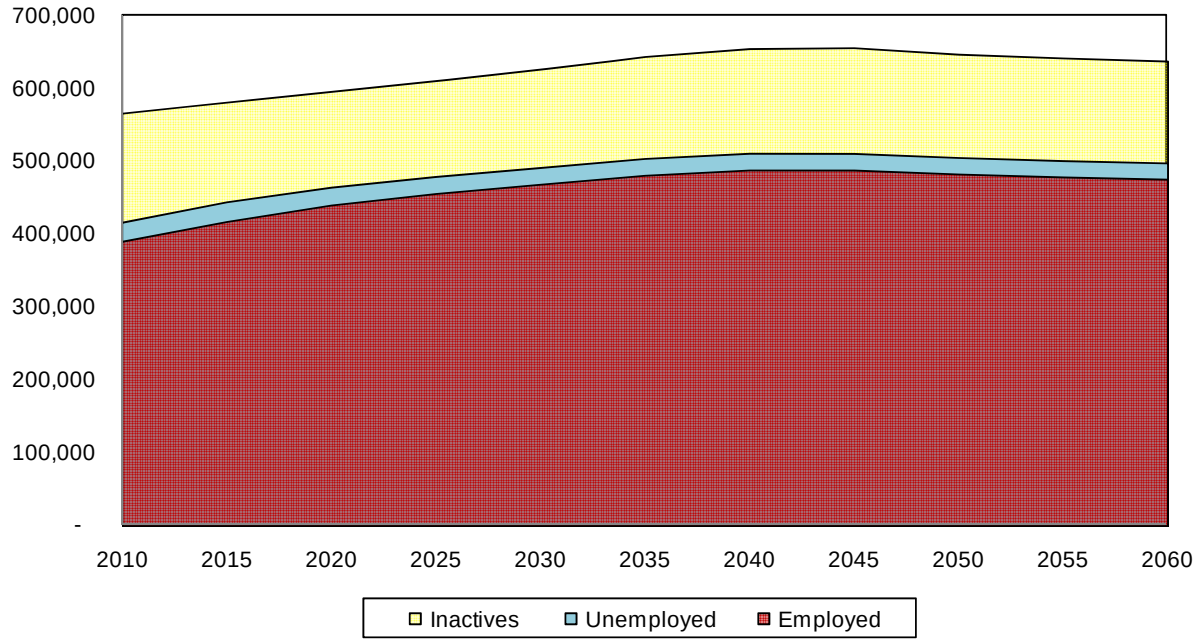
Table 3.3 also shows the development of the overall employment rate (the ratio of the number of employed persons aged 15-64 to the number of people aged 15-64), which is expected to increase from 68.8% in 2010 to 74.5% in 2060.

Figure 3.5 shows the changes in the population aged 15 to 64 over the projection period 2010-60 according to the labour force status: employed, unemployed and inactive persons.

Table 3.3: Assumptions of labour force participation rates and unemployment

	2010	2020	2030	2040	2050	2060
Labour force participation rate						
Male	80.2%	81.8%	81.0%	80.2%	80.2%	80.1%
Female	66.7%	73.7%	75.7%	75.7%	75.8%	75.8%
Total	73.5%	77.8%	78.4%	77.9%	78.0%	78.0%
Employment rate	68.8%	73.7%	74.7%	74.4%	74.5%	74.5%
Unemployment rate	6.3%	5.3%	4.7%	4.5%	4.5%	4.5%

Figure 3.5: Distribution of population aged 15-64, by labour force status



3.2.3. Inflation, wages, and interest rates

Price inflation, as measured by consumer price index, tends to fluctuate from year to year. The desire of the European Central Bank to maintain inflation rates below, but close to, 2 per cent, lead us to expect a constant inflation rate of 2 per cent throughout the projection period. The average inflation rate for the euro area since 1999, when the euro currency was formally introduced, has been 2 per cent.

In Cyprus, the increase of the consumer price index has been 4.7 per cent in 2008, 0.3 per cent in 2009 and 2.4 per cent in 2010. The assumed annual price inflation is 3.4 per cent in 2011. It will decrease to 2.3 per cent in 2012 and thereafter it will decrease 0.1 per cent annually until it reaches its long-term rate of 2 per cent in 2015.

The real rate of increase in average wages in the long-term is tied to increases in labour productivity. This assumption also takes into account an anticipated labour shortage. Given the current economic environment of relatively high unemployment rate and moderate economic growth, a real wage growth of 0.5 per cent is assumed in 2010. It is then set to gradually increase, reaching 1.3 per cent in

2025. Thereafter the real wage growth is assumed to be averaged at 1.7 per cent, fluctuating between 1.4 and 1.9 per cent.

The interest rate is required for the projection of revenue arising from investment income. This assumption is based on the projection of the rate of return on Scheme's assets, which are currently invested in, at a great extent, non-tradeable government deposits (93%) while the remaining assets are invested in medium-term government bonds and cash deposits held with commercial and co-operative banks in Cyprus.

The interest rate of the Social Insurance Fund on non-tradeable government deposits is calculated as the marginal lending facility rate of the European Central Bank less 0.25 per cent. The assumed initial rate of return reflects observed rates of returns on Scheme's assets for 2010 and the first five months of 2011, whereas the assumed ultimate real rate of return on Scheme's assets is derived from the historical real rates of return on European Central Bank's marginal lending facility rate over the 11-year period since the introduction of euro currency on 1 January, 1999.

In particular, the annual nominal rate of return on Scheme's assets is projected to gradually increase from its current level of 2 per cent to 3.5 per cent in early 2020s, and remain constant thereafter.

Table 3.4: Inflation rate, increase of nominal average wage and interest rate for selected years

Year	Inflation rate	Annual nominal increase of the average wage	Rate of return of the Social Insurance Fund
2011	3.4%	3.3%	2.0%
2012	2.3%	2.7%	2.0%
2013	2.2%	2.4%	2.0%
2020	2.0%	2.8%	3.0%
2030	2.0%	3.7%	3.5%
2040	2.0%	3.9%	3.5%
2050	2.0%	3.7%	3.5%
2060	2.0%	3.6%	3.5%

4. Results

This valuation deals with the ability of the Scheme to meet its future obligations at the time they fall due. This is done under an open-group approach. It is assumed that working persons will continue to be insured under the Scheme, thus paying contributions and accruing benefit entitlements, until later they receive benefits in accordance with the legal provisions of the Scheme. Future contributions and benefits are calculated according to the methodology covered in Section 2, the demographic and economic assumptions presented in Section 3 and on the basis of the Scheme-specific database presented in Appendix 4.

The main purpose of the valuation is to find out whether the financing of the Scheme is on course, and not to exactly forecast numerical values. Due to the long-term nature of the assumptions, absolute figures include a high degree of uncertainty. Therefore, results have to be interpreted carefully and future actuarial reviews have to be undertaken on a regular basis to check the actual experience in the light of the assumptions made.

This review deals with the expenditure and revenue of all branches of the Scheme: unemployment benefits, other short-term and employment injury benefits, and long-term benefits. Following the enactment of the Social Insurance Law N.59(I) on 9 July 2010, the Social Insurance Fund is now separated into the following four accounts:

- The Unemployment Account records operations of the Scheme concerning the unemployment benefit;
- The Other Benefits Account records operations of the Scheme concerning other short-term benefits, employment injury benefits and administration expenses;
- The Basic Pensions Account records operations concerning revenue and expenditures with respect to pensions in the basic part of the Scheme; and
- The Supplementary Pensions Account records operations concerning revenue and expenditures with respect to pensions in the supplementary part of the Scheme.

Table 4.1 shows the benefits covered by and the contribution rate allocated into each account for an employed person.

The key area of concern will be the long-term branch, since it counts for the largest proportion of future expenditure. In addition, it is certain that this proportion will grow significantly in the future due to the current immature state of the supplementary part of the Scheme. Long-term benefits will attain a mature state only after the youngest persons of the first generation of contributors will have died as pensioners. This requires that the situation of the Scheme be analysed over the next 51 years.

Table 4.1: Benefits covered and contribution rate by account for employed persons

Account	Benefits covered	Contribution allocation (as % of insurable earnings)
Unemployment	Unemployment benefit	1.15%
Other Benefits	Sickness benefit, maternity allowance, maternity grant, marriage grant, funeral grant, employment injury benefits and administration expenses	1.15%
Basic Pensions	Basic part of the Scheme: old-age pension, invalidity pension, widow's pension, orphan's benefit and other related lump sum benefits	10.0%
Supplementary Pensions	Supplementary part of the Scheme: same as those mentioned under Basic Pensions account	5.6%
Total		**17.9%**

In addition to the income from contributions, the Basic and Supplementary Pensions Accounts are credited with investment income and charged with long-term benefits of the respective part of the Scheme. The annual net balances of the accounts serve to increase the reserves in the respective part of the Scheme.

Unemployment and other short-term benefits, as well as employment injury benefits, are in principle financed on a pay-as-you-go basis. The level of contingency reserves held under the Unemployment and Other Benefits Accounts could not exceed one time the annual expenditure of the benefits covered by each account.

4.1. Unemployment benefit

As shown in Table 4.2, unemployment benefits have experienced important variations over recent years. In particular, over the period 2005-08 the total expenditure expressed as a percentage of insurable earnings decreased quite significantly from 1.14 in 2005 to 0.86 in 2008. This downward trend was reversed in 2009 due to the economic downturn. In 2009 the expenditure stood at a level of 1.15 which is the contribution rate currently allocated into the Unemployment Account pursuant to enactment of the Social Insurance Law N.59(I) on 9 July 2010. Prior to July 2010, the contribution rate was 1.0 per cent of the insurable earnings of employed persons.

Given the recent experience of expenditure on unemployment benefits and the risk of future fluctuations in this expenditure, it is recommended to leave the current contribution rate of 1.15 per cent of the insurable earnings of employed persons unchanged. Furthermore, given the current economic crisis which results in relatively high levels of unemployment in Cyprus, it is necessary that the financial position of the Unemployment Account is being monitored more closely and on a more regular basis.

Table 4.2: Expenditure on unemployment benefit for the period 2003-2009

Year	Annual expenditure on benefits (in €)	Expenditure as % of insurable earnings of employed persons
2003	47,506,129	1.16
2004	48,312,464	1.09
2005	54,332,448	1.14
2006	57,025,310	1.11
2007	54,812,341	0.97
2008	54,291,437	0.86
2009	77,869,786	1.15
Average		**1.06**

4.2. Other short-term and employment injury benefits

The experience on other short-term and employment injury benefits for the years 2007, 2008 and 2009 appears in Table 4.3. The experience of these three years is relatively stable, apart from Maternity allowance.

In particular, the total cost of other short-term benefits, which includes Sickness benefit, Maternity allowance and Benefit grants (Maternity grant, Marriage grant and Funeral grant) as well as Employment injury benefits (injury benefit, disablement benefit and death benefit), was averaged at 1.07 per cent of insurable earnings over the 3-year period 2007-09. The actual cost of Maternity allowance incurred in years 2008 and 2009 was 0.34 and 0.35 per cent of insurable earnings respectively, much higher than the corresponding cost in year 2007 which stood at 0.28. This increase was

primarily due to the extension of the duration of Maternity allowance payment from 16 to 18 weeks, which incurred in the second half of 2007 following a corresponding amendment in the Social Insurance Law.

Given the relatively stable experience of expenditure on other short-term and employment injury benefits, it is recommended to leave the current contribution rate of 1.15 per cent of insurable earnings in respect of employed persons unchanged.

Table 4.3: Expenditure on short-term and employment injury benefits for the period 2007-2009

Year 2007		
	Annual expenditure (in €)	**Expenditure as % of total insurable earnings**
Sickness benefit	30,104,030	0.49
Maternity allowance	17,026,412	0.28
Grant benefits	6,603,357	0.11
Employment injury benefits	8,896,930	0.14
Total	62,630,729	**1.01**

Year 2008		
	Annual expenditure (in €)	**Expenditure as % of total insurable earnings**
Sickness benefit	33,655,016	0.49
Maternity allowance	23,282,789	0.34
Grant benefits	8,404,845	0.12
Employment injury benefits	9,371,844	0.14
Total	74,714,494	**1.08**

Year 2009		
	Annual expenditure (in €)	**Expenditure as % of total insurable earnings**
Sickness benefit	36,845,847	0.50
Maternity allowance	25,498,581	0.35
Grant benefits	8,150,504	0.11
Employment injury benefits	9,855,689	0.14
Total	80,350,621	**1.10**

4.3 Administration expenses

The actual cost of administration expenses for each of the years 2007, 2008 and 2009 was stable at 0.14 per cent of insurable earnings. As mentioned above, the administration expenses are currently covered by the Other Benefits Account, but it is recommended that the total administration cost is allocated into the various benefit accounts of the Scheme in accordance with the level of actual administration expenses incurred in each account.

4.4. Long-term benefits

4.4.1. Demographic projections

Table 4.4 shows the anticipated development of the number of contributors, the number of pensions by type of pension benefit and sex, as well as the ratio of the number of contributors to the number of old-age and invalidity pensioners. This ratio measures the number of contributors who could support the number of old-age and invalidity pensions paid out at any point in time.

The number of contributors is directly linked to the assumed labour force participation rates applied to the working-age population. Hence, the demographic and labour market assumptions have a great impact on the expected number of future contributors. As shown in Table 4.4, the number of Scheme's contributors is expected to increase continuously throughout the period up to year 2045, from 452,773 in 2010 to 563,958 in 2045. Thereafter it is expected to slightly decrease due to small decline in the working-age population and labour force.

The number of old-age, invalidity, and widow's pensions increases throughout the projection period. In particular, the number of old-age pensioners is expected to more than double over the next 25 years due to ageing of the population. Furthermore, the number of male old-age pensioners is projected to grow by a factor of 2.5, i.e., from 55,408 in 2010 to 140,254 in 2060, while the number of female pensioners in 2060 will be around 6.4 times the number estimated in 2010. The important increase of the number of female pensioners is mainly due to the increased participation of women in the labour force projected under the macro-economic frame of the valuation.

Female old-age pensioners are expected to outnumber their male counterparts by the year 2032 and by 2060 there is projected to be 62,436 or 45% more female than male old-age pensioners. Over the same period, the number of invalidity and widow's pensioners is projected to continuously increase but at a much slower pace than for old-age pensioners.

The ratio of contributors to old-age and invalidity pensioners is projected to decrease from 4.8 in 2010 to 1.5 in 2060.

4.4.2. Financial ratios

The future evolution of the average pension under the Scheme may be analysed through the evolution of the aggregate replacement ratio, which is defined as the ratio of the average first pension for new old-age pensioners to the average earnings of the active contributors aged 55 and over. As shown in Table 4.5, for the basic part of the Scheme, the aggregate replacement ratio is presently 21 per cent for males and 19 per cent for females. Given that the minimum pension is currently equal to 85 per cent of the full basic pension in the basic part of the Scheme, the range between the minimum and the maximum pension is quite narrow. The projected aggregate replacement ratios shown in Table 4.5 will remain stable at around 21% for all types of pensions given the state of maturity of the Scheme and the presence of the minimum pension.

The supplementary part of the Scheme has not reached the state of maturity. This part of the Scheme was introduced only in 1980. It will thus take another 15 years before a worker will have contributed to the supplementary part of the Scheme during his/her career.

Unlike the situation in the basic part of the Scheme, the aggregate replacement ratios in the supplementary part are increasing with time for all types of pensions. In the supplementary part of the Scheme, the pension is directly proportional to the period of contribution. As shown in Table 4.6, a relative state of stability of the aggregate replacement ratios will be reached around 2025, after 45 years of existence of this part of the Scheme. In that year, the aggregate replacement ratio for old-age pension will be 33 per cent for males and 35 per cent for females. In the longer term, that ratio will stabilise at 32 per cent for males and 29 per cent for females.

Table 4.4: Demographic projections for long-term benefits

Year	Contributors	Number of Pensions							Ratio of contributors to old age and invalidity pensioners
		Old age		Invalidity					
		Males	Females	Males	Females	Widows	Orphans	Total	
2010	452,773	55,408	31,712	5,210	2,950	30,100	947	126,327	4.8
2011	460,243	56,833	33,470	5,693	3,229	31,172	1,001	131,399	4.6
2012	467,294	58,141	35,309	6,168	3,513	32,225	1,055	136,411	4.5
2013	474,069	59,205	37,072	6,638	3,801	33,269	1,109	141,094	4.4
2014	480,156	60,049	38,731	7,101	4,094	34,293	1,163	145,431	4.4
2015	485,479	60,762	40,327	7,559	4,391	35,326	1,198	149,563	4.3
2016	491,666	61,551	41,955	8,011	4,692	36,339	1,212	153,760	4.2
2017	497,982	62,336	43,615	8,457	4,998	37,370	1,217	157,993	4.2
2018	503,661	63,187	45,236	8,899	5,309	38,393	1,200	162,224	4.1
2019	508,637	64,211	46,903	9,335	5,624	39,454	1,176	166,704	4.0
2020	513,187	65,278	48,731	9,768	5,942	40,509	1,150	171,378	4.0
2025	532,060	71,870	60,686	11,852	7,570	45,740	949	198,668	3.5
2030	545,283	78,378	74,962	13,724	9,206	50,743	722	227,735	3.1
2035	556,770	85,000	91,977	15,401	10,806	55,031	521	258,736	2.7
2040	563,470	94,350	112,309	16,895	12,317	58,227	492	294,590	2.4
2045	563,958	107,075	136,809	18,195	13,665	60,684	443	336,873	2.0
2050	558,750	121,111	163,584	19,200	14,702	62,704	388	381,689	1.8
2055	555,464	131,831	185,730	19,983	15,528	64,782	344	418,198	1.6
2060	552,198	140,254	202,690	20,517	16,137	66,189	309	446,096	1.5

Note:

1. For the purpose of the actuarial projections, the orphans aged 21 and over have been considered as widows' pensions recipients
2. Concerning invalidity pensioners, the projection model assumes that the invalidity pension is paid for life. However, the global expenditure of the Scheme has been adjusted to consider pensioners with partial invalidity who have their pension adjusted upward when they reach age 63.

Table 4.5: Aggregate replacement ratios – Basic part of the Scheme

Year	Old age		Invalidity		Widows
	Males	Females	Males	Females	
2010	21%	19%	20%	19%	21%
2011	21%	19%	20%	19%	21%
2012	21%	20%	20%	19%	21%
2013	21%	20%	21%	20%	21%
2014	22%	21%	21%	20%	21%
2015	22%	21%	21%	20%	21%
2016	21%	21%	21%	20%	21%
2017	21%	21%	21%	20%	21%
2018	21%	21%	21%	20%	21%
2019	21%	22%	21%	20%	21%
2020	21%	21%	21%	20%	21%

Table 4.6: Aggregate replacement ratios – Supplementary part of the Scheme

Year	Old age		Invalidity		Widows
	Males	Females	Males	Females	
2010	24%	22%	22%	27%	10%
2011	25%	23%	23%	28%	10%
2012	25%	24%	23%	28%	10%
2013	26%	26%	24%	29%	11%
2014	26%	29%	24%	30%	11%
2015	27%	32%	25%	30%	12%
2020	31%	36%	26%	29%	13%
2025	33%	35%	26%	28%	14%
2030	32%	32%	26%	27%	15%
2035	32%	30%	26%	27%	15%
2040	32%	29%	26%	27%	15%
2045	32%	29%	26%	27%	15%
2050	32%	29%	26%	27%	14%
2055	32%	29%	26%	27%	14%
2060	32%	29%	26%	27%	14%

4.4.3. Financial projections

The projection of the revenue and expenditure components and the evolution of the reserve of the Scheme are presented in Table 4.7. In the present valuation, the long-term pay-as-you-go cost of the Scheme is projected to reach 36.8 per cent in 2060. Appendix 5 shows the detailed financial projections of revenues and expenditure over the next 51 years, separately for the basic and the supplementary part of the Scheme.

From Table 4.7, we can identify some critical years in the future financial evolution of the Scheme:

Table 4.7: Financial projections of the Scheme (in million euros where applicable)

Year	Contribution rate	Total insurable earnings	Revenue			Expenditure	Reserve (end of year)	Reserve ratio	PAYG cost
			Contributions	Investment earnings	Total				
2010	15.6%	7,781	1,235	100	1,335	947	6,954	7.3	12.2%
2011	15.6%	8,166	1,297	141	1,438	1,033	7,359	7.1	12.7%
2012	15.6%	8,525	1,354	149	1,503	1,112	7,750	7.0	13.0%
2013	15.6%	8,888	1,411	157	1,568	1,200	8,119	6.8	13.5%
2014	16.9%	9,231	1,586	165	1,751	1,286	8,584	6.7	13.9%
2015	16.9%	9,566	1,644	218	1,861	1,376	9,069	6.6	14.4%
2016	16.9%	9,930	1,706	229	1,936	1,472	9,533	6.5	14.8%
2017	16.9%	10,315	1,773	240	2,013	1,573	9,973	6.3	15.2%
2018	16.9%	10,707	1,840	301	2,141	1,677	10,438	6.2	15.7%
2019	18.2%	11,112	2,054	317	2,371	1,782	11,026	6.2	16.0%
2020	18.2%	11,528	2,131	334	2,465	1,897	11,594	6.1	16.5%
2025	19.5%	13,943	2,762	491	3,253	2,608	14,622	5.6	18.7%
2030	20.8%	16,984	3,590	596	4,186	3,528	17,671	5.0	20.8%
2035	22.1%	20,966	4,713	704	5,417	4,730	20,851	4.4	22.6%
2040	23.4%	25,669	6,116	802	6,918	6,367	23,655	3.7	24.8%
2045	23.4%	31,031	7,412	829	8,242	8,628	23,991	2.8	27.8%
2050	23.4%	36,985	8,860	614	9,474	11,674	16,836	1.4	31.6%
2055	23.4%	44,035	10,575	43	10,618	15,161	-892	-0.1	34.4%
2060	23.4%	52,261	12,574	-997	11,578	19,215	-32,644	-1.7	36.8%

- Contributions alone are sufficient to meet the total expenditure until 2031;
- From 2032 to 2043, part of the investment earnings are used, in addition to contributions, to meet the expenditures;
- From 2044, the total of contributions and investment earnings is no more sufficient to meet the Scheme's expenditure and the reserve starts decreasing;
- The Scheme is in actuarial equilibrium until 2047 given that its reserve ratio continues to be greater than the target level until that year, where target level is determined in Section 2; and
- The reserve is exhausted in 2055.

Figure 4.1 shows, for each year until 2055, the total revenues of the Scheme, consisting of the amount of contributions and investment earnings, and Scheme's expenditures, whereas Figure 4.2 shows the projected Scheme's reserve ratio as compared to the target reserve ratio over the period 2010-60.

Figure 4.1: Projected Scheme's revenues and expenditure over 2010-55 (in million €)

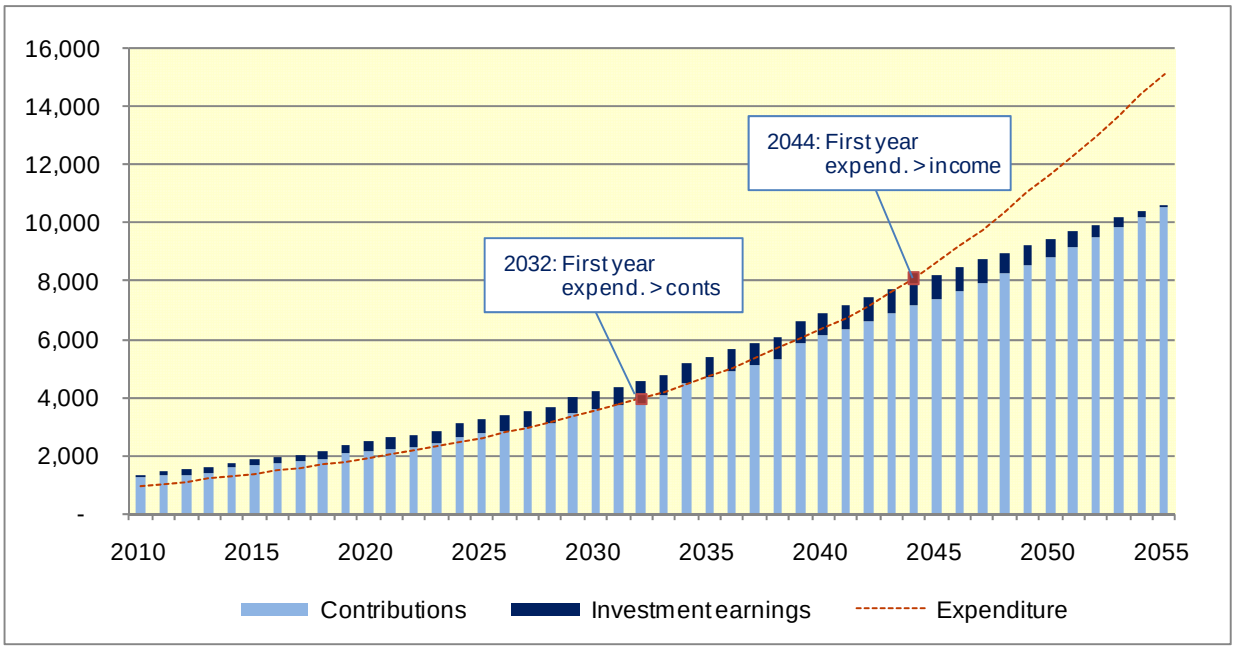
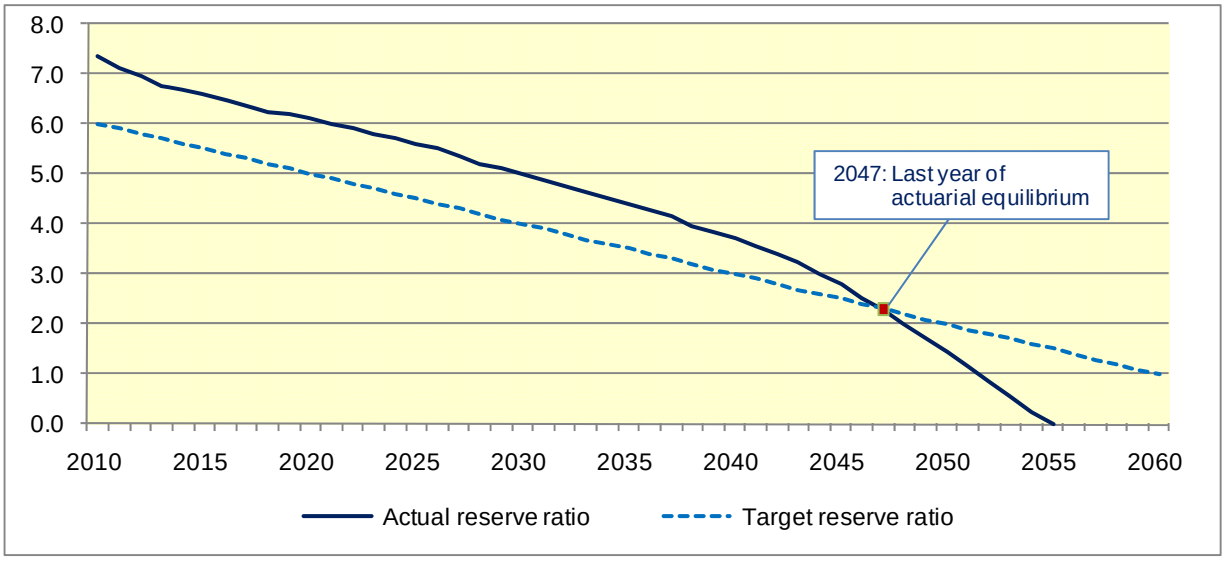


Figure 4.2: Projected Scheme's reserve ratio vs Target reserve ratio over 2010-60



4.4.4. Comparison of projection in the 2006 actuarial report with the 2009 report

Table 4.8 shows that the projected financial position of the Scheme in this actuarial report, as measured by the PAYG rate, the general average premium, the first year that expenditures exceed contributions and the last year of actuarial equilibrium, is much better than that projected in the previous report, throughout the projection period.

Table 4.9 compares the development of the reserve ratio under the 2009 actuarial review with that under the 2006 actuarial review.

Table 4.8: Projected financial position – 2009 vs 2006 Actuarial Report

Financial Indicator	Actuarial Report as at 31 December, 2009	Actuarial Report as at 31 December, 2006
General average premium (2010-60)	22.8%	23.6%
PAYG rate		
2010	12.2%	13.3%
2035	22.6%	25.2%
2060	36.8%	39.0%
First year of expenditure exceeding contributions	2032	2014
Last year of actuarial equilibrium	2047	2017

Table 4.9: Projection of the reserve ratio

Year	2009 Actuarial Report	2006 Actuarial Report
2010	7.3	7.1
2011	7.1	6.9
2012	7.0	6.6
2013	6.8	6.4
2014	6.7	6.1
2015	6.6	5.9
2020	6.1	4.2
2025	5.6	2.4
2030	5.0	0.4
2035	4.4	-
2040	3.7	-
2045	2.8	-
2050	1.4	-
2055	-	-

The differences in the results between the 2006 and 2009 report are mainly the result of the social insurance legislative amendments, improvements to the projection model, taking into account the Scheme's observed experience over the period 2007-09, and revision of assumptions. Section 5 provides a detailed reconciliation of projection results under this report with those produced in the previous report and determines the effects of the above variations on key financial indicators, which are used to assess the projected financial position of the Scheme.

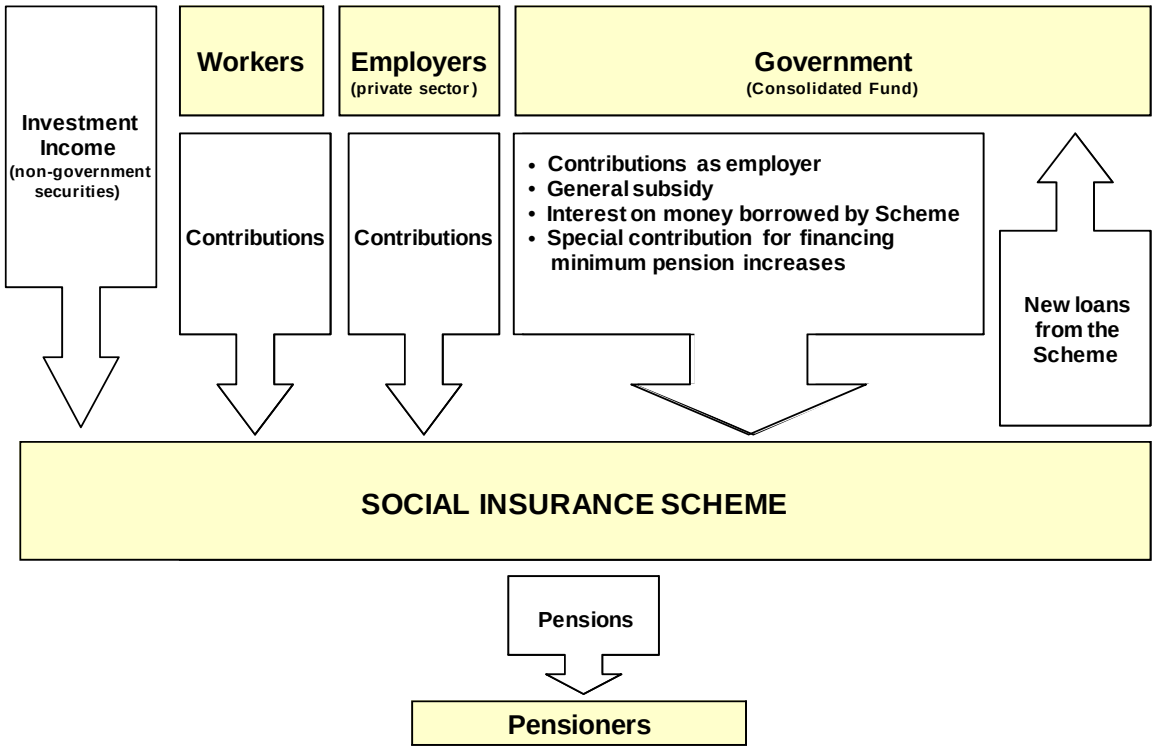
4.5. Cash flows between the Government and the Scheme

The evolution of the net cash flows between the Consolidated Fund and the Scheme is particularly interesting in the context of the Government's finances. Figure 4.3 shows graphically all cash flow transfers that take place between the Scheme and its financiers, including the Government, and pensioners.

Presently, the Scheme's assets are almost entirely invested in government securities. This represents a positive cash flow for the Government, providing government an access to capital funds. Each year, the Consolidated Fund benefits from a new loan primarily resulted from the annual surplus of the Scheme (the excess of Scheme's annual revenues over expenditures).

On the other hand, the Government must pay interest on the money borrowed from the Scheme, which represents a negative cash flow. Other negative cash flows result from the fact that the Government must contribute to the Scheme by way of its general subsidy, currently equal to 4.3 per cent of insurable earnings in respect of all employed persons, and by way of its contribution as employer, currently equal to 10.15 per cent of insurable earnings in respect of civil servants who are entitled to retirement benefits from the Government employees pension scheme. The Government also pays a special contribution to the Scheme for financing the increases of the minimum pension granted in 1999 and 2000.

Figure 4.3: Cash flows between the Scheme and its financiers and pensioners



As shown in Table 4.10, there has been an upward trend in the annual amount of the negative cash flow from the Scheme to the State Consolidated Fund over the last 10 years (2000-2009), although on an annual basis the size of net cash flow amount to Government has experienced some variations over that period since the factors affecting it are not strongly interrelated.

Table 4.10: Net cash transfers between Consolidated Fund and the Scheme over the period 2000-09 - (in thousand €)

Year	Positive cash flow	Negative cash flows				Net cash flow to Government
	New loans to Government by Scheme[1]	General government subsidy	Government contribution as employer	Interest payments on money borrowed	Special contribution towards financing min. pension	
2000	320,138	136,989	76,870	197,078	5,471	-96,270
2001	332,928	153,969	81,382	202,580	8,042	-113,045
2002	300,217	157,142	86,976	175,510	8,461	-127,872
2003	249,226	174,414	100,073	149,178	8,883	-183,322
2004	340,552	172,085	102,684	181,744	9,214	-125,175
2005	356,697	227,668	108,814	178,260	9,493	-167,538
2006	325,529	219,613	118,389	171,135	10,320	-193,929
2007	439,565	244,597	118,299	194,342	10,942	-128,615
2008	505,379	274,619	129,485	266,797	17,582	-183,105
2009	396,404	302,512	146,471	114,591	18,687	-185,856

1. Equal to the annual increase in the level of Scheme's assets invested in government securities

As shown in Table 4.11, under projections of the present actuarial review, the size of the negative cash flows to the Government is anticipated to increase over the next 20 years, from 2.9 per cent of insurable earnings in 2010 to 7.5 per cent of insurable earnings in 2030. In carrying out the above projections, it was assumed that:

- there is no change in the current investment policy of the Scheme under which Scheme's assets are almost entirely invested in government securities;
- the new loan granted to the government by the Scheme each year is equal to the Scheme's annual revenues minus expenditures; and
- the size of workforce of civil servants remains constant throughout the projection period and the government contributions as an employer of the civil servants are paid in future at the legislated rates as per 2009 social insurance reform (currently, the government contribution is 10.15% of insurable earnings with respect to civil servants who are entitled to retirement benefits from the Government employees pension scheme whereas the private employer contribution rate is 6.8%).

In the 2006 actuarial report, the estimated negative cash flow amounts to the Government for 2010 and 2020 were projected at 5.0 and 9.3 per cent of insurable earnings respectively. These projected amounts under the 2006 report were significantly higher than the corresponding levels of 2.9 per cent (in 2010) and 5.3 per cent (in 2020) of insurable earnings projected under this report (see Table 4.11). The above anticipated reduction of approximately 45% in the size of net transfers from the State Consolidated Fund to the Scheme is primarily due to the 2009 reform of the Scheme and at a lesser extent the favourable Scheme's observed experience over the period 2007-08.

Table 4.11: Projected cash flows between the Consolidated Fund and the Scheme over the period 2010-30 (in million €)

Year	Positive cash flow	Negative cash flows				Net cash flow to Government	
	New loans to Government by Scheme	General government subsidy	Government contribution as employer	Interest payments on money borrowed	Special contribution towards financing min. pension	Amount in million €	As a % insurable earnings
2010	388	335	155	100	21	(222)	-2.9%
2011	405	351	159	141	22	(268)	-3.3%
2012	391	367	163	149	23	(311)	-3.6%
2013	368	382	168	157	24	(363)	-4.1%
2014	466	425	185	165	25	(334)	-3.6%
2015	485	440	189	218	26	(388)	-4.1%
2020	568	565	243	334	32	(606)	-5.3%
2025	645	725	288	491	42	(901)	-6.5%
2030	658	934	354	596	56	(1,282)	-7.5%

4.6. Recommendations

4.6.1. Scheme Accounts

As mentioned in Section 4, following the enactment of the Social Insurance Law N.59(I) on 9 July 2010, the present financing and accounting format of the Scheme consists of four accounts, namely Unemployment, Other Benefits, Basic Pensions and Supplementary Pensions. In addition, all administration expenses of the Scheme are currently covered by the Other Benefits Account.

It is recommended to:

- Merge the Basic Pensions and Supplementary Pensions Accounts since they deal with the same type of benefit (pensions); and
- Allocate Scheme's administration expenses to each account proportionately in accordance with the actual occurrence of those expenses in each account.

Table 4.12 shows the recommended allocation of total current contribution rate of 17.90 per cent of insurable earnings for employed persons to each account and the corresponding type of expenditure covered.

Table 4.12: Expenditure covered and contribution rate by account for employed persons

Account	Benefits and expenses covered	Contribution allocation (as % of insurable earnings)
Unemployment	Unemployment benefits and administration expenses	1.15%
Other Benefits	Sickness benefit, maternity allowance, maternity grant, marriage grant, funeral grant, employment injury benefits and administration expenses	1.15%
Pensions	Old-age pension, invalidity pension, widow's pension, orphan's benefit, other related lump sum benefits and administration expenses	15.6%
Total		**17.9%**

4.6.2. Revision of investment policy

Currently, Scheme's assets are invested primarily in non-tradeable government deposits (93%) while the remaining assets are invested in medium-term government bonds and cash deposits held with commercial and co-operative banks in Cyprus.

The Scheme could consider the possibility of increasing the proportion of its assets invested in non-government securities in order to enhance diversification of the investment portfolio and aim to achieve higher rates of return through these diversified investments. This in turn would improve the financial status of the Scheme through increased revenues. The extent of this improvement would eventually depend on the amount of investment in non-government assets and the additional investment return that could be achieved on those assets as compared to the expected return under current investment policy. Nevertheless, the financial improvement is not expected to be significant given that investment income, under current investment policy, is projected to represent, on average over the next 35 years, only 12 per cent of total revenues. It must be borne in mind that the main revenue source of the Scheme will continue to be contributions in future.

Furthermore, investing part of Scheme's reserves in non-government assets would help in the containment of future increases of government debt and would mean that, in future, government securities would represent a much smaller share of the total reserves. In that context, any cash flows needs of the Scheme in periods of significant economic difficulties or in the longer term, according to this valuation after 34 years when revenues are projected to be insufficient to meet expenditures, can then be met by recovering funds (or selling securities) from any of the Scheme's borrowers and not necessarily the government, which might itself face cash flow problems at that time.

Any change in the current investment policy of the Scheme should be gradual in order to avoid a negative impact on government cash flow and a deterioration of its budgetary position, as well as to allow time for the implementation of the new investment framework of the Scheme including the establishment of an independent investment management committee, following the recent decision of the Ministerial Council. The actual percentage of future Scheme's surpluses to be invested in non-government securities each year should be decided in close co-operation with the Ministry of Finance in the context of government's finances and in particular by considering the impact of public social protection programmes, including the Scheme, onto government budget.

Finally, it is important to note that the new investment policy and strategy should:

- be consistent with the financing objectives of the Scheme, Scheme's maturity and its future cashflow requirements;
- aim to achieve a reasonable balance between the two primary investment objectives of security of asset and return on investments; and
- take into account the national economic and social utility of the investments and consider the extent to which those investments make a substantial contribution to the long-term national growth rates.

By contributing to long-term national economic growth, the chosen investments can improve the financial status of the Scheme in terms of the number of workers and the amount of their insurable earnings. Indeed, social security schemes are primarily dependent, in the long term, on the evolution of economic growth.

5. Reconciliation with Previous Report

5.1. Introduction

The results presented in this report were reconciled with those previously projected in the actuarial report as at 31 December, 2006, so as to determine the effects of the numerous changes that affect the projections. The indicator used for the reconciliation is the pay-as-you-go rate, which is the ratio of expenditures to insurable earnings in a given year and corresponds to the contribution rate that would need to be paid to cover the cost of the Scheme if there were no reserves.

The most significant effects, which are discussed below, include the following:

- Impact of the amendments in the Social Insurance Law and other relevant laws since the 2006 actuarial review;
- Effect of methodological improvements made to the projection model between 2007 and 2009;
- Effect of the actual Scheme experience from 2007 through 2009 on the starting data in the report as at 31 December, 2009; and
- Impact of changes made to the key assumptions since the previous triennial report.

5.2. Amendments in legislation

The Scheme was subject to a series of amendments to Social Insurance Laws since the 2006 actuarial review. Those amendments included the following:

- Social Insurance Law N.110(I) of 2007 - enacted on 25 July, 2007 - Maternity Allowance:
  - ✓ Increase in the duration of the Maternity Allowance payment from 16 to 18 weeks.
- Social Insurance Law N.22(I) of 2009 - enacted on 1 April, 2009 - Reform package for securing the long-term viability of the Scheme:
  - ✓ Gradual increases in contribution rates allocated to long-term benefits – seven increases by 1.3 percentage points every five years – first increase in April 2009 and last increase in January 2039;
  - ✓ Stricter eligibility conditions to old-age pension to be introduced gradually over the period until January 2012 - increase of the minimum contribution requirement to 10 years of paid contributions (previously the minimum requirement was 3 years);
  - ✓ For the purposes of old-age basic pension calculation, a maximum limit of 6 years on credits granted to an insured person in the basic part of the Scheme for any period of full time education or approved training after the age of 16 (previously there was no maximum limit imposed) - introduced as of January, 2010;
  - ✓ Stricter eligibility conditions for the payment of old-age lump sum at age 68, for those who are eligible for old-age pension at 65 - 6 years of paid contributions (previously the minimum requirement was for 3 years), to be introduced gradually over the period until January 2012.
  - ✓ Abolishment of the right of all those insured persons, who take early or normal retirement and they are eligible for pensionable benefits from a non-contributory occupational pension plan, to receive unemployment benefit - introduced as of January, 2010.
  - ✓ Commitment by the ministers of Finance and Labour and Social Insurance to submit to the House of Parliament a draft legislation concerning the upgrading of the investment framework and policy of the Social Insurance Fund and the effective investment management of the Fund, following the establishment of an adequate level of real reserves.

- Special Defence Tax Law N.23(I) of 2009 - enacted on 27 March, 2009 – Tax rate paid by the Scheme on the income received from its investment in cash deposits and government bonds:
  - ✓ Reduction of income tax rate from 10 to 3 per cent.
- Social Insurance Law N59(I) of 2010 – enacted on 9 July, 2010 – Scheme Accounts
  - ✓ Establishment of four new Scheme accounts, namely Unemployment, Other Benefits, Basic Pensions and Supplementary Pensions, as a replacement of the three old accounts, namely Unemployment, Basic and Supplementary.
  - ✓ Contribution rate allocation (for employed persons) into the four new accounts as follows - Unemployment: 1.15%, Other Benefits: 1.15%, Basic Pensions: 10.00% and Supplementary Pensions: 5.60%.

5.3. Methodological improvements to projection model

The methodology described in Section 2 and Appendix 2 of this report reflects a number of improvements made to the projection model used in previous reports, mainly in the:

- calculation of credits granted to insured women for childhood; and
- determination of eligibility rates.

5.3.1. Child credits

In the previous actuarial review, a uniform child credits allowance of 7 years was made. An experience analysis performed on data of child credits granted to new pensioners, by type of pension, over the period 2006-2010, showed that the average number of child credits awarded to new pensioners gradually decreased from 6 years in 2006 to 5.1 years in 2010.

In this actuarial review, the projection model was modified to allow for the child credits allowance to be linked to the development of the fertility rate as well as the labour force participation rates for females. The above model improvement resulted to an average child credits allowance of 5 years for old-age and widows' pensions and 4.5 years for invalidity pensions over the projection period 2010-2060.

5.3.2. Eligibility conditions

In the previous actuarial review, the eligibility profile of each of the following three groups of new beneficiaries was identical:

- those who satisfy the insurance points condition of 70% of insurance period for the pension award;
- those who satisfy the insurance points condition 30% of insurance period for the pension award; and
- those who satisfy the insurance points condition for the retirement grant.

An experience analysis performed on data of the eligibility profile of the above three groups of beneficiaries over the last 5 years, showed that each of the groups experienced a different profile.

In this actuarial review, the projection model was improved to calculate more accurately the number of insured persons who meet eligibility conditions for pension or lump sum at retirement each year, by introducing different eligibility profile for each of the above groups.

5.4. Experience update (2007-09)

The projections made in the 2006 actuarial report were compared with the results published in the financial statements for the years 2007, 2008 and 2009, as shown in Appendix 3 of this report. Those results were adjusted so that they could be presented on the same basis as those in the actuarial report, that is, by:

- considering only the income and expenditure amounts, which are shown in the old accounts of Basic and Supplementary and correspond to the Scheme's long-term benefits; and
- assuming that expenditure amounts are disbursed as soon as they are encumbered and received as soon as they are due.

Table 5.1 shows the results of that comparison. Each element in the table is analysed in the following pages.

5.4.1. Initial reserve

In the 2006 actuarial report, the level of reserves at the beginning of the projection was estimated to be €5,334 millions. In the 2009 report, the level of reserves as at 31 December, 2006 was corrected downwards by €9 millions, a difference of 0.2% compared with the initial reserve in the 2006 report. The difference is the result of an adjustment made to reflect a revaluation of assets in line with accounting standards.

5.4.2. Contributions

The total amount of contributions collected during the period 2007-09 was approximately €203 million or 7.2% higher than projected in the 2006 actuarial report. This difference is mainly due to a higher-than-expected number of contributors, resulting from a higher-than-expected level of employment in the years 2007 and 2008. As shown in Table 5.2, the number of contributors in 2009 was 452,395, that is, 33,643 more than the number projected in the 2006 report, a difference of 8%. Over the period 2007-09, the total number of contributors increased by more than 16% from 389,837 in 2006 to 452,395 in 2009, whereas over the same period the corresponding expected increase was only 7%.

Table 5.1: Changes in Scheme's reserves

	(A) Actual in millions €	(B) Expected in millions €	(C)=(A)-(B) Difference in millions €	(C)/(B) Deviation %
Reserves as at 31 December, 2006	**5,325**	**5,334**	**-9**	**-0.2%**
Plus contributions	3,005	2,802	203	7.2%
Plus investment income	586	781	-195	-25.0%
Minus expenditures	2,298	2,405	-107	-4.4%
Reserves as at 31 December, 2009	**6,618**	**6,512**	**106**	**1.6%**

Table 5.2: Actual vs Expected number and % annual increase of contributors (2006-2009)

Year	Actual		Expected	
	Number	% Increase	Number	% Increase
2006	389,837		389,837	
2007	423,359	8.6%	397,391	1.9%
2008	449,182	6.1%	408,300	2.7%
2009	452,395	0.7%	418,752	2.6%

5.4.3. Investment income

Over the period from 2007 to 2009, total income from investments was €586 million, 25% lower than anticipated primarily due to the rapid lowering of the European Central Bank interest rates during the 2nd half of 2008 and 2009 with a view to tackling the financial crisis and cushioning its impact to the real economy.

Table 5.3 compares the nominal rates of return on Scheme's assets projected in the 2006 actuarial report with the rates observed from 2007 to 2009. During that period, the average annual rate of return on Scheme's assets, which was 3.4% whereas the expected rate was 4.5%.

Table 5.3: Nominal rate of return on Scheme's assets (as per cent)

Year	Actual rate of return	Expected rate of return
2007	4.0	4.5
2008	4.1	4.5
2009	2.0	4.5
Average rate	**3.4**	**4.5**

5.4.4. Expenditure

Benefit payments during the period were €107 million lower than anticipated, representing a deviation from the expected results of about 4.4%. The difference between actual and expected results is mainly due to an over-projection of the number of pensions-in-payment, which is partly offset by an under-estimation of the indexation rate for pension benefits for 2008 and 2009 by an average annual rate of almost 2 percentage points.

As shown in Table 5.4, the total number of pensions-in-payment in 2009 was 120,956, that is, 11,210 less than the number projected in the 2006 report, a difference of 8.5%. Over the period 2007-09, the total number of pensions-in-payment increased steadily by 13% from 107,231 in 2006 to 120,956 in 2009, whereas over the same period the corresponding expected increase was 23%.

Table 5.4: Actual vs Expected number and % annual increase of pensioners (2006-2009)

Year	Actual		Expected	
	Number	% Increase	Number	% Increase
2006	107,231		107,231	
2007	111,834	4.3%	117,844	9.9%
2008	116,109	3.8%	125,671	6.6%
2009	120,956	4.2%	132,166	5.2%

5.5. Changes in assumptions

Table 5.5 summarises the changes made to the key assumptions used in this report compared with those used in the previous triennial report. These changes are as follows:

- The assumed *total fertility rate* is higher than in the previous triennial report. In the 2006 actuarial report, the rate was 1.5 in 2022 and remained stable thereafter. In this report, the rate increases gradually from 1.51 in 2010 to 1.6 in 2036 and remains stable thereafter.
- In this report, the *life expectancies* for both males and females are assumed to reach 85.0 and 88.5 years respectively in 2060. These life expectancies projected in the 2009 report are greater than that projected in the 2006 report, which were assumed to reach 82.5 years for males and 87.5 years for females in 2060.
- The assumed level of *net migration* is lower in this report than in the previous triennial report. In the 2006 report, net migration was 9,000 in 2010 gradually decreasing to 6,000 in 2051 and remained stable thereafter. In this report, net migration increases from 2,000 in 2010 to 6,000 in 2020 and thereafter gradually dropping to 4,000 by 2060.
- The assumed overall *male labour force participation rate* is lower in this report than in the 2006 report, whereas the *female labour force participation rate* is higher. For males, in the 2006 report, labour force participation rate was anticipated to

average at 82.5% over the period 2010-60, whereas it is expected to average at 80.7% in this report. The corresponding figures for females are 74.6% and 72.8% in the 2009 and 2006 report respectively.

- In this report, the level of *unemployment rate* is assumed to gradually decrease to 4.5% in 2036 and remain stable thereafter, whereas in the previous report it was 3.5% throughout the projection period.
- In this report, the assumed annual *real interest rate* on Scheme's assets in the long-term is set at 1.5% from 2021 onwards, whereas in the 2006 report it was 1 percentage point higher, i.e., 2.5%.

Some other Scheme-specific assumptions, which are described in Appendix 4, were also changed. For example, the proportion of contributors married at the time of death and the invalidity incidence rates. As it will be seen in the next Section 5.6, overall, the changes in these Scheme-specific assumptions had a minor effect on the projection results.

Table 5.5: Changes to key assumptions

Assumption	Actuarial Report as at 31 December, 2009		Actuarial Report as at 31 December, 2006	
Total fertility rate	1.60 (2036+)		1.50 (2022+)	
Life expectancy at birth	Males	Females	Males	Females
2010	78.1 years	82.6 years	77.8 years	82.5 years
2060	85.0 years	88.5 years	82.5 years	87.5 years
Net migration	2,000 (2010) 6,000 (2020) 4,000 (2060)		9,000 (2010) 8,000 (2020) 6,000 (2060)	
Real GDP growth rate	1.0% (2010) 2.4% (2030) 1.5% (2060)		4.3% (2010) 2.6% (2030) 2.0% (2060)	
Labour force participation rates (15-64)	Males	Females	Males	Females
	80.2% (2010)	66.7% (2010)	81.5% (2010)	65.8% (2010)
	81.0% (2030)	75.7% (2030)	83.0% (2030)	73.1% (2030)
	80.1% (2060)	75.8% (2060)	82.2% (2060)	76.4% (2060)
Unemployment rate	4.5% (2036+)		3.5% (2007+)	
Price inflation	2.0% (2015+)		2.0% (2007+)	
Real wage increase	1.7% (2026+)		2.1% (2020+)	
Real rate of return	1.5% (2021+)		2.5% (2007+)	

5.6. Results

Tables 5.6 and 5.7 show the results of the reconciliation.

Table 5.6 shows the effects of the various factors on the pay-as-you-go rates. The Scheme's legislative amendments, mainly following the 2009 social insurance reform, had a very significant downward effect on the pay-as-you-go rates, especially in the medium (-2.2%) and long term (-2.3%).

The methodological improvements made to the projection model used in previous actuarial reports have also resulted to a decrease of the pay-as-you-go rates especially in the medium (-1.1%) and long term (-1.0%).

The experience update (2007-09) had the effect of reducing the pay-as-you-go rates in the short (-0.8%) and medium term (-1.3%).

Finally, the overall impact of changes to the projection assumptions onto the pay-as-you-go rates is negative, resulting in an increase of the pay-as-you-go rates in the short (+0.4%) and medium term (+2.0%).

Table 5.6: Reconciliation of the pay-as-you-go rates (as % of insurable earnings) of the 2009 actuarial report with those of the previous report

	2010	2035	2060
As per Actuarial Report as at 31 December, 2006	**13.3**	**25.2**	**39.0**
I. Amendments	**-0.6**	**-2.2**	**-2.3**
II. Model improvements	**-0.1**	**-1.1**	**-1.0**
III. Experience Update (2007-2009)	**-0.8**	**-1.3**	**+1.1**
IV. Changes in Assumptions			
Demographic	+0.2	+1.5	-1.6
Economic	+0.2	+0.6	+1.7
Scheme-specific	+0.0	-0.1	-0.1
Subtotal:	**+0.4**	**+2.0**	**+0.0**
Total of I. to IV.	**-1.1**	**-2.6**	**-2.2**
As per Actuarial Report as at 31 December, 2009	**12.2**	**22.6**	**36.8**

Table 5.7 reveals that the Scheme's legislative amendments had a significant positive effect on the period during which the Scheme is in actuarial equilibrium. In overall terms, the amendments extended the actuarial equilibrium period by 31 years from 2017 according to the 2006 actuarial report to 2048.

The overall cumulative impact from the other three factors (improvements to projection model, experience update and changes in assumptions) on the last year of actuarial equilibrium is minimal. In particular, while the improvements to projection model and experience update extended the actuarial equilibrium by six and seven years respectively, the changes in the assumptions shortened the period of actuarial equilibrium by 14 years bringing it back to 2047 mainly due to the changes in demographic and economic assumptions.

Table 5.7: Reconciliation of changes in last year of actuarial equilibrium

		Last year of actuarial equilibrium
As per Actuarial Report as at 31 December, 2006		**2017**
Changes	**Effect of Change**	
I. Amendments	+31 years	2048
II. Model improvements	+6 years	2054
III. Experience Update (2007-2009)	+7 years	2061
IV. Changes in Assumptions		
Demographic	-6 years	2055
Economic	-9 years	2046
Scheme-specific	+1 year	2047
As per Actuarial Report as at 31 December, 2009		**2047**

6. Sensitivity tests on the results

Since all projections have a degree of uncertainty, sensitivity tests were carried out on the results. Those tests were used to measure the changes in the results that would occur if changes in an assumption were different than that made in the actuarial report. The tests were limited to the following six key demographic and economic variables which subject to a relatively high degree of uncertainty:

- Demographic – fertility, mortality and net migration; and
- Economic – female labour force participation rates, unemployment rate and real rate of return on Scheme's assets.

Two tests were conducted for each of the above assumptions. The first evaluated the effect on the results of changes less favourable for the Scheme than those used in the actuarial report and the second evaluated the effect of more favourable changes. The variations in assumptions tested represent a difference considered to be significant with respect to the assumptions made in the actuarial report without, however, being the upper and lower limits of a probable interval of change for each variable.

In order to examine the degree of sensitivity of projected results to each change of assumption, for each test, three financial indicators are given, the values of which are compared with those in the actuarial report. These indicators are as follows:

- Last year that the Scheme is in actuarial equilibrium, i.e., its reserve ratio is at least equal to the target level which is determined in Section 2;
- First year that Scheme's expenditures exceed contributions; and
- Pay-as-you-go rate, which is the ratio of expenditure to insurable earnings in a given year.

A less favourable change in an assumption (Test I) typically shortens the period during which the Scheme is in actuarial equilibrium and Scheme's contributions alone exceed expenditure, as well as it gives a higher PAYG rate. A more favourable change (Test II) has the opposite effect.

Table 6.1 summarises the alternative assumptions used in the sensitivity tests. It is followed by a brief discussion of each assumption and the impact that the variation in each assumption has on projection results. Table 6.2, which is presented at the end of this section, shows the values of the above three financial indicators for each sensitivity test.

Table 6.1: Sensitivity test assumptions

Assumption	Test I (unfavourable)		Best-estimate assumptions in the Report		Test II (favourable)	
Total fertility rate	1.45 (2027+)		1.60 (2036+)		1.75 (2027+)	
Life expectancy at birth	Males	Females	Males	Females	Males	Females
2035	83.3 years	87.0 years	81.9 years	85.8 years	80.9 years	84.8 years
2060	87.0 years	90.5 years	85.0 years	88.5 years	83.0 years	86.5 years
Net migration	4,600 (2020) 2,600 (2060)		6,000 (2020) 4,000 (2060)		7,400 (2020) 5,400 (2060)	
Female labour force participation rate (15-64)	72.7% (2030) 72.8% (2060)		75.7% (2030) 75.8% (2060)		78.7% (2030) 78.8% (2060)	
Unemployment rate	5.5% (2019+)		4.5% (2036+)		3.5% (2025+)	
Real rate of return	1.0% (2018+)		1.5% (2021+)		2.0% (2024+)	

6.1. Changes in demographic assumptions

6.1.1. Fertility

In this actuarial report, the total fertility rate is assumed to gradually increase from 1.51 children per woman in 2010 to 1.6 in 2036 and remaining constant at this level for the remaining projection period.

A change in the fertility rate and consequently in the number of births, results in a change in the number of new Scheme's contributors around 25 years later. Therefore, the effect of a variation in fertility on the projected financial situation of the Scheme can be observed only in the long term.

In Test I (unfavourable), the assumed fertility rate is lower than that used in the report. It decreased progressively, reaching 1.45 in 2027 and remaining constant thereafter. In Test II (favourable), it increases gradually, reaching 1.75 in 2027 and remains constant thereafter.

The effect of the change in births on the number of new contributors is felt around 25 years later. In 2060, the cumulative effect of the fertility rate results in a reduction of 3.1% in the number of contributors in Test I and an increase of 4.3% in Test II.

6.1.2. Mortality

In the present report, it is assumed that the life expectancy at birth gradually increases during the projection period, reaching 85.0 years for males and 88.5 years for females in 2060.

The sensitivity tests used variations in the level of improvement in life expectancy or mortality reduction during the projection period. An improvement in life expectancy that is greater than the improvement assumed in the report, would increase the aggregate benefit amount because the pension benefit payments would be made over a longer period. Similarly, a smaller improvement in life expectancy would reduce the aggregate benefit amount.

Test I (unfavourable) assumes an increase in life expectancy compared with the report. Life expectancy at birth would thus be 87.0 years for males and 90.5 years for females in 2060. That represents an increase of 2 years for each gender compared with the report. Test II (favourable), on the other hand, assumes a shorter life expectancy, that is, 83.0 for males and 86.5 years for females in 2060, representing a reduction of 2 years for each gender compared with the report.

In 2060, under Test I (unfavourable), the aggregate benefit amount increases by 3.3%, whereas under Test II (favourable) it decreases by 3.4%.

6.1.3. Net migration

The best-estimate projections of the report assume that net migration progressively increases from 2,000 people in 2010 to 6,000 people in 2020 and thereafter gradually decreases to 4,000 people in 2060.

A change in the net migration is a change in the number of new contributors of the Scheme. Over a longer term, the number of beneficiaries also changes.

In Test I (unfavourable), the assumed net migration gradually increases from its current level of 2,000 people to 4,600 people in 2020 and thereafter progressively decreases to 2,600 in 2060. That represents a decrease of 1,400 people in the level of annual net migration over the period 2020-60 compared with the report. Test II (favourable), on the other hand, assumes higher levels of net migration, that is, 7,400 in 2020 and 5,400 in 2060, representing an increase of 1,400 people for each year during the period 2020-60 compared with the report.

According to Test I, the population declines by 8.2% in 2060, compared with the report, whereas in Test II, the population increases by 7.3%. The number of contributors decreases by 9.6% in 2060 in Test I, but increases by 8.8% in Test II.

6.2. Changes in economic assumptions

6.2.1. Female labour force participation rate

The present report assumes that the average labour force participation rate for females between 15 and 64 increases from 66.7% in 2010 to 75.7% in 2030 and thereafter remains stable.

A downward change in female labour force participation rates (Test I) affects employment given that the rate of unemployment remains unchanged from the report. This decrease results in a reduction of the number of female contributors of the Scheme and of the aggregate amount of benefits over the longer term. An upward change in activity on the labour market (Test II) has the opposite effect.

In Test I (unfavourable), the assumed female participation rate progressively increases from its current level of 66.7% to 72.7% in 2030, being 3 percentage points lower than the best-estimate rate of the report for that year, and thereafter remains stable until 2060. By contrast, in Test II (favourable), the assumed female participation rate gradually increases from its current level of 66.7% to 78.7% in 2030, being 3 percentage points higher than the best-estimate rate of the report for that year, and thereafter remains stable until 2060.

According to Test I, the female employed population and the number of female contributors decline by approximately 4.0% in 2060, compared with the actuarial report, whereas in Test II, the female employed population and the number of female contributors increase by approximately 3.9% in 2060.

6.2.2. Unemployment rate

According to the actuarial valuation, the unemployment rate for both males and females is assumed to progressively decrease from its current level of 6.3% to its ultimate lower level of 4.5% in 2036 and thereafter remain stable. Thus, from 2036 onwards employment will vary at the same rate at the labour force.

In the sensitivity tests on unemployment changes, labour force participation rates remain the same as those assumed in the report. An upward change in unemployment has the main effect of reducing the number of contributors to the Scheme as well as the aggregate benefit amount in the longer term, once these people reach retirement. A downward change in unemployment has the opposite effect.

In Test I (unfavourable), the unemployment rate is assumed to be higher than in the report and results in less favourable changes in employment levels. The ultimate level of unemployment is 5.5% and reached in 2019. In Test II (favourable), the decline in unemployment is greater than in the report. The unemployment rate reaches its ultimate lower limit of 3.5% in 2024.

According to Test I, there are 95,882 more jobs in 2060 than in 2009, whereas Test II projects 106,270 more jobs between now and 2060. In the actuarial report the best-estimate projected increase of jobs between 2009 and 2060 is 101,076.

6.2.3 Real rate of return

The projected real rate of return on Scheme's in the report is assumed to progressively increase to its ultimate level of 1.5% in 2021, and thereafter remain constant.

Variations of this assumption have an immediate impact on income generated by the reserve. Contributions and aggregate benefits are not affected in any way.

In Test I (unfavourable), the real rate of return is assumed to be lower than in the report and results in lower investment income levels. The ultimate level of real rate of return is 1.0% and reached in 2018. In Test II (favourable), the real rate of return is assumed to be higher than in the report. The real rate of return reaches its ultimate level of 2.0% in 2024.

Because of the cumulative effect of the above rate of return changes on the reserve, in Test I, investment income decreases by 22% compared with the report in 2040. In Test II, investment income in the same year increases by 24%.

Table 6.2: Results of sensitivity tests

Assumption	Test	Last year of actuarial equilbrium	First year expenditures exceed contributions	Pay-As-You-Go rates (%)	
				2030	2060
Best-estimate assumptions of the report		2047	2032	20.8%	36.8%
Fertility	Test I	2046	2032	20.8%	37.5%
	Test II	2047	2032	20.8%	35.7%
Mortality	Test I	2044	2031	21.0%	38.9%
	Test II	2049	2032	20.6%	35.6%
Net migration	Test I	2043	2030	21.3%	38.9%
	Test II	2050	2033	20.4%	34.9%
Female labour force participation rate	Test I	2045	2031	21.0%	37.0%
	Test II	2048	2032	20.5%	36.6%
Unemployment rate	Test I	2046	2031	20.9%	36.9%
	Test II	2049	2033	20.4%	36.5%
Real rate of return on Scheme's assets	Test I	2044	2032	20.8%	36.8%
	Test II	2049	2032	20.8%	36.8%

7. Conclusion

This actuarial report shows that the legislated schedule of contribution rates, following the 2009 social insurance reform, is sufficient to keep the long-term benefits branch of the Scheme in actuarial equilibrium over the period 2010 to 2047. Compared to last actuarial review, the projected financial status of the Scheme and the net cashflow position of the government towards the Scheme were improved significantly. In particular, the Scheme's equilibrium period was extended by 30 years, from 2017 to 2047, and the net transfers from government to the Scheme were reduced, on average, by 45% over the period 2010-2020. The above financial improvements are primarily due to the 2009 pension reform of the Scheme and at the lesser extent due the favourable Scheme's observed experience over the period 2007-09. The above improvements were partly offset by a less favourable demographic and economic outlook assumed in this actuarial review.

The rapid increasing cost pattern of long-term benefits after 2040, primarily due to ageing effect, compared to the growth of the Scheme's revenues over that period, will eventually require additional measures to be taken - an increase of the contribution rates and/or benefit adjustments.

It is recommended that the government introduces the necessary legislative changes which would enable the Scheme to amend its current investment policy so that the proportion of Scheme's assets invested in non-government securities increases. The revision of investment policy is necessary for the sound financial governance of the Scheme.

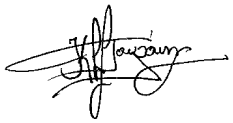
The projected financial status of the Scheme presented in this report is on the assumed demographic and economic framework over the long term. Therefore, it remains important to review the Scheme's long-term financial position on a regular basis by producing periodic actuarial valuation reports. For this purpose, as required by the Social Insurance Law, the next actuarial report is scheduled to be made as at 31 December, 2012.

8. Actuarial opinion

In my opinion, this actuarial report, which was prepared in compliance with the provisions of section 76 of the Social Insurance Law N.59(I)/2010:

- is based on data that are sufficient and reliable;
- uses assumptions that are, individually and in aggregate, reasonable and appropriate; and
- employs a methodology that is appropriate and consistent with sound actuarial principles.

The report and opinions given in it are in accordance with internationally accepted actuarial practice and the Guidelines of Actuarial Practice for Social Security Programs of the International Actuarial Association (IAA).



Costas Stavrakis FIA, FCAA
Chief Actuarial Officer

APPENDIX 1

Overview of the legal provisions of the Scheme

A1.1. Introduction

The information presented in this appendix is valid as at 2 July, 2010, the date on which a new Social Insurance Law, N.59(I)/2010, was put into force. The new Law amends and consolidates the Social Insurance Laws of 1980 to 2009, which were abolished. Any amendments in the legislation after the enactment date of the new Law are not shown.

A1.2. Historical context

The first Social Insurance Scheme in Cyprus was introduced in January 1957. It covered compulsorily the employed persons, with the exception of certain agricultural workers. The self-employed persons and employed workers excepted from compulsory insurance were given the right to be insured voluntarily. The benefits of the 1957 scheme were: marriage grant, maternity grant, funeral grant, sickness benefits, unemployment benefits, old-age pension, widow's pension and orphan's benefits.

In October 1964, compulsory insurance was extended to every person gainfully employed in Cyprus, including the self-employed, and the material scope was expanded to include the maternity allowance and employment injury benefits.

In January 1973, invalidity pension was introduced for persons permanently incapable of work. Sickness benefits were extended to self-employed persons and married women, and unemployment benefits were extended to married women.

The invasion of Cyprus by Turkey in July 1974 made necessary certain restrictive measures for safeguarding the Scheme against the risk of bankruptcy. Such measures included the reduction of pension rates and the suspension of the rights to unemployment and certain other benefits. The July 1974 levels were restored in 1977. Thereafter, the rates of benefit were increased from time to time since 1978 and a new benefit was introduced, the missing person's allowance, payable to wives and eligible children of persons missing as a result of the Turkish invasion.

On 6 October 1980, the supplementary part of the Social Insurance Scheme (the "Scheme") was introduced. This new part of the Scheme is earnings-related.

A1.3. Coverage

The Scheme 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 benefit and employment injury benefits.

Voluntary contributors working abroad for Cypriot employers are entitled to all benefits apart from employment injury benefits. Other voluntary contributors are entitled only to marriage grant, maternity grant, funeral grant, old-age pension and survivors' benefits.

A1.3.1. Voluntary insurance

Voluntary insurance is allowed to persons who:

- wish to continue insurance after a prescribed period of compulsory insurance; or
- work abroad in the service of Cypriot employers.

The condition for continuation of insurance on a voluntary basis is that the person concerned has basic insurance of at least one insurance point, earned from paid contributions.

Persons working abroad in the service of Cypriot employers are allowed to be insured without any condition as to previous insurance. The application for voluntary insurance must be submitted within 12 months from the end of the contribution year for which voluntary contributions are to be paid.

A1.4. Contributions

A1.4.1. Age conditions

Liability for the payment of contributions starts at 16 and ceases at the pensionable age. However, an insured person who attains the pensionable age and does not satisfy the insurance conditions for old-age pension must continue to pay contributions until satisfaction of the insurance conditions. In no case can contributions be paid after the age of 68.

A1.4.2. 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 2009, basic insurable earnings are fixed at €154.07 per week, or €8,012 per year. The maximum insurable earnings for contribution purposes in 2009 are €48,048.

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 2009, one point is credited for every €8,435 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 of self-employed persons, 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.

A1.4.3. Contribution rate

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

Table A1.1
Contribution rates as at July, 2010

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
Voluntary contributors working abroad for a Cypriot employer	13.6 per cent of insurable earnings, as agreed in the contract of employment
Other voluntary contributors	11.0 per cent of an amount of earnings they fix, not exceeding the value of insurance points obtained in the previous year, or the average value of insurance points obtained over the last three years if higher
National guard	1.25 per cent of the basic insurable earnings paid by state
State contribution	4.3 per cent of the insurable earnings of employed persons, self-employed and voluntary contributors working abroad, and 3.8 per cent of insurable earnings of other voluntary contributors

In case of delay in the payment of contributions by an employer or a self-employed person, there is an automatic payment of a charge calculated as a percentage of the amount of contributions due and rising progressively with the time of delay. The maximum amount of charge is 27 per cent of the amount of contributions due.

A1.4.4. Financial provisions

Following the enactment of the Social Insurance Law N.59(I) on July, 2010, the Social Insurance Fund maintains four separate accounts: the Unemployment Benefit Account, the Other Benefits Account, the Basic Pensions Account and the Supplementary Pensions Account.

The Unemployment Benefit Account is credited with 1.15 per cent of the insurable earnings of employed persons on which contributions have been paid, and is charged with the payment of unemployment benefit.

The Other Benefits Account is credited with 1.15 per cent of the insurable earnings of employed persons, 1.3 per cent of the insurable income of self-employed persons and 0.2 per cent of the insurable earnings of voluntary insured persons, on which contributions have been paid, and is charged with the payment of sickness benefit, maternity allowance, grants, employment injury benefits and administration expenses.

The Basic Pensions Account is credited with 10 per cent of insurable earnings of employed and self-employed persons, 9 per cent of insurable earnings of voluntary insured persons, on which contributions have been paid, and is charged with the payment of pensions in the basic part of the Scheme, including old-age pension, invalidity pension, widow's pension and orphan's benefit.

The Supplementary Pensions Account is credited with 5.6 per cent of insurable earnings of all insured persons, on which contributions have been paid, and is charged with the payment of pensions in the supplementary part of the Scheme, including old-age pension, invalidity pension, widow's pension and orphan's benefit.

A1.4.5. Credited contributions

Normal credits - Contributions are credited to an insured person for:

- any period of full time education or approved training after the age of 16;
- the period preceding the day the person first becomes insured up to the first day of the preceding contribution year;
- any period of unemployment for which unemployment benefit is paid (up to 26 weeks) and, in addition, any period of unemployment (up to 26 weeks) for which no entitlement to benefit exists; and
- any period of incapacity for work due to sickness, injury, maternity or invalidity for which benefit is payable. For employed persons, a period of incapacity without benefit entitlement gives right to credits up to 26 weeks. For self-employed persons, such period gives right to credits if it is preceded by a period for which benefit was payable.

Child credits - Credits to insured women for childhood up to 156 weeks are granted to women entitled to pension after 31 December 1992, in respect of each child, for the period preceding the 12th birthday of the child, provided that she does not have any paid or credited contributions in those weeks.

Prospective credits - In case of invalidity or death of an insured person under the age of 63, the time between the date of invalidation or death and the age of 63 is deemed to be a period of insurance. The earnings to be credited for that period are based on the average insurable earnings in the supplementary part of the Scheme for the period most favourable between (1) the last five years, (2) the period from October 1980 up to the relevant date, or (3) the period from age 16 up to the relevant date. The condition for the award of prospective credits is that the person qualifies for the pension.

Value of credits - Credits awarded for periods of unemployment or incapacity for work due to maternity, sickness, injury or invalidity have the value of the earnings on which the benefit payable has been assessed and paid. Exception to this rule is the credits awarded for periods of unemployment or incapacity for work for which benefits were not paid. Those credits have the value of the basic insurable earnings. Other credits, such as pre-entry and education/training credits, have the value of the basic insurable earnings.

Contributions under the repealed scheme - Contributions paid or credited before 6 October 1980 are converted into insurance points. Each weekly contribution paid or credited has a value of 0.02 times the basic insurable earnings, provided that the total value of such contributions in a given year does not exceed the equivalent of one insurance point.

A1.5. Benefits

A1.5.1. 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.

The basic insurance provides for the payment of a minimum pension equal to a percentage of the full basic pension in respect of old-age, invalidity and widow's pension. This percentage was 70 per cent before 1999. It has been increased to 77 per cent of the full basic pension in 1999 and to 85 per cent in 2000. The minimum pension is €314.00 per month (paid for 13 month) in 2009 for a person with no dependants.

The above increases of the minimum pension (adopted in 1999 and 2000) are financed directly from the Consolidated Fund. Every year, funds are transferred from the Consolidated Fund to the Scheme for the financing of those increases.

A1.5.2. Marriage grant

The insurance conditions are that the husband or the wife:

1. has been insured for at least 26 weeks and has basic insurance up to the date of marriage of at least 0.5 of insurance point, earned from paid contributions; and
2. has paid or been credited with contributions which provided him/her with at least 0.39 of insurance point within the *relevant contributions year*.

The *relevant contributions year* is defined as the last contributions year, prior to the *benefit year* which includes the date of fulfilling the relevant insurance conditions. The *benefit year* is defined as the period which starts the first Monday of July of each year and ends the last Sunday prior to the first Monday of July of the following year. So for example, if the marriage incurred during the first half of 2011 the *relevant contributions year* is 2009, given that the benefits year runs from 5 July 2010 to 4 July, 2011.

The amount of the marriage grant is 8 per cent of the basic insurable earnings, i.e., €634 in 2009. It is divided between both spouses.

A1.5.3. Maternity grant

The insurance conditions for the maternity grant are the same as for the marriage grant (by either the wife or husband). The amount of the maternity grant is 6 per cent of the basic insurable earnings, i.e., €466 in 2009 and is paid only to the wife.

A1.5.4. Funeral grant

Persons eligible to the funeral grant are:

1. persons in receipt of old-age, invalidity, widow's pension, death benefit or missing person's allowance;
2. orphans receiving the orphan's benefit;
3. persons whose death is caused by work injury;
4. persons who satisfy the same insurance conditions as those of the marriage grant; and
5. dependants of persons specified in (1) and (4) above.

In 2009, the amount of the funeral grant, which is set at 8 per cent of the basic insurable earnings, is €634 for cases (1) to (4) above and €317 for dependants.

A1.5.5. Maternity allowance

The insurance conditions are that a person:

1. has been insured for at least 26 weeks and has basic insurance up to the first day of commencement of maternity leave of at least 0.5 of insurance point, earned from paid contributions; and
2. has paid or been credited with contributions which provided him/her with at least 0.39 of insurance point within the *relevant contributions year*.

The amount of the maternity allowance consists of the:

- basic benefit, which is equal to 75 per cent of the weekly value of the insurance point earned in the basic insurance during the relevant contributions year, increased to 80%, 90% and 100% for one, two and three dependants respectively; and
- supplementary benefit, which is equal to 75 per cent of the weekly value of the insurance points earned in the supplementary insurance during the relevant contributions year.

The benefit is not payable in the case of a woman who receives full wages during the maternity allowance period. If reduced wages are paid, the amount of such wages and the benefit payable cannot exceed full wages.

The allowance is payable for a period of 18 weeks beginning between the second and the sixth week preceding the expected week of confinement.

A1.5.6. Sickness benefit

Sickness benefit is payable between the ages of 16 and 63 to insured persons incapable of work. Persons who do not satisfy the insurance conditions for old-age pension at 63 are allowed to draw benefit up to the date on which they satisfy the relevant insurance conditions but in no case after the age of 65.

The insurance conditions are that a person:

1. has been insured for at least 26 weeks and has basic insurance up to the date of incapacity at least 0.5 of insurance point, earned from paid contributions; and
2. has paid or been credited with contributions which provided him/her with at least 0.39 of insurance point within the *relevant contributions year*.

The amount of sickness benefit consists of the:

- basic benefit, which is equal to 60 per cent of the weekly value of the insurance point earned in the basic insurance during the *relevant contributions year*, increased to 80%, 90% and 100% for one, two and three dependants respectively; and
- supplementary benefit, which is equal to 50 per cent of the weekly value of the insurance points earned in the supplementary insurance during the *relevant contributions year*, up to a maximum amount of one times the basic insurable earnings.

In order to re-qualify for sickness benefit, the person must have paid contributions on earnings not lower than 26 times the weekly basic insurable earnings after the beginning of the period for which the right has been exhausted, and in addition a period of 13 weeks of employment must have elapsed since the date of exhaustion.

The benefit is not payable in the case the person receives full wages. If reduced wages are paid, the amount of such wages and the benefit payable cannot exceed full wages.

The waiting period before the commencement of the benefit is three days for employed persons and nine days for self-employed persons. The benefit is payable in each period of interruption of employment for 156 days and under certain conditions it can be extended for another 156 days.

A1.5.7. Unemployment benefit

Unemployment benefit is payable between the ages of 16 and 63. Persons who do not satisfy the insurance conditions for old-age pension at 63 are allowed to draw benefit up to the date on which they satisfy the relevant insurance conditions but in no case after the age of 65.

The insurance conditions are that a person:

1. has been insured for at least 26 weeks and has basic insurance up to the date of unemployment at least 0.5 of insurance point, earned from paid contributions; and
2. has paid or been credited with contributions which provided him/her with at least 0.39 of insurance point within the *relevant contributions year*.

The amount of the unemployment benefit is the same as the sickness benefit. The benefit is payable for a maximum of 156 days.

In order to re-qualify for benefit, the person must have paid contributions on earnings not lower than 26 times the weekly basic insurable earnings after the beginning of the period for which the right has been exhausted, and in addition a period of 26 weeks of employment must have elapsed since the date of exhaustion.

A1.5.8. 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 the $^1/_3$ 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.

In the case of invalidity caused by any accident, insurance conditions are those of the sickness benefit.

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 %

A1.5.9. 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 = 260 weeks and y = 5 insurance points as from 4.1.2010;
   - ✓ x = 364 weeks and y = 7 insurance points as from 3.1.2011;
   - ✓ x = 520 weeks and y = 10 insurance points as from 2.1.2012; 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. Eligibility to the old-age pension is not conditional on retirement from regular employment.

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% and 100% for one, two and three 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.

For the purposes of old-age basic pension calculation, a maximum of six years of education/training credits is taken into account.

A lump-sum benefit is payable at age 68 to persons who do not meet the insurance conditions for an old-age pension, provided that the person has been insured for at least x weeks and has basic insurance up to the date of old-age lump-sum entitlement at least y insurance points, earned from paid contributions, where

- x = 208 weeks and y = 4 insurance points as from 4.1.2010;
- x = 260 weeks and y = 5 insurance points as from 3.1.2011; and
- x = 312 weeks and y = 6 insurance points as from 2.1.2012.

The lump-sum amount is equal to 15 per cent of the value of the total number of insurance points earned from paid and credited contributions.

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.

An old-age pensioner who has paid contributions on insurable earnings between the date of entitlement to the pension and the age of 65 is entitled to a weekly increase of the pension equal to 1/52 of 1.5 per cent of the total amount of insurable earnings during that period.

A1.5.10. Widow's pension

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.

In the case of death caused by any accident, there is entitlement to the widow's pension provided that the insurance conditions for funeral grant are satisfied.

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.

A lump sum is payable to a widow whose husband satisfies only the first insurance condition of the invalidity pension. This lump sum is equal to 15 per cent of the total number of insurance points earned from paid and credited contributions in the basic insurance plus 9 per cent of the total number of insurance points earned from paid and credited contributions in the supplementary insurance.

In case of remarriage, the widow is entitled to a gratuity equal to one year's pension, excluding any increases for dependants.

A1.5.11. Orphan's benefit

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 fulfils the insurance conditions for a widow's pension; or
4. when the widowed mother, who was in receipt of widow's pension, remarried.

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. There is no age limit for orphans who are unmarried and permanently incapable of self-support. A gratuity of one year's benefit is payable, for cases (1) and (2), on termination of his entitlement other than by death before the age of 17.

A1.5.12. Missing person's allowance

The amount of the allowance is the same as the basic widow's pension or the basic orphan's benefit as the case may be.

A1.5.13. Employment injury benefits

Temporary incapacity (injury benefit) - The injury benefit is payable to an employed person incapable of work as a result of an employment accident or occupational disease. The benefit is payable for a maximum of 12 months from the date of accident. The amount of the benefit is the same as the sickness benefit, except that the basic benefit is the benefit which corresponds to the basic insurable earnings.

Disablement benefit - The disablement benefit is payable to an employed person who, as a result of a work injury, suffers a loss of physical or mental faculty of a degree of not less than 10 per cent, with the exception of disablement due to pneumoconiosis which is compensated from 1 per cent. Disablement benefit may take the form of either a grant or a pension depending on the degree of disablement.

The amount of the benefit is as follows.

- For an incapacity between 10 and 19 per cent, a disablement grant is paid, equal to €3,365 (in 2009) for 10 per cent disablement, increasing proportionately to €6,393 (in 2009) for 19 per cent disablement.
- For an incapacity of 20 per cent and above, a disablement pension is payable. For a 100 per cent disablement, the pension consists of the:
  - ✓ Basic pension, which is equal to 60 per cent of the basic insurable earnings, increased to 80%, 90% and 100% for one, two and three dependants respectively; and
  - ✓ Supplementary pension, which is equal to 60 per cent of the value of the annual

average number of insurance points earned from paid or credited contributions in the supplementary insurance over the period beginning with the first day of the second year before the year in which the accident occurred and ending with the day of accident.

For a degree of disablement below 100 per cent, the pension is proportional to the actual degree of disablement. In addition, when the beneficiary of a disablement pension with a degree below 100 per cent is incapable of work and is expected to remain incapable permanently, and provided that the disablement is due to an employment injury, the disablement pension can be calculated on the basis that the degree of disablement is equal to the degree of invalidity, if this is more favourable to the beneficiary.

A constant attendance allowance of €201.09 per month (in 2009) is payable for disablement pensioners needing constant care.

Death benefits – The death benefits are paid to the survivors of an employed person who dies as a result of employment accident or an occupational disease. The benefits include *widow's pension*, *orphan's benefit* and *parent's allowance* when the deceased is not survived by a spouse or by orphans.

The *widow's pension* consists of the:

- Basic pension - same as basic disablement pension for 100 per cent disablement; and
- Supplementary pension - 60 per cent of the supplementary disablement pension that the deceased was entitled to, for a 100 per cent disablement.

The *orphan's benefit* consists of the:

- Basic benefit - same as the orphan's benefit payable under cases (1) and (2); and
- Supplementary benefit - same as the orphan's benefit payable under cases (1) and (2).

The *parent's allowance* consists of the:

- Basic allowance - 40 per cent of basic insurable earnings per parent; and
- Supplementary allowance - 30 per cent of the supplementary disablement pension that the deceased was entitled to, for a 100 per cent disablement.

A1.6. General provisions

A1.6.1. Revision of insurable earnings

The amount of the basic insurable earnings as well as the ceiling on such earnings is adjusted in accordance the movement of the general level of insurable earnings every year. In particular, they are increased by the rate of increase of average insurable earnings between the two last years for which full statistical information is available. This means that the amount of the basic insurable earnings for 2010 is determined by applying the rate of increase of average insurable earnings between 2008 and 2009 to the amount of basic insurable earnings of 2009.

A1.6.2. Revision of benefit rates after award

The rates of basic pensions are reviewed at the beginning of each year in the same way as the basic insurable earnings are revised.

The rates of the supplementary pensions are reviewed in accordance to the increase in the cost of living. This revision is in line with the movement of the average level of the consumer price index over the two second half of the two years preceding the relevant year. This means that the annual rate of increase of the supplementary benefits as of 1 January 2010 is determined by a comparison of the average level of the consumer price index in the second half of 2009 and the second half of 2008.

Furthermore, the rates of pensions are increased every July in accordance to the increase in the cost of living, if the increase is higher than 1 per cent. This July increase is taken into account when determining the increase of the rates of pension at the beginning of the following year.

A1.6.3. Beneficiaries under repealed scheme

Beneficiaries in respect of pension payable before the introduction of the new scheme on 6 October, 1980 are receiving benefits corresponding to the basic benefits under the new scheme.

APPENDIX 2

Methodology of the actuarial valuation

A2.1. Introduction

This actuarial review makes use of the comprehensive methodology developed at the Financial and Actuarial Service of the ILO for reviewing the long-term actuarial and financial status of national pension schemes. The review has been undertaken by modifying the generic version of the ILO modelling tools in order to fit the situation of Cyprus and of the Scheme 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 Scheme are determined and used in combination with the demographic/economic framework.

A2.2. 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 Scheme, and the future level of flat-rate benefits.

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.

A2.2.1. General population

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

A2.2.2. Economic growth

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

A2.2.3. 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.

A2.2.4. 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.

A2.3. Modelling the financial development of the Scheme

The present actuarial review addresses all revenue and expenditure items of the Scheme. The most important components of this budget concern long-term pension benefits. This section focuses on them.

For short-term benefits, revenue and expenditures are projected using simple projection methods based on recent experience.

Projections for pensions are done collectively for all groups of insured, hence not separating workers of the private sector, workers of the public sector, self-employed persons and voluntarily insured persons.

A2.3.1. Purpose of pension projections

The purpose of the pension model is twofold. First, it is used to assess the financial viability of the long-term benefits branch. This refers to the measure of the long-term balance between revenue and expenditures of the Scheme. 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 Scheme, 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.

A2.3.2. 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 Scheme.

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.

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

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 Scheme's assets, the past performance of the fund, the Scheme's investment policy and assumptions on future economic growth and wage development.

A2.3.3. 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 Scheme'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 Scheme, but to check its financial viability. This entails evaluating the Scheme with regard to the relative balance between future revenue and expenditures. This type of evaluation is crucial, especially in the case of the Cyprus Scheme, which has not yet reached its mature stage.

APPENDIX 3

Financial results of the Social Insurance Scheme (2007 – 2009)

Appendix 3 presents the financial results of the three accounts (General, Supplementary and Unemployment) of the Scheme for the period 2007-2009. As mentioned in Section 5.2 of this report, the above accounts were replaced by four other new accounts, namely Unemployment, Other Benefits, Basic Pensions and Supplementary Pensions, effective July 2010.

The reserve of the General Benefit Account has increased by 41% from €833 million at the end of 2006 to €1,171 million at the end of 2009. The reserve ratio of the General Benefit Account, i.e., the size of the reserve divided by the total annual expenditure of the General Benefit Account, has increased slightly from 1.6 in 2006 to 1.8 in 2009.

The reserve of the Supplementary Benefit Account has increased by 22% from €4,492 million on 31 December 2006 to €5,475 million on 31 December 2009. The reserve ratio of the Supplementary Benefit Account has decreased slightly from 24 to 20 times the annual expenditure over the 3-year period 2006-2009.

The annual level of expenditure on Unemployment Benefits Account has experienced important variations during the period 2007-2009. In particular, in 2008 income was higher than expenditure, whereas in 2009 the opposite incurred, i.e., expenditure was higher than income. In 2007 income and expenditure were almost the same. Therefore, the overall financial status of the Unemployment Benefits Account has not changed over the above period. The account has accumulated a negative reserve of €15.8 million at the end of 2009. However, taking into account an amount of €40 million which the account was credited with as a result of an one-off adjustment regarding the establishment of the new Scheme's accounts in July 2010, the negative reserve of €15.8 million becomes a positive reserve of €24.2 million.

Table A3.1: General account

	2007	2008	2009
RESERVE at 1 January	**832 565 161** [(1)]	**915 946 352**	**1 042 081 014**
Revenue			
Contributions	584 798 320	656 576 695	725 113 570
Receipt from Consol. Fund	10 941 385	17 582 239	18 686 574
Interest earnings	32 482 782	58 849 267	24 849 441
Other income	7 648 204	3 201 557	5 670 270
Total income	**635 870 691**	**736 209 758**	**774 319 855**
Expenditure			
Benefits			
Pensions	506 173 320	555 948 174	588 724 101
Short-term benefits	32 814 130	39 504 262	41 714 526
Employment injury benefits	5 917 606	6 217 766	6 467 589
Administrative expenses	7 584 444	8 404 893	8 770 233
Total expenditure	**552 489 500**	**610 075 096**	**645 676 449**
RESERVE at 31 December	**915 946 352**	**1 042 081 014**	**1 170 724 420**

[(1)] The reserve as at 1 January, 2007 was revised downwards, approximately by €9 millions, representing an adjustment made to reflect a revaluation of assets in line with accounting standards, and which was noted in the 2008 financial results of the General Benefit Account.

Table A3.2: Supplementary account

	2007	2008	2009
RESERVE at 1 January	**4 491 972 683**	**4 818 391 046**	**5 201 799 930**
Revenue			
Contributions	369 346 306	414 680 017	457 966 464
Interest earnings	164 950 580	211 816 403	92 703 265
Other income	1 774 214	2 178 966	2 158 066
Total income	**536 071 100**	**628 675 386**	**552 827 795**
Expenditure			
Benefits			
Pensions	185 753 746	216 274 037	247 036 256
Short-term benefits	20 919 666	25 838 388	28 780 406
Employment injury benefits	2 979 326	3 154 077	3 388 100
Administrative expenses	-	-	-
Total expenditure	**209 652 737**	**245 266 502**	**279 204 762**
RESERVE at 31 December	**4 818 391 046**	**5 201 799 930**	**5 475 422 963**

Table A3.3: Unemployment account

	2007	2008	2009
RESERVE at 1 January	**-13 304 340**	**-13 886 178**	**-7 058 929**
Revenue			
Contributions	56 111 464	63 157 247	70 441 055
Interest earnings	- 602 531	- 760 805	- 75 057
Other income	194 394	234 824	242 218
Total income	**55 703 327**	**62 631 266**	**70 608 216**
Expenditure			
Benefits	54 812 340	54 291 437	77 869 786
Administrative expenses	1 472 825	1 512 580	1 522 287
Total expenditure	**56 285 165**	**55 804 017**	**79 392 073**
RESERVE at 31 December	**-13 886 178**	**-7 058 929**	**-15 842 786**

APPENDIX 4

Scheme-specific data and assumptions

A4.1. Introduction

In addition to the demographic and economic assumptions presented in the Section 3 of this report, the projection of the future financial development of the Scheme requires a data base specific to the Scheme (characteristics of insured persons and pensions-in-payment) and some particular actuarial assumptions. For the present valuation, projections have been performed separately for the basic and supplementary part of the Scheme. In addition, basic data and assumptions have been divided according to the sex of insured persons. The model provides separate projections for these four sub-groups.

A4.2. Data and assumptions on the insured population

A4.2.1. Number of insured persons

Data on the insured population were obtained from the Statistics and Information System (IS) department of the Social Insurance Services. The data base presents a population of 452,395 active insured persons having contributed in 2009. Out of these persons, 315,313 had annual earnings over €8,435 and have thus been credited with insurance points in the supplementary part of the Scheme. The distribution of these populations by age and sex is presented in Table A4.1.

In addition to the persons who have contributed in 2009, the Scheme covers another 350,475 persons who have contributed to the Scheme in the past, but not in 2009. Their characteristics are presented in Table A4.2. These persons still have the status of insured persons and may re-enter the Scheme at some point in the future. The present valuation assumes that a certain proportion of them will eventually claim a pension under the Scheme.

Table A4.1: Active insured persons (2009)

Age group	Basic insurance contributors		Supplementary insurance contributors	
	Males	Females	Males	Females
16-19	3670	4106	337	317
20-24	22338	21353	9474	7886
25-29	35600	34250	23736	21024
30-34	31700	32246	24430	20412
35-39	29423	31657	23574	19513
40-44	27093	27183	22690	17498
45-49	27620	24584	24227	17271
50-54	25606	18892	22726	14607
55-59	19617	12570	17629	10079
60-64	13854	6575	11969	4986
65+	1683	775	704	224
Total	238204	214191	181496	133817

Table A4.2: Inactive insured persons (2009)

Age group	Total inactive insured persons		Inactive insured persons who have insurance points in the supplementary part	
	Males	Females	Males	Females
16-19	2459	1785	52	8
20-24	11872	11796	896	550
25-29	19090	18832	4040	2703
30-34	19906	24704	6771	4644
35-39	25680	51323	8586	6031
40-44	16592	21385	7845	6207
45-49	13128	19744	6721	6310
50-54	13216	18148	5770	5812
55-59	13058	16462	4889	5470
60-64	10561	14971	4053	5588
65+	2590	3173	575	400
Total	148152	202323	50198	43723

Table A4.3: Average annual insurable earnings of active contributors (2009)

Age	Total average earnings		Average earnings in the supplementary part	
	Males	Females	Males	Females
17	4570	4498	3197	2410
22	9994	8592	5975	4663
27	14499	12947	9307	8736
32	18760	15258	13250	12215
37	21168	15816	15656	13305
42	22229	16159	16507	13129
47	23427	17013	17316	13319
52	23885	18858	17824	14458
57	24440	19663	18300	15118
62	20208	14501	14980	10685
Total	19303	14909	14729	11949

A4.2.2. Insurable earnings

Credits under the Scheme are computed in terms of points. For the year 2009, one insurance point is equivalent to annual earnings of €8,435. The first insurance point is credited to the basic part of the Scheme and annual earnings in excess of €8,435 and up to €48,048 are converted into insurance points in the supplementary part. Table A4.3 presents average annual insurable earnings of active contributors for specific ages.

In order to reflect the dispersion of earnings and, consequently, the distribution of earnings in the basic and supplementary part of the Scheme, a coefficient of variation has been applied to average earnings by age groups and for each year of projection. In addition, the average earnings of the insured population have been separated into three sub-groups of earnings: the lowest 30 per cent, a medium range of 40 per cent and the highest 30 per cent.

A4.2.3. Accrued insurance points

Accrued insurance points in the basic and the supplementary part of the Scheme, for the active and inactive insured populations, were obtained from the administrative file of the Statistics and Information Systems department of the Social Insurance Services. Average data are presented in Table A4.4 and A4.5 respectively.

Table A4.4: Past insurance points of active and inactive insured persons in the basic part of the Scheme as of 31 December 2009

Age	Basic part of the Scheme (number of past insurance points)			
	Active		Inactive	
	Males	Females	Males	Females
17	0.6	0.5	0.3	0.2
22	1.9	1.8	0.6	0.5
27	4.2	4.5	1.1	1.1
32	7.5	7.2	1.7	1.5
37	11.3	9.7	1.7	1.2
42	15.6	12.1	2.8	2.9
47	20.4	15.3	3.8	3.6
52	24.9	19.1	4.5	4.5
57	30.0	23.0	6.7	6.3
62	35.7	25.1	13.5	10.0

Table A4.5: Past insurance points of active and inactive insured persons in the supplementary part of the Scheme as of 31 December 2009

Age	Supplementary part of the Scheme (number of past insurance points)			
	Active		Inactive	
	Males	Females	Males	Females
17	0.5	0.4	0.2	0.2
22	1.5	1.0	0.6	0.4
27	4.0	3.7	1.1	0.9
32	9.3	8.9	1.6	1.6
37	16.5	14.2	2.2	2.2
42	23.4	16.9	3.1	2.6
47	31.6	20.9	4.8	3.2
52	40.7	28.3	8.1	4.5
57	47.4	34.6	22.8	9.2
62	47.1	29.9	49.2	23.4

A4.3. Demographic assumptions related to the Scheme

A4.3.1. Mortality of insured persons

Mortality rates for the insured population have been assumed equal to the mortality rates of the general population. Sample mortality rates are presented in Table A4.6 below. 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.

For invalidity pensioners, in the absence of statistics on the experience under the Cyprus Scheme, mortality rates have been set so as to reflect the level of the Swiss EVK Table. Mortality rates for males and females were fixed, at age 20, at 25 times the mortality rate applicable to active insured persons and this ratio was linearly reduced to one at age 60.

Table A4.6: Sample mortality rates applied to the insured population

Age	Males		Females	
	2010	2060	2010	2060
0	0.00846	0.00389	0.00771	0.00379
5	0.00022	0.00010	0.00026	0.00013
10	0.00012	0.00005	0.00009	0.00004
15	0.00023	0.00010	0.00016	0.00007
20	0.00039	0.00017	0.00024	0.00011
25	0.00040	0.00017	0.00031	0.00014
30	0.00041	0.00017	0.00038	0.00017
35	0.00051	0.00022	0.00049	0.00022
40	0.00076	0.00032	0.00067	0.00030
45	0.00141	0.00059	0.00106	0.00047
50	0.00250	0.00104	0.00164	0.00073
55	0.00478	0.00200	0.00258	0.00116
60	0.00812	0.00333	0.00395	0.00174
65	0.01395	0.00600	0.00708	0.00326
70	0.02439	0.01122	0.01323	0.00645
75	0.04091	0.02000	0.02435	0.01257
80	0.07031	0.03670	0.04550	0.02494
85	0.12047	0.06751	0.08164	0.04765
90	0.19271	0.11609	0.13507	0.08413
95	0.28276	0.18553	0.20567	0.13715
100	1.00000	1.00000	1.00000	1.00000

A4.3.2. Invalidity incidence

Rates of entry into invalidity have been calculated from the Scheme's experience over the years 2008, 2009 and 2010. Invalidity incidence rates are kept constant for the whole projection period. The rates are presented in Table A4.7.

Table A4.7: Rates of entry into invalidity

Age	Males	Females
22	0.00025	0.00003
27	0.00045	0.00011
32	0.00046	0.00012
37	0.00093	0.00042
42	0.00159	0.00098
47	0.00228	0.00156
52	0.00450	0.00360
57	0.00834	0.00677
62	0.01097	0.01010

A4.3.3. Retirement

The actuarial model used for the present actuarial review considers retirement as the residual element of a series of factors. The macro-economic frame described in the previous section provides the number of persons employed each year. For a given age (at which retirement is possible under the Scheme), the difference between the number of insured persons in two consecutive years is considered to be new retirees. Consistency checks are performed to reproduce the retirement pattern observed under the Scheme.

A4.3.4. Family structure

Information on the family structure of the insured persons is necessary for the projection of survivors' benefits. In the case of the Scheme, these data are also used to project the dependents' supplement paid in the basic part of the Scheme. 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. Due to the fact that widowers' pensions are paid only in exceptional cases, projections are made only for widows' pensions.

Data on the percentage of persons married were obtained from tables of the 2001 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 A4.8.

Table A4.8: 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	.01	17	1
22	.10	20	1
27	.46	24	2
32	.73	29	4
37	.85	34	7
42	.91	39	10
47	.93	44	13
52	.94	49	16
57	.94	54	17
62	.94	59	18
67	.92	64	19
72	.88	69	20
77	.81	74	20
82	.70	80	20
87	.55	85	20

A4.4. Other assumptions

A4.4.1. Special credits

The assumption of child credits granted to new female pensioners was derived from the Scheme's experience over the period 2006-2010 and by considering the development of the fertility rate as well as the females labour force participation rates. In this valuation, an additional 5 years of credit for old-age and widows' pensions and 4.5 years of credit for invalidity pensions, on average, were assumed for female participants.

An additional two years of credit was assumed for male participants to take into account the compulsory service for the National Guard.

Finally, an additional two and a half years of training/education credit was on average assumed for both male and female participants over the projection period 2010-2060, in line with the development of the education level.

A4.4.2. Indexing of Scheme's parameters and pensions-in-payment

It has been assumed that the basic insurable earnings and the minimum pension are indexed annually in line with the wage growth assumption. In addition, pensions-in-payment are assumed to be indexed in the future in line with the wage index in the basic insurance and with the price index in the supplementary insurance.

A4.4.3. Administrative expenses

Administrative expenses are totally affected to the Other Benefits account and are determined as the amount paid in 2009 indexed with the assumed nominal rate of increase of wages determined for the economic framework of the valuation.

A4.5. Pensions-in-payment, August 2009[1]

Old-age pensions (amounts in € where applicable)

Age group	Basic insurance				Supplementary insurance			
	Males		Females		Males		Females	
	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension
58-59	2	5,593	-	-	2	7,666	-	-
60-64	5,655	5,452	2,303	3,984	5,432	6,405	2,182	4,680
65-69	15,111	5,074	10,154	3,907	13,665	5,231	8,195	2,494
70-74	13,568	4,937	8,016	4,079	11,703	4,029	5,633	1,827
75-79	8,937	5,052	5,092	4,258	7,361	2,657	2,039	1,409
80-84	6,044	5,160	2,555	4,135	4,964	1,795	1,060	979
85-89	3,188	5,158	1,252	4,143	2,578	1,385	488	813
90-94	1,195	5,015	511	4,200	798	833	146	497
95+	329	4,843	157	4,187	1	169	2	134
Total	54,029	5,087	30,040	4,054	46,504	4,003	19,745	2,296

Invalidity pensions (amounts in € where applicable)

Age group	Basic insurance				Supplementary insurance			
	Males		Females		Males		Females	
	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension
20-24	6	3,947	1	4,807	5	628	1	500
25-29	39	4,017	6	3,485	36	1,490	6	1,612
30-34	95	4,297	47	4,292	86	1,867	46	1,366
35-39	176	4,592	97	4,370	166	2,356	92	1,368
40-44	302	4,806	175	4,055	290	2,632	167	1,545
45-49	501	4,700	346	3,788	485	2,899	319	1,759
50-54	891	4,583	531	3,459	852	3,482	458	2,142
55-59	1,338	4,416	758	3,319	1,221	3,751	655	2,569
60-62	1,370	4,296	712	3,252	1,216	3,847	596	2,295
Total	4,718	4,468	2,673	3,494	4,357	3,443	2,340	2,158

[1] In the tables of this section, the annual pensions are equal to 13 times the monthly pension.

Widows' pensions (amounts in € where applicable)

Age group	Basic insurance				Supplementary insurance			
	Males		Females		Males		Females	
	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension
19-24	-	-	5	5,267	-	-	4	2,161
25-29	-	-	27	5,010	-	-	25	2,578
30-34	-	-	75	5,574	-	-	73	2,719
35-39	-	-	155	5,674	-	-	141	2,805
40-44	-	-	225	5,805	-	-	211	3,053
45-49	1	3,422	433	5,377	1	665	413	3,691
50-54	1	4,807	788	4,728	1	593	724	3,301
55-59	1	4,807	1,243	4,455	1	2,601	1,073	2,999
60-64	3	3,807	2,015	4,357	2	419	1,619	2,797
65-69	3	4,131	2,890	4,404	1	709	2,140	2,133
70-74	5	3,784	4,371	4,460	4	1,732	3,095	1,453
75-79	6	3,898	5,329	4,505	4	1,341	3,615	1,076
80-84	10	4,566	5,213	4,557	5	998	3,112	846
85-89	9	4,617	3,419	4,583	5	541	1,512	693
90-94	4	4,775	1,454	4,577	1	5,597	431	609
95+	5	4,462	547	4,472	-	-	-	-
Total	48	4,329	28,189	4,537	25	1,240	18,188	1,642

Note: For the purpose of actuarial projections, male beneficiaries were classified as widows.

Orphans' pensions (amounts in € where applicable)

Age group	Basic insurance				Supplementary insurance			
	Males		Females		Males		Females	
	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension
0-4	117	1,508	82	1,485	6	1,497	4	2,189
5-9	118	1,355	126	1,377	5	1,037	5	568
10-14	141	1,386	99	1,346	9	1,123	3	871
15-19	94	1,581	99	1,501	12	3,169	11	1,467
20-24	33	1,643	23	1,718	4	2,256	2	583
25-29	7	2,976	12	3,038	3	1,459	5	557
30-34	15	2,991	15	3,098	6	530	10	646
35-39	22	3,205	29	3,205	11	267	13	327
40-44	39	3,205	66	3,205	11	364	20	264
45-49	44	3,168	84	3,205	12	248	29	268
50-54	46	3,205	98	3,189	15	173	17	293
55-59	28	3,205	84	3,205	8	256	15	215
60-64	18	3,197	58	3,205	2	88	3	185
65-69	9	3,205	16	3,205	-	-	1	20
70+	1	3,205	5	3,205	-	-	-	-
Total	732	1,997	896	2,353	104	900	138	484

Note: For the purpose of actuarial projections, orphans aged 20 and over were classified as widowers.

APPENDIX 5

Detailed financial projections

Table A5.1: Financial projections of the basic part of the Scheme (in million euros where applicable)

Year	Contribution rate	Total insurable earnings	Revenue			Expenditure	Reserve (end of year)	Reserve ratio	PAYG cost
			Contributions	Investment earnings	Total				
2010	10.0%	7,781	799	18	817	619	1,319	2.1	8.0%
2011	10.0%	8,166	839	28	866	663	1,522	2.3	8.1%
2012	10.0%	8,525	876	32	908	701	1,729	2.5	8.2%
2013	10.0%	8,888	913	36	949	749	1,929	2.6	8.4%
2014	11.3%	9,231	1,068	41	1,110	791	2,248	2.8	8.6%
2015	11.3%	9,566	1,107	59	1,167	836	2,579	3.1	8.7%
2016	11.3%	9,930	1,150	67	1,217	886	2,910	3.3	8.9%
2017	11.3%	10,315	1,194	76	1,270	938	3,242	3.5	9.1%
2018	11.3%	10,707	1,240	101	1,340	985	3,597	3.7	9.2%
2019	12.6%	11,112	1,431	113	1,544	1,031	4,110	4.0	9.3%
2020	12.6%	11,528	1,485	129	1,614	1,081	4,642	4.3	9.4%
2025	12.6%	13,943	1,799	252	2,051	1,416	7,676	5.4	10.2%
2030	12.6%	16,984	2,196	364	2,560	1,894	10,951	5.8	11.2%
2035	12.6%	20,966	2,719	478	3,197	2,559	14,249	5.6	12.2%
2040	12.6%	25,669	3,340	571	3,912	3,492	16,876	4.8	13.6%
2045	12.6%	31,031	4,057	604	4,661	4,779	17,582	3.7	15.4%
2050	12.6%	36,985	4,860	496	5,356	6,549	13,912	2.1	17.7%
2055	12.6%	44,035	5,811	174	5,985	8,604	3,857	0.4	19.5%
2060	12.6%	52,261	6,920	-435	6,489	10,997	-14,759	-1.3	21.0%

Table A5.2: Financial projections of the supplementary part of the Scheme (in million euros where applicable)

Year	Contribution rate	Total insurable earnings	Revenue			Expenditure	Reserve (end of year)	Reserve ratio	PAYG cost
			Contributions	Investment earnings	Total				
2010	5.6%	7,781	436	82	518	328	5,636	17.2	4.2%
2011	5.6%	8,166	457	114	571	370	5,837	15.8	4.5%
2012	5.6%	8,525	477	117	595	410	6,021	14.7	4.8%
2013	5.6%	8,888	498	121	619	450	6,190	13.7	5.1%
2014	5.6%	9,231	517	124	641	494	6,336	12.8	5.4%
2015	5.6%	9,566	536	158	694	540	6,491	12.0	5.6%
2016	5.6%	9,930	556	162	718	585	6,624	11.3	5.9%
2017	5.6%	10,315	578	165	743	635	6,731	10.6	6.2%
2018	5.6%	10,707	600	201	800	691	6,841	9.9	6.5%
2019	5.6%	11,112	622	203	826	750	6,916	9.2	6.7%
2020	5.6%	11,528	646	205	851	815	6,952	8.5	7.1%
2025	6.9%	13,943	962	239	1,201	1,191	6,946	5.8	8.5%
2030	8.2%	16,984	1,393	231	1,624	1,632	6,720	4.1	9.6%
2035	9.5%	20,966	1,992	226	2,218	2,169	6,603	3.0	10.3%
2040	10.8%	25,669	2,772	231	3,003	2,871	6,780	2.4	11.2%
2045	10.8%	31,031	3,351	225	3,577	3,844	6,410	1.7	12.4%
2050	10.8%	36,985	3,994	118	4,112	5,119	2,926	0.6	13.8%
2055	10.8%	44,035	4,756	-130	4,626	6,549	-4,746	-0.7	14.9%
2060	10.8%	52,261	5,644	-561	5,083	8,208	-17,881	-2.2	15.7%

APPENDIX 6

Peer review statement

A6.1. Introduction

The Social Security Department of the International Labour Organisation (ILO) has been appointed by the Cyprus government to perform a peer review of the valuation. This appendix describes the nature of the work done by the Actuary performing the peer review of the valuation and highlights key findings.

A6.2. Scope of the review

The objective of the peer review was to ensure that data used are sufficient and reliable and that the methodology and assumptions used in the projection of demographic and financial results are appropriate. The peer reviewer provided guidance and approval as necessary in the selection of major orientations to be followed in the modelling process.

A6.3. Scheme's provisions

Since no translation of the Greek legislation was available in any of the ILO official languages, the Actuary performing the review relied on the description of benefits provided by the Social Insurance Services of the Ministry of Labour and Social Insurance as a summary of the legislation prevailing at the valuation date. Communications between the Actuary performing the review and the Chief Actuarial Officer of the Ministry of Labour and Social Insurance of Cyprus, plus past experience of the peer reviewer in the valuation of the Social Insurance Scheme (the "Scheme") ensured that no material error could have been introduced in the description of the provisions of the Scheme for which demographic and financial projections were performed.

A6.4. Data

Scheme-specific data were extracted by the Social Insurance Services in the format historically used by the ILO in previous actuarial valuations of the Scheme. Data on insured persons, wages, pensions in payment and accrued past credits were extracted by the statistical department of the Social Insurance Services from the administrative database of the organisation. Checks were performed between data extracted from administrative files and financial statements to ensure consistency.

The determination of demographic and macroeconomic assumptions relied on demographic data mainly obtained from the Statistical Service of Cyprus and macroeconomic data mainly obtained from the Ministry of Finance of Cyprus. Consistency checks were performed to ensure reliability of data.

A6.5. Methods and assumptions

The valuation has been performed using a version of the ILO generic model previously adapted to the provisions of the Scheme. The previous version of the model has been improved, notably concerning the projection of mortality rates, measurement of eligibility conditions for certain benefits, the dependants' supplement factors and the calculation of child credits. The effect of the minimum pension of the Scheme is difficult to measure with the model as it is presently built, since it produces separate projections for the basic and supplementary parts of the Scheme. Future improvements of the model should be contemplated in order to project the effect of the minimum pension more precisely. It is however considered that this does not cause a significant impact on financial projections.

It is considered that assumptions used in the determination of the demographic and macroeconomic framework are appropriate to assess the long-term financial sustainability of the Scheme. Scheme-specific assumptions are also appropriate. They are based on recent experience of the Scheme as much as possible. They have been determined on the best-estimate approach, which implies that there is no margin for adverse deviations.

A6.6. Conclusion

According to the reviewer, financial projections of the Scheme rely on sufficient and reliable data and appropriate methods and assumptions. The actuarial report accurately projects the financial status of the Scheme.