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Republic of Cyprus

Report to the Government

Actuarial valuation of the Social Insurance Scheme as of 31 December 2000



International Labour Organization Financial, Actuarial and Statistical Services Branch Geneva, October 2003

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Executive summary

1. Financial status of the scheme

Unemployment benefits

The experience under the Unemployment Account has deteriorated since 1998. There is an urgent need to restore the financial status of that benefit branch.

The contribution rate should be increased from 1.0 per cent to 1.1 per cent of the earnings of the employed persons. In addition, it is recommended to transfer funds from the Supplementary Benefit Account to the Unemployment Benefit Account in order to cancel the accumulated deficit of the Unemployment Account. The amount of such transfer should be determined when the final figure as regards the accumulated deficit as of the end of 2001 will be known.

Short-term and employment injury benefits

Short-term and employment injury branches have not experienced major changes in their financial status since the last review. The contribution rates allocated to these benefits may be kept unchanged until the next actuarial review.

Long-term benefits

As regards long-term benefits, the scheme does not face cash flow problems in the short-term. According to the *status quo* projections, the period of equilibrium of the lower band (the period over which the reserve is at least equal to 1.0 time the annual expenditure) is 13 years, and the period of equilibrium of the upper band (the period over which the reserve is at least equal to 9.0 times the annual expenditure) is 21 years. However, 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 increase of the ratio of pensioners to contributors. For example, the pay-as-you-go (PAYG) cost of the lower band is projected to increase from 8.6 per cent in 2001 to 18.4 per cent in 2050. For the upper band, the PAYG cost is projected to increase from 2.3 per cent in 2001 to 12.9 per cent in 2050. The increasing cost pattern of long-term benefits will eventually require an increase of the contribution rates and/or benefit adjustments.

The present contribution rates may be kept unchanged at least until the next actuarial review, but measures should be envisaged now for a reduction of future costs, and precise rules should be enacted for the determination of future contribution rates (see point 3 below).

2. New contribution rate allocation amongst branches

It is recommended to replace the present financing and accounting format separated into a Basic Account, a Supplementary Account and an Unemployment Account, by an accounting base reflecting the four benefit branches (Unemployment benefits, Short-term benefits, Employment injury benefits and Long-term benefits). Specific contribution rates should be allocated to each benefit branch, instead of considering the contribution rate of the long-term branch as the residual contribution rate not required for the financing of the other benefits on a pay-as-you-go basis.

Following that recommendation, the total contribution rate of 16.60 per cent of insurable earnings would be allocated as follows between the different benefit branches, starting on 1 January 2003.

Propoh	Contribution rate*				
Dialicii	Lower band	Upper band	Total		
Unemployment benefits	-	-	1.10%		
Short-term benefits	0.75%	0.35%	1.10%		
Employment injury benefits	0.15%	0.05%	0.20%		
Long-term benefits	8.60%	5.60%	14.20%		
Total			16.60%		
*The cost of administration is included in the contribution rate of each branch.					

3. Rules for the determination of future contribution rates for long-term benefits

The financing of long-term benefits should take into account the nature of the benefit, the demographic environment and the maturing process of this type of benefit. It is thus recommended to adopt rules for the determination of future contribution rates that will take these factors into account. Since the lower band was introduced earlier that the upper band and the benefits are determined by different types of formulas in the two bands, the state of maturity will be reached at different times and the contribution rates should be determined under different rules.

The determination of contribution rates for long-term benefits should be made on the basis of the following rules:

- for the lower band, the reserve should be at least equal to 1.0 time the annual expenditure of the lower band,
- for the upper band, the reserve should be at least equal to 9.0 times the annual expenditure of the upper band. In the long run, when the upper band has reached maturity, the reserve ratio may decrease to 1.0 time the annual expenditure.

If an actuarial valuation reveals that the application of the current contribution rates causes the reserve to decrease below those levels during the 10-year period following the actuarial valuation, the contribution rate will be increased immediately at a level sufficient to meet the reserve-ratio criteria of the band for the next 10 years. Under those rules, the lower band would be in equilibrium until 2013 and the upper band until 2021. A more detailed description of the mechanism was provided in the last actuarial valuation.

4. Reform options

The report presents a series of modifications to the scheme in order to improve the financial situation of the long-term branch in the future.

As regards expenditure, the report recommends:

- an increase of the normal retirement age from 63 to 65;
- an indexing of lower band benefits according to price instead of wage increases.

As regards *revenue*, the report recommends a modification of the investment policy to increase the rate of return of the fund.

Increase of the normal retirement age

It is recommended to gradually increase the normal retirement age (NRA) starting in 2004 for both the lower and the upper bands. The NRA would increase by 3 months per year according to the following schedule.

Year	Normal retirement age
2004	63 years and 3 months
2005	63 years and 6 months
2006	63 years and 9 months
2007	64 years
2008	64 years and 3 months
2009	64 years and 6 months
2010	64 years and 9 months
2011 and thereafter	65 years

Revision of the indexing mechanism in the lower band

It is proposed to index pensions in payment in the lower band on the basis of a price index instead of a wage index, so that both the lower and the upper band pensions would now be indexed on the same basis. The present pension formula of the lower band would remain the same, but in the future pensions in payment and the amount of the minimum amount would be indexed based on the CPI.

Increase of the rate of return on investments

Considering the recent decrease of the interest rate granted by the government on its past borrowings, the Social Insurance Fund should consider the possibility to invest part of its reserves in non-government assets. Investment in equities should be considered. Such a change in the investment policy should be gradual.

Investment of social security fund in non-government assets would add some flexibility to the scheme in periods of economic difficulties, allowing the scheme to draw on these reserves, if necessary, without increasing the transfers from the government at a time when the government itself also faces cash flow problems.

Effect of the proposed reform measures

Under the reform options, it is assumed that the special government subsidy for the financing of the recent increases of the minimum pension is suppressed.

The *increase of the retirement age* would decrease the PAYG cost in 2050 from 18.4 per cent to 17.1 per cent in the lower band and from 12.9 per cent to 11.9 per cent in the upper band. It would extend the period of equilibrium from 2013 to 2015 in the lower band and from 2021 to 2024 in the upper band.

With the *indexing of pensions in the lower band according to CPI instead of wages*, the period of equilibrium would extend from 2013 to 2037 and the PAYG cost in 2050 would decrease from 18.4 per cent to 11.1 per cent.

The revised investment policy would extend the period of equilibrium for both the lower and the upper band.

Introduction

The present actuarial valuation of the Cyprus Social Insurance Scheme is carried out in compliance with section 71 of the Social Insurance Law. It reflects the financial situation of the scheme as of 31 December 2000.

The ILO appointed Mr. Pierre Plamondon, Senior Actuary at the Social Protection Sector of the ILO to undertake this assignment. Mr. Plamondon was in Cyprus in June 2001 to prepare the statistical plan for the valuation and to discuss the terms of reference with the authorities of the Department of Social Insurance. Mr. Michael Cichon and Mr. Plamondon were in Cyprus in March 2002 to meet with the Minister of Labour and Social Insurance, the Minister of Finance, the social partners and the authorities of the Social Insurance Department, to present the preliminary findings of the valuation and to discuss different avenues for reform.

The terms of reference of the project include:

- 1. review of the financial situation of the Social Insurance Scheme as of 31 December 2000;
- 2. long-term projection of revenue and expenditure of the scheme and recommendations on a financing strategy;
- 3. recommendations concerning the impact of the scheme on the government's budget;
- 4. recommendations concerning the impact of the child-care credit as regards specific groups of insured persons;
- 5. recommendations concerning the claim of some beneficiaries of the missing person's allowance;
- 6. an analysis of the administrative treatment of the invalidity pensions, a historical review of the invalidity costs of the scheme, and a comparison with the current practices in other countries;
- 7. the possibility to raise the basic pension, or more generally, recommendations on the restructuring of the scheme's benefit structure;
- 8. analysis of the experience in unemployment benefits and recommendations on appropriate corrective actions;
- 9. issues related to the participation of the self-employed persons.

Topics 1 to 5 are covered in the present report. Items 6 to 9 are treated in separate Actuarial Technical Notes.

The compilation of data for the valuation was done by Ms. Soula Chimonidou and her staff of the Social Insurance Department. The Director-General of the ILO wishes to express his sincere thanks to the Minister of Labour and Social Insurance and to the Director of the Social Insurance Department for their continuous collaboration and assistance on this project.

1. Review of the recent experience of the scheme

1.1. Amendments since the last review

The following amendments were adopted since the last actuarial review:

- in October 1998, the conditions of eligibility to unemployment and sickness benefits were modified so that benefits are paid for 6 months at each interruption of employment. Before that date, in order to re-qualify for benefit the person had to pay contributions on earnings not lower than 26 times the weekly basic insurable earnings since the last period of interruption of employment, and in addition a period of 26 weeks needed to have elapsed since the date of exhaustion;
- the minimum pension was increased by 10 per cent from 1 January 1999 and by another 10 per cent from 1 July 2000. Those increases are financed by the Consolidated Fund;
- on 6 October 2001, four modifications related to the equality of treatment of men and women came into force:
 - □ the possibility for self-employed women in agriculture to be insured;
 - □ the marriage grant based on the insurance record of any of the spouse, instead of the insurance record of the woman;
 - □ dependants supplements paid to female beneficiaries for short-term benefits, on behalf of dependant spouse and children;
 - dependants supplements paid to female beneficiaries for pensions, on behalf of children;
- it is now possible for a person receiving a widow's pension to claim, in addition, an old age pension based on her own contributions to the scheme;
- until 2000, the retirement age of miners could be reduced (from the normal retirement age of 65) by 1 month for each 5 months of work as a miner, down to a minimum retirement age of 60. Since 2001, the earlier retirement age now starts to be calculated from age 63 instead of 65 and the minimum retirement age is now 58 instead of 60.

1.2. Financing provisions

The Social insurance budget is separated into three accounts:

- the General Account records operations of the scheme concerning income and expenditures in the lower band;
- the Supplementary Account records operations of the scheme concerning income and expenditures in the upper band;
- the Unemployment Account records operations concerning unemployment benefits.

Contributions are first allocated to the Unemployment Account in the amount of 6 per cent of total contributions paid on behalf of employed persons. The remaining part of the contribution income for employed persons plus the totality of contributions of self-employed persons and voluntary insured persons are then allocated as follows:

- a share of 9.5 / 15.5 is allocated to the General Account; and
- a share of 6.0 / 15.5 is allocated to the Supplementary Account.

In addition to these contributions, the General and Supplementary Accounts are credited with investment income and charged with short-term and long-term benefits of the respective band. All grants and administrative expenses are debited from the General Account. The annual net balances of the Accounts serve to increase the reserves in the respective band.

Unemployment benefits are hence financed on a pay-as-you-go basis under a separate accounting. Shortterm and employment injury benefits are also, while implicitly, financed on a pay-as-you-go basis as the benefit expenditure is simply debited from the General and Supplementary Accounts. No specific contingency reserves are kept for these benefits.

Consequently, contributions used for the financing of long-term benefits is in the unusual position of being the residual of contributions not necessary for short-term and employment injury benefits. Such a procedure could be justified if the contribution rate calculated for short-term and employment injury benefits could be assumed to be stable over time. But this assumption cannot be made as demonstrated by past experience. It is thus recommended to allocate fixed contribution rates to each type of benefits, and to keep separate accounting of each branch.

1.3. Experience of the scheme since the last review

1.3.1. Evolution of the accounts

Annex 3 present the financial results of the three accounts (General, Supplementary and Unemployment) for the period 1998-2000. The reserve of the General Benefit Account has increased from £265 millions at the end of 1997 to £351 millions at the end of 2000, representing 1.8 times the annual expenditure of the General Account on 31 December 2000. The reserve of the Supplementary Benefit Account has increased from £1170 millions on 31 December 1997 to £1639 millions on 31 December 2000. The reserve ratio of the Supplementary Benefit Account has been stable around 32 times the annual expenditure over the last three years.

The Unemployment Benefit Account is not in a good financial position. Expenditures have been higher than revenues every year since 1998 and the account has accumulated a negative reserve of £9 100 521 at the end of 2000. There is an urgent need to restore the financing of that benefit branch. As a first measure, it is recommended to transfer funds from the Supplementary Benefit Account to the Unemployment Benefit Account in order to cancel the accumulated deficit of that branch. The amount of such transfer should be determined at the light of precise figures as regards the accumulated deficit as of the end of 2001. It will also be necessary to increase the contribution rate of that branch. The determination of the contribution rate is presented in Section 3.1.

1.3.2. Rate of return

The rate of return of the Social Insurance Fund has continued to be good over the last three years, in nominal and real terms (see Table 1). On 31 December 2000, 97 per cent of the reserves of the scheme were invested in Treasury bills, thus explaining the stability of the return. Interest rates were liberalised in Cyprus at the beginning of 2001. This should cause, in the medium-term, a general reduction of interest rates in Cyprus. A diversification of the investment portfolio of the scheme should thus be contemplated in order to maintain good real rates of return. The investment policy is discussed in Section 4.3.

Year	Average rate of return of the Social Insurance Fund	Inflation rate in Cyprus	Real rate of return
1998	6.9%	2.2%	4.7%
1999	6.8%	1.7%	5.1%
2000	6.5%	4.2%	2.3%

Table 1. Rate of return of the Social Insurance Fund

1.3.3. Number of pensioners

The number of pensions in payment has been relatively stable during the period 1997-1999. On the other hand, the year 2000 has experienced a more significant increase in all types of pensions. The more important increase concerns old-age pensions paid to female contributors with an increase of 1241 pensions, or 8.4 per cent, over the preceding year. This is for the most part the result of the new practice of paying a double pension to widows who are also entitled to their own old-age pension.

	Old-a	ge pension	Invalic	lity pension	Widow	's pension	Orphar	ns' pension
Year	Male	Female	Male	Female	Male	Female	Male	Female
1997	38710	13626	3129	1239	-	20426	344	426
1998	39713	14220	3249	1318	-	20558	373	462
1999	40917	14765	3208	1321	-	20595	488	604
2000	41643	16006	3524	1490	-	21396	490	630

Table 2.	Number o	f pensioners	by type	of pension a	and sex	(1997-2000)
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1.3.4. Average pensions

The increase of the minimum pension in the lower band (10 per cent in 1999 and 10 per cent in 2000) has caused an important increase of the average pension, because:

- it has caused ad hoc increases of the pension of those already at the minimum pension, and
- it has increased the number of persons eligible to the minimum pension.

Table 3 shows the important increase of the average pension expressed as a percentage of the average insurable earnings over the past three years.

Table 3. Average annual pensions in the lower band (1998-2000)

	Old-age pension In		Inva	llidity pension	Wid	ow's pension
Year	Amount	As % of insured earnings	Amount	As % of insured earnings	Amount	As % of insured earnings
1998 1999	1877 1988	29.5% 30.2%	1725 1844	27.1% 28.0%	1684 1810	26.5% 27.5%
2000	2142	31.4%	2004	29.4%	1908	28.0%

1.4. Cash transfers between the Consolidated Fund and the Social Insurance Scheme

Of special interest for the government is the evolution of the net cash flow between the Consolidated Fund and the Social Insurance Scheme. The scheme invests its reserve in Treasury bills. This represents a positive cash flow for the government, providing government an access to capital funds. However, government must pay interest on money borrowed from the scheme, which represents a negative cash flow. Other negative cash flows result from the fact that government must contribute to the scheme by way of its general subsidy and by way of its contribution as an employer.

The net cash flow has become negative in 1989 and the size of the negative cash flow is increasing each year as shown in Table 4.

	Positive cash flow	N	egative cash flows		Net cash flow
Year	New loans granted to the government by	General government	Contribution of the government as an	Interest payments on borrowed	to the government ²
1088	6/1 Q6Q	26 /17	16 17/	21 889	/80
1989	72 488	20 417	17 406	26 390	-313
1990	82 628	32 548	19 295	31 273	-488
1991	86 324	34 950	20 891	36 651	-6 168
1992	104 747	39 453	22 001	42 912	381
1993	123 247	49 634	26 163	52 337	-4 887
1994	141 643	56 204	31 918	61 239	-7 718
1995	146 213	59 108	30 683	70 736	-14 314
1996	155 067	63 826	34 340	80 934	-24 033
1997	160 816	67 393	38 970	91 899	-37 446
1998	177 134	71 758	39 620	102 190	-36 434
1999	178 908	74 392	41 727	113 189	-50 400
2000	181 275	80 176	44 990	118 153	-62 044
¹ Equal to total inc	come of the scheme minus scheme'	s expenditure.			
² Equal to income	from private sector contributors (plu	us some other income) minus	scheme's expenditure.		

Table 4.	Net cash transfers between the Consolidated Fund and the Social Insurance Fund
	(in thousand £)

2. The projected demographic and economic environments

The actuarial valuation first places the Social Insurance Scheme in the demographic and economic context of Cyprus. It starts with a projection of the general population of Cyprus and a projection of the economic variables that will influence the number of contributors and the number of persons who will receive benefits from the scheme, as well as the level of their wages, the rate of inflation and the interest rates. The methodology of the actuarial valuation is described in Annex 2.

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

2.1. The projected population of Cyprus

The general population of the country is projected starting with the data of the 2001 Census and using assumptions on the future development of fertility, mortality and migration.

The total fertility rate has decreased sharply over the last decade in Cyprus. It was 2.5 in 1992 and decreased continuously to levels around 1.9 in 2000. In the present valuation, we assume a total fertility rate of 1.9 in 2000, decreasing gradually to 1.8 in 2020 and remaining constant at 1.8 for the rest of the projection period.

As regards mortality, the life expectancy at birth observed in 1998-1999 was 75.3 for males and 80.4 for females. For the present valuation, mortality rates are determined with the methodology used for the development of the United Nations life tables. For the determination of future mortality rates, the currently observed life expectancies are gradually increased to 78.3 for males and 83.4 for females in 2050. Sample mortality rates can be found in Annex 4.

Migration is a very volatile factor for demographic projections and the past levels observed in Cyprus are not significant and do not show a systematic pattern that can be projected for 50 years. This factor is thus ignored for the long-term projection of the Cyprus population.

According to the above assumptions, the population of Cyprus is projected to increase from its present level of 703 351 persons in 2001 to 779 355 in 2030 and then decreasing to 757 396 in 2050. Compared to the previous valuation, the lower ultimate population level is explained by lower projected fertility rates.

The increase in the dependency ratio is illustrated by Figure 1. The ratio of the population aged 65 and over to the population aged 15-64 increases continuously from 17.5 per cent in 2001 to 39.4 per cent in 2050. The increase in the dependency ratio of the general population will affect the demographic ratio of the Social Insurance Scheme, as will be seen in Chapter 3.

Number of persons by age groups					
		Age group			
Year	0-14	15-64	65 and over	Total	
2001	150 731	470 373	82 247	703 351	
2010	140 942	500 683	99 581	741 206	
2020	142 670	500 463	127 205	770 338	
2030	131 690	489 770	157 895	779 355	
2040	124 712	479 909	169 422	774 043	
2050	121 224	456 247	179 925	757 396	
Percentage distributi	on by age				
	<u>0-14</u>	<u>15-64</u>	65 and over	65 and over	
Year	Total	Total	Total	15-64	
2001	21.4%	66.9%	11.7%	17.5%	
2010	19.0%	67.5%	13.4%	19.9%	
2020	18.5%	65.0%	16.5%	25.4%	
2030	16.9%	62.8%	20.3%	32.2%	
2040	16.1%	62.0%	21.9%	35.3%	
2050	16.0%	60.2%	23.8%	39.4%	

Table 5. Projection of the population of Cyprus (2001-2050)

Figure 1. Projection of the population of Cyprus (2001-2050)



2.2. Economic and labour market projections

The general economic development and the labour market directly influence the financial development of the Social Insurance 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.

2.2.1. Economic growth

During the 1980s, the Cyprus economy grew by an average annual (real) rate of 6.2 per cent which has slowed down over the 1990s. The real GDP grew at a rate of 5.0 per cent in 1998, 4.5 per cent in 1999 and 5.1 per cent in 2000.

Under the given population projection and the assumptions on labour market participation, Cyprus will enter a period of growing labour supply shortages. Further economic growth will then only be possible if fuelled out of labour productivity growth. Productivity and GDP growth rates should therefore gradually converge. We expect slowly declining growth rates from 5.0 per cent in 2001 to 3.2 per cent in 2020. The real GDP growth rate is assumed to decrease gradually to 3.0 per cent in 2050. Thus, until about 2020 the driving forces behind growth will be additional employment and an increase of labour productivity. After 2020, GDP growth and productivity growth converge, implying no further substantial increases in employment.

Year	Real GDP growth	Rate of growth of productivity per worker	% increase of the number of wo rkers
2001	5.0%	3.3%	1.7%
2002	4.9%	3.7%	1.2%
2003	4.8%	3.7%	1.1%
2004	4.8%	3.7%	1.1%
2005	4.7%	3.7%	1.0%
2010	4.0%	3.1%	0.9%
2020	3.2%	3.0%	0.2%
2030	3.0%	3.0%	0.0%
2040	3.0%	3.0%	0.0%
2050	3.0%	3.0%	0.0%

 Table 6. Annual growth of GDP, productivity and employment

2.2.2. Labour force, employment and unemployment

Labour supply is in the long run basically determined by the development of the population and its structure and by changes in labour market behaviour of private households. From 1980 to 1998 the total labour force of Cyprus grew by 90 000 persons (plus 41 per cent) whereas the population aged 15 and over grew by almost 125 000 (plus 32 per cent). As a result, the total participation rate (defined as the ratio of the number of persons in the labour force to the total population aged 15 and over) grew from 58.5 per cent in 1980 to 61.5 per cent in 1998. But the participation rate of males decreased by 2 per cent points and the female rate increased by 7.5 per cent points. The total participation rate peaked in 1989. Since then, it stabilised around values slightly over 60 per cent. This development is the combined result of the strong increase of the female participation rate which was – since the beginning of the 1990s – accompanied by a gradual decline of the male participation rate.

For the future, for the male population, we assume slightly increasing participation rates for the age groups below 25 and over 45 so that participation rates for males between 15 and 64 reach almost 100 per cent. For the female population, female age-specific participation rates grow significantly. 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 reflects the general ageing process of the male Cypriot population. For females, the decreasing average participation rate tendency is reversed by the needs of the continuously growing economy. While, in reality, one might assume that the reversal of participation rates would also take place among the male active population, it was here deliberately assumed that it only happens within the female population, also in order to emphasize that there is ample room to increase female participation.



Figure 2. Labour force participation rates, 2000 to 2050

Table 7. Labour market balance

	2001	2010	2020	2030	2040	2050
Population	703 351	741 206	770 338	779 355	774 043	757 396
Male	345 265	363 677	377 695	381 714	379 109	372 188
Female	358 086	377 529	392 643	397 641	394 935	385 208
Population 15 and over	552 620	600 265	627 668	647 665	649 331	636 172
Male	267 991	291 603	304 396	313 964	314 952	309 826
Female	284 629	308 662	323 272	333 701	334 379	326 346
Labour force	326 234	354 352	371 187	376 488	375 884	374 616
Male	201 571	218 514	224 461	222 648	221 400	213 660
Female	124 664	135 838	146 727	153 840	154 484	160 956
Labour force participation rate	59.0%	59.0%	59.1%	58.1%	57.9%	58.9%
Male	75.2%	74.9%	73.7%	70.9%	70.3%	69.0%
Female	43.8%	44.0%	45.4%	46.1%	46.2%	49.3%
Employed persons	314 243	343 636	360 398	364 133	364 133	364 133
Male	195 653	213 481	222 735	214 792	208 634	203 707
Female	118 590	130 155	137 663	149 341	155 499	160 426
Unemployment rate	3.7%	3.0%	2.9%	3.3%	3.1%	2.8%
Active insured persons	309 292	336 097	349 671	354 327	355 964	353 568
As % of the employed population	98%	98%	97%	97%	98%	97%

2.2.3. Inflation, wages, and interest rates

Since the beginning of the 1980s, inflation can be considered under control in Cyprus. However, the year 2000 experienced an inflation rate higher than what was observed over the previous five years. The increase of the consumer price index has been 4.2 per cent in 2000, as compared to 2.2 per cent in 1998 and 1.7 per cent in 1999. This can be explained by the rapid increase in oil prices, high agricultural

product prices caused by the drought conditions, and exchange rate movements. The strength of domestic demand and the tighter labour market conditions also contributed to enhancing inflationary pressures in 2000. These factors are expected to subside and the inflation rate is anticipated to revert back to levels around 2.0 per cent in the future. We assume that the inflation rate will stay around 2.0 per cent per year from year 2004.

Year	Inflation rate	Annual increase of the nominal average wage	Rate of return of the Social Insurance Fund
2001	3.5%	6.8%	5.0%
2002	3.0%	6.7%	5.0%
2003	2.5%	6.2%	5.0%
2004	2.0%	5.7%	5.0%
2005	2.0%	5.7%	5.0%
2006	2.0%	5.6%	4.9%
2007	2.0%	5.4%	4.8%
2008	2.0%	5.3%	4.7%
2009	2.0%	5.1%	4.6%
2010	2.0%	5.1%	4.5%
2015+	2.0%	5.0%	4.5%
2013+	2.078	5.078	4.570

Table 8. Inflation rate, increase of nominal average wage and interest rate for selected years

The real increase of the average wage is assumed to follow, in the future, the rate of growth of the productivity per worker.

The interest rate of the Social Insurance Fund on fund borrowed by the government is calculated presently as the Lombard rate less 0.5 per cent. In 2002, the rate of return of the Social Insurance Fund is 5.0 per cent. It is projected that the Lombard rate will decrease slightly in the future, leading to an interest rate credited to the Social Insurance Fund equal to 4.5 per cent from 2010 onwards.

3. Actuarial projections under status quo conditions

This valuation deals with the ability of the Social Insurance 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 SIS indefinitely, thus paying contributions and accruing benefit entitlements, and later receive benefits in accordance with the legal provisions of the schemes. Future contributions and benefits are calculated according to the demographic and economic assumptions as presented in the Chapter 2 and on the basis of the database specific to the SIS presented in Annex 4.

The main purpose of the valuation is to find out whether the financing of the SIS 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 SIS, unemployment benefits, short-term benefits, employment injury benefits and long-term benefits. 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 upper band. 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 analyse over the next 50 years.

Considering the present financing arrangement of the scheme, this chapter first presents the cost of the unemployment, short-term and employment injury benefits, in order to establish the residual contribution rate available for long-term benefits. For long-term benefits, the projections of revenue and expenditure is presented for the lower and the upper band separately, for the purpose of showing the period over which these respective contribution rates are sufficient to support benefits. As mentioned in the previous actuarial review, there is a need to isolate the financing of the long-term branch from the experience under the short-term benefits. For the analysis, benefits have been grouped as follows:

- unemployment benefits;
- *short-term benefits:* Sickness benefit, Maternity allowance, Maternity grant, Marriage grant, Funeral grant;
- *employment injury benefits:* Injury benefit, Disablement pension, Disablement grant, Death benefit:
- long-term benefits: Old age pension, Invalidity pension, Widow's pension, Orphan's benefit.

3.1. Unemployment benefits

Unemployment benefits have experienced important variations in recent years. Total annual expenditure is shown in Table 9.

Year	Annual expenditure	Expenditure as % of insurable earnings of employed persons
1998	18 971 764	1.2%
1999	22 851 680	1.3%
2000	23 604 708	1.3%
2001	19 791 152	1.0%

Table 9. Expenditure on unemployment benefits for the period 1998-2001

As a result of the unfavourable experience of the years 1998 to 2000, the Unemployment Account has accumulated a negative reserve of £9 100 521 on 31 December 2000. However, the situation has improved in 2001 and the present financing arrangement by which 6.0 per cent of total contributions of employed persons are allocated to the Unemployment Fund is just sufficient in 2001 to cover the annual expenditure on benefits.

Given the unfavourable experience of the period 1998-2000 and the risk of future fluctuations in the expenditure on unemployment benefits, it is recommended to increase the contribution rate from 1.0 per cent to 1.1 per cent of the insurable earnings of employed persons (or 6.6 per cent of the contributions of employed persons instead of 6.0 per cent). In addition, an amount (to be determined after the final accounts for 2001 are published) should be transferred from the Supplementary Account to the Unemployment Account to cover the negative accumulated reserve (considering that funds were transferred in the past from the Unemployment Fund to the other two Funds).

3.2. Short-term benefits

The experience on short-term benefits for the years 1999 and 2000 appears in Table 10.

Table 10. Expenditure on short-term benefits for the period 1999-2000

Year 1999				
		Annual expenditure	Expenditure as % of to	otal insurable earnings
	Lower band	Upper band	Lower band	Upper band
Sickness benefit	5 916 672	3 642 658	0.31%	0.19%
Maternity allowance	2 857 261	2 362 673	0.15%	0.12%
Other benefits	3 553 700	-	0.19%	-
Total	12 327 633	6 005 331	0.65%	0.31%

Year 2000

		Annual expenditure	Expenditure as % of tota	al insurable earnings
	Lower band	Upper band	Lower band	Upper band
Sickness benefit Maternity allowance Other benefits	8 280 655 3 846 768 3 937 812	5 087 460 3 018 612	0.41% 0.19% 0.20%	0.25% 0.15%
Total	16 065 235	8 106 072	0.80%	0.40%

The experience of these two years shows important differences in expenditure as a percentage of insurable earnings. Preliminary data for the year 2001, however, reveal that the cost of short-term benefits has reverted back to the levels observed before 2000. For example, total expenditure on sickness benefits (lower and upper bands combined) were £11 422 043 in 2001, or 0.53 per cent of total insurable earnings, which compares to the figures for 1999 (0.31 per cent + 0.19 per cent).

The total cost of short-term benefits (including Sickness benefit, Maternity allowance, Maternity grant, Marriage grant, Funeral grant and Missing person's allowance) is thus estimated at 0.75 per cent of insurable earnings in the lower band and 0.35 per cent of insurable earnings in the upper band.

3.3. Employment injury benefits

Employment injury benefits include short-term and long-term components. The projected cost of each component appears in Table 11.

	Cost as a percentage of insurable earnings of employed persons				
Type of benefit	Lower band	Upper band			
Injury benefit	0.03%	0.02%			
Disablement pension	0.07%	0.02%			
Death benefit	0.05%	0.01%			
Disablement grant	-	-			
Total	0.15%	0.05%			

Table 11. Cost of employment injury benefits

The total cost of employment injury benefits is estimated at 0.15 per cent of insurable earnings in the lower band and 0.05 per cent of insurable earnings in the upper band.

3.4. Long-term benefits

3.4.1. Contribution rate available for the financing of long-term benefits

Under the present financial arrangement, the contribution rate available for pensions is the residual of the income that is not required for the financing of unemployment, short-term and employment injury benefits and administration expenses, on a pay-as-you-go basis.

Table 12 presents the calculation of the residual contribution rate for pensions. Since these contribution rates are rather stable during the years 1999 and 2000 around 8.6 per cent for the lower band and 5.6 per cent for the upper band, these contribution rates will be used for the financial projections of the following sections.

Table 12. Calculation of the contribution rate available for financing long-term benefits

	Ge	General Account Supplementary Account		
	1999	2000	1999	2000
Revenue available for financing expenditure on a PAYG basis (total revenue, excluding interest revenue)	181 398 549	196 666 687	112 917 828	121 701 886
Expenditure other than pensions Benefits Administration	16 667 320 2 518 205	20 865 146 2 703 456	6 990 365	9 197 187 -
Revenue available for financing long-term benefits	162 213 024	173 098 085	105 927 463	112 504 699
Contribution rate available for long-term benefits*	8.56%	8.63%	5.59%	5.61%
* On the basis of total insurable earnings of £1 895 million	n in 1999 and £	2 005 million in 2	000.	

3.4.2. Lower band projections

Table 13 shows that the ratio of pensioners to contributors in the lower band is projected to increase from 28 per cent in 2001 to 71 per cent in 2050. The number of male old age pensioners is projected to grow from 42 108 in 2001 to 75 845 in 2050, while the number of female pensioners in 2050 will be more than 5 times the number observed in 2001. This is the result of the increased participation of women in the labour force that is projected under the macro-economic frame of the valuation.

As regards replacement rates in the lower band, the ratio of the average pension to the average earnings of the active contributors is presently 29 per cent for males and 33 per cent for females (see Table 14). It must be mentioned that, after the modifications of 1999 and 2000 that raised the level of the minimum pension, the minimum pension is now equal to 85 per cent of the full basic pension. Hence the range between the minimum and the maximum pension has narrowed since the last review. In addition, these modifications have caused an increase of the replacement rate of female pensioners who generally have earnings lower than those of male insured persons.

The financial ratios shown in Table 14 decrease over time. The pension is calculated as a percentage of the average career earnings since a fixed date (5 October 1964). So the average earnings of an individual will decrease as the number of years considered in the average will continue to increase, until a maximum of 47 years (retirement age of 63 minus the minimum age at entry into the acheme of 16) will be reached. However two factors limit the reduction of the financial ratios of female contributors over time: a larger proportion of them receive the minimum pension because of lower average earnings and most of them are eligible for the child-care credit.

					Pensioners				Ratio of
		Old	age	Inva	lidity				pensioners
/ear	Contributors	Males	Females	Males	Females	Widows	Orphans	Total	to contributors
2001	309 292	42 108	16 632	3 769	1 612	22 525	467	87 113	28%
2002	312 667	42 420	17 468	4 138	1 792	23 418	515	89 752	29%
2003	315 504	42 556	18 318	4 503	1 977	24 276	566	92 196	29%
2004	318 394	42 703	19 172	4 855	2 161	25 107	619	94 617	30%
2005	321 019	42 424	19 799	5 196	2 346	25 919	673	96 357	30%
2006	324 075	42 311	20 553	5 526	2 533	26 710	724	98 358	30%
2007	327 460	42 657	21 619	5 845	2 722	27 509	769	101 122	31%
2008	330 535	43 224	22 826	6 154	2 913	28 302	807	104 227	32%
2009	333 577	44 008	24 165	6 453	3 105	29 103	844	107 678	32%
2010	336 097	44 985	25 717	6 740	3 299	29 915	871	111 527	33%
2011	337 936	46 061	27 381	7 016	3 494	30 743	890	115 586	34%
2012	340 154	46 946	29 017	7 281	3 690	31 591	902	119 428	35%
2013	342 066	47 681	30 709	7 538	3 885	32 468	910	123 191	36%
2014	343 640	48 637	32 616	7 787	4 081	33 364	905	127 390	37%
2015	345 277	49 733	34 636	8 026	4 275	34 291	899	131 860	38%
2020	349 671	56 213	45 826	9 053	5 216	39 209	816	156 333	45%
2025	350 462	64 379	60 564	9 735	6 033	44 413	710	185 835	53%
2030	354 327	68 684	73 679	10 098	6 697	49 673	692	209 522	59%
2035	357 027	69 308	82 004	10 312	7 274	54 358	672	223 929	63%
2040	355 964	69 624	87 521	10 515	7 788	57 658	657	233 762	66%
2045	354 531	72 129	92 020	10 697	8 231	59 113	633	242 822	68%
2050	353 568	75 845	96 356	10 817	8 598	58 928	595	251 138	71%

Table 13. Demographic projections for long-term benefits – Lower band

Note:

 For the purpose of the actuarial projections, the orphans aged 21 and over have been considered as widows' pensions recipients
 Concerning invalidity pensioners, the projection model assumes that the invalidity pension is paid for life (not converted to an old age pension at age 63) This does not affect the total number of pensioners.

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	Old	age	Inva	alidity	Widows
Year	Males	Females	Males	Females	
2001	29%	33%	27%	29%	25%
2002	29%	32%	27%	29%	25%
2003	29%	32%	27%	29%	25%
2004	29%	32%	27%	29%	25%
2005	29%	32%	27%	29%	26%
2010	28%	31%	28%	30%	26%
2015	27%	31%	27%	30%	26%
2020	26%	30%	27%	30%	25%
2025	26%	30%	28%	30%	25%
2030	26%	30%	28%	31%	24%
2035	26%	30%	28%	31%	24%
2040	26%	30%	28%	31%	24%
2045	26%	30%	28%	32%	24%
2050	26%	30%	28%	32%	24%

Table 14. Financial ratios – Lower band

The projection of the revenue and expenditure components and the evolution of the reserve of the lower band are presented in Table 15. In the present valuation, the long-term pay-as-you-go cost of the lower band is projected to reach 18.4 per cent in 2050 as compared to 16.5 per cent in the last review. The variation is due to (1) the increases of the minimum pension in 1999 and 2000, (2) the assumption of higher long-term participation rates of women in the present valuation and consequently the increased proportion of pensioners receiving the minimum pension in the long-term, and (3) corrections to the computer program of the projection model.¹

The fifth column of Table 15 represents the amount of the transfer coming from the Consolidated Fund to finance the increases of the minimum pension introduced in 1999 and 2000.

According to those financial projections, if the present contribution rate of 8.6 per cent allocated to the lower band is not modified, the reserve will represent at least 1.0 time the annual expenditure until year 2013 (the previous actuarial reports were defining the period of equilibrium of the lower band as the number of years during which the ratio of the reserve to the annual expenditure is at least equal to 1.0 and was projecting a period of equilibrium until 2018). The period of equilibrium of the present valuation is shorter than the one of the last report. The reasons for this decrease of the period of equilibrium are:

- the sharp increase of the number of old age pensioners over the last three years. The number of old age pensioners has increased more than anticipated mainly because of the new practice of the Social Insurance Department to pay double pensions to widows who are also entitled to their own old age pensions. A certain number of latent female contributors who were not expected to claim an old age pension because of limited career earnings are now entitled to a minimum old age pension in addition to their widow's pension;
- 2. the decrease of the interest rate credited to the scheme's assets.

On the other hand, the higher than expected growth of the number of contributors and their earnings between 2000 and 2001 helped to entend the period of equilibrium by approximately two years.

¹ The computer program used for the last valuation was erroneously omitting the dependants' supplement for persons receiving the minimum pension.

Figure 3. Projection of the reserve ratio in the lower band – Status quo



The general average premium of the lower band (the level contribution rate sufficient to finance the scheme's expenditure over the next 50 years) is 13.8 per cent. When compared to the present contribution rate allocated to the lower band (8.6 per cent), it shows that the contribution rate would have to be increase at some point in the future to support the scheme, under *status quo* conditions.

		Total Revenue								
Cor	ntribution	insurable	Contri-	Transfer	Investment		Expenditure	Reserve	Reserve	PAYG
Year	rate	earnings	butions	Cons Fund*	earnings	Total	•	(end of year)	ratio	cos
2004	0.60/	2 220	101	6	10	014	102	074	1.0	9.60/
2001	0.0%	2 220	191	0	10	214	192	374	1.9	0.0%
2002	0.0%	2 390	200	7	19	231	208	397	1.9	0.1%
2003	8.6%	2570	221	/	20	248	225	420	1.9	8.8%
2004	8.6%	2741	236	8	21	264	243	441	1.8	8.9%
2005	8.6%	2 921	251	8	- 22	281	260	463	1.8	8.9%
2006	8.6%	3 115	268	9	22	299	278	484	1.7	8.9%
2007	8.6%	3 318	285	10	23	318	299	502	1.7	9.0%
2008	8.6%	3 528	303	11	23	337	323	517	1.6	9.1%
2009	8.6%	3 744	322	12	23	357	347	527	1.5	9.3%
2010	8.6%	3 966	341	13	23	377	376	528	1.4	9.5%
2011	8.6%	4 197	361	14	23	397	407	518	1.3	9.7%
2012	8.6%	4 443	382	15	22	419	438	499	1.1	9.9%
2013	8.6%	4 698	404	16	21	441	471	470	1.0	10.0%
2014	8.6%	4 963	427	18	19	464	508	426	0.8	10.2%
2015	8.6%	5 239	451	19	17	487	548	364	0.7	10.5%
2020	8.6%	6 782	583	29	-10	602	805	-326	-0.4	11.9%
2025	8.6%	8 659	745	44	-84	705	1 185	-2 125	-1.8	13.7%
2030	8.6%	11 081	953	63	-234	782	1 680	-5 727	-3.4	15.2%
2035	8.6%	14 207	1 222	86	-491	817	2 282	-11 841	-5.2	16.1%
2040	8.6%	18 069	1 554	115	-897	771	3 034	-21 473	-7.1	16.8%
2045	8.6%	22 912	1 970	152	-1 516	606	4 025	-36 102	-9.0	17.6%
2050	8.6%	29 046	2 498	201	-2 445	254	5 354	-58 015	-10.8	18.4%

 Table 15.
 Financial projections (status quo) – Lower band

* For financing the increase of the minimum pension of 10% in 1999 and 10% in 2000.

3.4.3. Upper band projections

The ratio of pensioners to contributors in 2001 is presently 22 per cent in the upper band as compared to 28 per cent in the lower band. The supplementary scheme has not reached the maturity state because this part of the system was introduced only in 1980. However, the demographic ratios in the long run are similar in both the lower and the upper bands (see Table 17).

Unlike the situation in the lower band, the financial ratios (replacement rates) in the upper band are increasing with time as a result of the design of the pension formula which calls for a pension amount proportional to the period contributed. As shown in Table 16, a state of maturity (or stability of the financial ratios) is reached around 2020, after 40 years of existence of the upper band.

	Old	age	Inva	alidity	Widows
Year	Males	Females	Males	Females	
2001	13%	13%	18%	20%	8%
2002	14%	13%	19%	22%	8%
2003	15%	13%	20%	23%	8%
2004	16%	14%	21%	23%	9%
2005	16%	14%	21%	24%	9%
2010	21%	19%	23%	27%	10%
2015	24%	24%	24%	28%	11%
2020	27%	27%	25%	29%	13%
2025	28%	29%	26%	30%	14%
2030	29%	30%	26%	31%	15%
2035	29%	31%	26%	31%	15%
2040	29%	31%	27%	32%	16%
2045	29%	32%	27%	32%	16%
2050	29%	32%	27%	32%	16%

Table 16. Financial ratios – Upper band

Table 17. Demographic projections for long-term benefits – Upper band

			Pensioner					Ratio of	
		Old	age	Inva	lidity				pensioners
Year	Contributors	Males	Females	Males	Females	Widows	Orphans	Total	to contributors
2001	232 704	31 004	7 520	2 757	831	8 922	70	51 103	22%
2002	235 288	32 178	8 613	3 089	964	10 068	106	55 017	23%
2003	237 389	33 115	9 633	3 408	1 097	11 226	143	58 623	25%
2004	239 568	33 970	10 637	3 715	1 228	12 386	183	62 119	26%
2005	241 610	34 326	11 423	4 013	1 361	13 545	221	64 889	27%
2006	244 007	34 819	12 220	4 309	1 496	14 700	259	67 804	28%
2007	246 696	35 715	13 141	4 604	1 634	15 844	296	71 234	29%
2008	249 218	36 710	14 067	4 896	1 774	16 971	329	74 746	30%
2009	251 691	37 797	14 976	5 185	1 915	18 078	353	78 303	31%
2010	253 770	39 014	15 961	5 471	2 057	19 168	371	82 041	32%
2011	255 324	40 222	17 020	5 750	2 200	20 236	387	85 814	34%
2012	257 247	41 391	18 086	6 022	2 343	21 283	403	89 528	35%
2013	258 878	42 577	19 185	6 286	2 486	22 311	417	93 261	36%
2014	260 283	43 853	20 392	6 540	2 628	23 321	428	97 162	37%
2015	261 763	45 176	21 686	6 787	2 770	24 322	438	101 179	39%
2020	265 989	51 989	28 470	7 857	3 454	29 084	464	121 318	46%
2025	266 218	59 975	36 600	8 591	4 053	33 613	461	143 293	54%
2030	267 670	65 394	43 350	9 000	4 541	37 916	452	160 654	60%
2035	269 319	67 346	48 546	9 229	4 949	41 732	453	172 254	64%
2040	268 576	68 492	52 661	9 392	5 307	44 617	451	180 919	67%
2045	267 092	71 064	56 341	9 522	5 611	46 248	433	189 219	71%
2050	265 368	74 420	60 131	9 603	5 858	46 612	402	197 027	74%

Note:

For the purpose of the actuarial projections, the orphans aged 21 and over have been considered as widows' pensions recipients.
 Concerning invalidity pensioners, the projection model assumes that the invalidity pension is paid for life (not converted to an old age pension at age 63). This does not affect the total number of pensioners.

The projection of the revenue and expenditure components and the evolution of the reserve of the upper band are presented in Table 18. The pay-as-you-go cost of the upper band increases from 2.3 per cent in 2001 to 12.9 per cent in 2050.

With the present contribution rate of 5.6 per cent allocated to the upper band, the reserve ratio will continue to be higher than 9.0 until 2021 (period of equilibrium as defined in the previous valuation). There is no change to the period of equilibrium of the upper band as compared to the previous valuation. The last year of the period of equilibrium was also 2021 in the last valuation. The stability of the period of equilibrium is however the net result of:

- 1. the lower contribution rate available for the upper band, being now 5.6 per cent compared of 5.7 per cent in the last valuation (for a 1-year reduction);
- 2. the higher than expected growth of the number of contributors and their earnings experienced between 2000 and 2001 (for a 2-year increase);
- 3. the lower rate of return on investments assumed for the future (for a 2-year reduction);
- 4. new growth and labour market assumptions (for a 1-year increase).

It must be noted that the upper band has not been affected, like the lower band, by costly changes in the legal environment or administrative practice, such as the payment of double pensions and the increase of the minimum pension that contributed to a decrease of the period of equilibrium in the lower band.

The general average premium of the upper band (the level contribution rate sufficient to finance the scheme's expenditure over the next 50 years) is 8.7 per cent.





Table 18. Financial projections (status quo) – Upper band

		Total	Revenue						
Co	ntribution	insurable		Investment		Expenditure	Reserve	Reserve	PAYG
Year	rate	earnings	Contributions	earnings	Total		(end of year)	ratio	cost
2001	5.6%	2 220	124	84	208	50	1 797	35.9	2.3%
2002	5.6%	2 398	134	92	226	58	1 965	33.7	2.4%
2003	5.6%	2 570	144	100	244	67	2 142	31.9	2.6%
2004	5.6%	2 741	153	109	262	77	2 327	30.2	2.8%
2005	5.6%	2 921	164	118	282	87	2 522	29.1	3.0%
2006	5.6%	3 115	174	125	300	98	2 724	27.8	3.1%
2007	5.6%	3 318	186	133	318	112	2 931	26.2	3.4%
2008	5.6%	3 528	198	139	337	128	3 140	24.6	3.6%
2009	5.6%	3 744	210	146	356	146	3 349	22.9	3.9%
2010	5.6%	3 966	222	152	374	170	3 553	20.9	4.3%
2011	5.6%	4 197	235	161	396	195	3 754	19.3	4.6%
2012	5.6%	4 443	249	170	418	219	3 953	18.0	4.9%
2013	5.6%	4 698	263	178	441	246	4 148	16.8	5.2%
2014	5.6%	4 963	278	187	465	276	4 337	15.7	5.6%
2015	5.6%	5 239	293	195	488	311	4 515	14.5	5.9%
2020	5.6%	6 782	380	226	606	513	5 183	10.1	7.6%
2025	5.6%	8 659	485	228	713	802	5 139	6.4	9.3%
2030	5.6%	11 081	621	181	802	1 150	3 942	3.4	10.4%
2035	5.6%	14 207	796	69	865	1 557	1 221	0.8	11.0%
2040	5.6%	18 069	1 012	-136	876	2 079	-3 698	-1.8	11.5%
2045	5.6%	22 912	1 283	-481	802	2 786	-11 921	-4.3	12.2%
2050	5.6%	29 046	1 627	-1 038	589	3 7 3 4	-25 171	-6.7	12.9%

3.4.4. Impact on government cash flows

The negative cash flows to the government will continue to increase as a percentage of total insured earnings because:

- the new loans granted to the government decrease after 2007 because of the incapacity of current contributions and investment earnings to face increasing scheme's expenditures;
- the interest that the government has to pay to the scheme on its past borrowings increases continuously;
- the government subsidy and the government contribution as employer are increasing at the rate of increase of the national wage.

Table 19.Cash transfers between the government budget and the Social Insurance Fund (in million £)Status quo

	Positive cash flow	Negative cash flows				
	Newslands		Contribution	Interest		
	inew loans	0	or the	payments	Net each flow	A = = 0/ = f
	granted to the	General	government	on .	Net cash flow	As a % of
	government	government	as an	borrowed	to the	insurable
Year	by the scheme	subsidy	employer	money	government	earnings
2001	181	89	48	101	(57)	-2.6%
2002	191	96	52	110	(67)	-2.8%
2003	199	103	56	120	(79)	-3.1%
2004	207	110	59	130	(92)	-3.4%
2005	217	117	63	140	(103)	-3.5%
2006	223	125	67	148	(117)	-3.8%
2007	225	133	72	155	(135)	-4.1%
2008	224	141	76	163	(156)	-4.4%
2009	218	150	81	169	(181)	-4.8%
2010	205	159	86	175	(214)	-5.4%
2011	192	168	91	184	(250)	-6.0%
2012	180	178	96	192	(285)	-6.4%
2013	166	188	102	199	(323)	-6.9%
2014	144	199	107	206	(368)	-7.4%
2015	116	210	113	212	(418)	-8.0%

3.5. Proposed rules for the determination of future contribution rates for long-term benefits

The financing of long-term benefits should take into account the nature of the benefit, the demographic environment and the maturing process of this type of benefit. It is thus recommended to adopt rules for the determination of future contribution rates that will take these factors into account. Since the lower band was introduced earlier that the upper band and the benefits are determined by different types of formulas in the two bands, the state of maturity will be reached at different times and the contribution rates should be determined under different rules.

The determination of contribution rates for long-term benefits should be made under the following rules:

• for the lower band, the reserve should be at least equal to 1.0 time the annual expenditure of the lower band;

• for the upper band, the reserve should be at least equal to 9.0 times the annual expenditure of the upper band. In the long run, when the upper band has reached maturity, the reserve ratio may decrease to 1.0 time the annual expenditure.

If an actuarial valuation reveals that the application of the current contribution rates causes the reserve to decrease below those levels during the 10-year period following the actuarial valuation, the contribution rate will be increased immediately at a level sufficient to meet the reserve-ratio criteria of the band for the next 10 years

Under those rules, the lower band would be in equilibrium until 2013 and the upper band until 2021. The present contribution rates available for the financing of long-term benefits can thus be kept unchanged at least until the next actuarial review.

3.6. Recommended contribution rates under status quo

Starting on 1 January 2003, the total contribution rate of 16.60 per cent of insurable earnings should be allocated as follows between the different benefit branches and the contribution revenue should be separated amongst the four benefit branches based on the application of those contribution rates to the appropriate insured earnings. These contribution rates include implicit margins to cover the cost of administration. These contribution rates may be maintained until the next actuarial review.

Pranch	Contribution rate				
	Lower band	Upper band	Total		
Unemployment benefits Short-term benefits Employment injury benefits Long-term benefits	0.75% 0.15% 8.60%	0.35% 0.05% 5.60%	1.10% 1.10% 0.20% 14.20%		
Total			16.60%		

4. Reform options

This chapter presents a series of modifications to the scheme aimed at improving its financial position and ensure its long-term sustainability. The reform options focus mainly on containing future increases of benefit expenditure.

As regards *expenditure*, the report recommends:

- an increase of the normal retirement age from 63 to 65;
- a modification of the lower band's indexing mechanism.

As regards *revenue*, the report recommends a modification of the investment policy to increase the rate of return of the fund.

In the context of the reform options presented in this chapter, we suppose that the government stops transferring to the Social Insurance Fund its special contribution for the financing of the recent increases of the minimum pension.

4.1. Increase of the age of entitlement to a full old-age pension

4.1.1. Description

The first proposal calls for a gradual increase of the normal retirement age. The modification would apply to both the lower and the upper band. Increasing the retirement age reduces the average duration of pension payment.

An increase of the retirement age would be justified considering the projected increase of the life expectancy in Cyprus and the consequent increase of the dependency ratios presented in Section 2.1 of this report. A higher retirement age would also be justified in the context of a labour market characterized by nearly full employment (see Section 2.2.2).

The proposed option is an increase of the normal retirement age (NRA) starting in 2004. The NRA would increase by 3 months per year according to the following schedule.

Year	Normal retirement age
2004	63 years and 3 months
2005	63 years and 6 months
2006	63 years and 9 months
2007	64 years
2008	64 years and 3 months
2009	64 years and 6 months
2010	64 years and 9 months
2011 and after	65 years

Even with this proposed increase of the normal retirement age, it would be advisable to maintain the possibility for insured persons to start drawing their pension from age 63 as presently, but at a reduced rate (for example, a 6 per cent lifetime reduction of the pension for each year of anticipation applied to both the lower and the upper band), thus adding some flexibility to the measure. This would be particularly appreciated by people who receive a pension from an occupational scheme that allows retirement at an earlier age. Under that measure, with a normal retirement age of 65, if a person actually retires at age 63, the pension would be reduced by 12 per cent for life and any future benefit derived from

the old age pension (e.g. a widow's pension) would be based on the reduced amount. It is possible to design measures for people who claim the old age pension before the normal retirement age but continue to work while receiving the pension in order to adjust their pension upward periodically to take into account the new contributions they pay to the scheme.

This increase of retirement age would benefit to future generations of contributors. It would limit future contribution rate increases and would increase the benefit/contribution ratio that these future contributors may expect from the scheme. The persons negatively affected by the measure are those presently near the retirement age who would have to wait for some additional months before drawing their pension at full rate. However, these older workers have benefited since the inception of the scheme of advantageous contribution rates well below the real long-term cost of the scheme (see general average premium in Sections 3.4.2 and 3.4.3) and would nevertheless receive a very good return on their contributions even with a delayed retirement.

4.1.2. Cost implications

The increase of the retirement age would decrease the general average premium from 13.8 per cent to 12.9 per cent in the lower band and from 8.7 per cent to 7.9 per cent in the upper band. Because the increase of the retirement age is gradual, the effect on the period of equilibrium of the lower band is not significant (from 2013 to 2015). For the upper band, the period of equilibrium would extend from 2021 to 2024 under that option.

4.2. Indexing of lower band pensions based on a price index

4.2.1. Description

Presently, pensions in payment are adjusted periodically using a wage index in the lower band and a price index in the upper band. It is proposed to index pensions in the lower band on the basis of a price index instead of a wage index. The present earnings-related pension formula of the lower band would remained unchanged, but pensions in payment and the minimum pension would be indexed in the future on the basis of the increase of the Consumer Price Index.

Concerning more specifically the minimum pension, this means that the present formula under which the minimum pension is established at 85 per cent of the full basic pension would no longer apply. New pensioners at the minimum would receive the same minimum pension as the one received by previous year's pensioners, taking into account the new recommended CPI indexing mechanism. It must be noted that the indexing mechanism of pensions in payment in the lower band has only a limited effect if not combined with the adjustment of the minimum pension also on the basis of a price index. The reason is that a large proportion of pensioners in the lower band receive the minimum pension. So if the amount of the minimum pension continues to be determined in the future as a percentage of the maximum basic pension (which increases with wages), the minimum pension will gradually catch up pensions in payment that were initially fixed above the minimum.

4.2.2. Cost implications

This option causes a decrease of the general average premium from 13.8 per cent to 9.2 per cent. The reduction in expenditure is felt in both the short and the long-term. In addition, the period of equilibrium would extend significantly from 2014 to 2037 under that option.
4.3. Increase of the rate of return on investments

4.3.1. Description

Another way for the scheme to improve its financial position is to increase its investment earnings. The historical real rate of return on the scheme's assets has been good but has benefited from a privileged situation, the rate of return having always been fixed under rules that do not always reflect market interest rates. The level of interest rates in Cyprus have decreased recently because efforts are made to meet the criteria for the accession of the country to the European Union. According to the economic framework and assumptions presented in Chapter 2, it is expected that the real rate of return on scheme's reserves will decrease in the future if these reserves continue to be invested in government securities.

The Social Insurance Fund could hence consider the possibility to invest part of the reserves in nongovernment assets in order to increase its return. Investment of social security funds in non-government assets would also add some flexibility to the scheme in periods of economic difficulties, allowing the scheme to draw on these reserves, if necessary, without increasing the transfers from the government at a time when the government itself also faces cash flow problems. A new investment policy should aim at diversifying the investment portfolio with alternatives to fixed-income securities. Investment in equities should be considered. In the process of diversifying the portfolio, it will be important to match the assets of the schemes with its liabilities which are long-term by nature.

Such a change in the investment policy should be gradual, first to avoid a negative impact on government cash flow (to suddenly deprive government from this source of funds would deteriorate its budgetary position). Second, a gradual investment of social security assets in the private sector would leave time for the institution to set-up an investment management team. Third, time is also necessary to analyse the investment opportunities in Cyprus.

4.3.2. Cost implications

In the cost illustrations on the effect of this option, it is assumed that the new investment policy would generate a rate of return 1 per cent higher than under the base scenario. With a higher investment return, the general average premium would decrease from 13.8 per cent to 13.3 per cent in the lower band and from 8.7 per cent to 8.3 per cent in the upper band. The period of equilibrium would extend from 2013 to 2014 in the lower band and from 2021 to 2023 in the upper band.

4.4. Summary of cost implications of the proposed measures

Table 20 presents the effect of the reform proposals on the general average premium and on the period of equilibrium of both the lower and the upper band. The reform proposals would cause a decrease of the long-term costs of both the lower and the upper band. The reform options would also extend the period of equilibrium in all cases considered.

As mentioned earlier, under *status quo* conditions, the general average premium of the lower band is 13.8 per cent and the end of the period of equilibrium is 2013 (the last year for which the reserve is at least equal to 1.0 time the annual expenditure). For the upper band, the general average premium under *status quo* conditions is 8.7 per cent and the present contribution rate is sufficient to maintain a level of reserve at least equal to 9.0 times the annual expenditure until 2021.

Table 20. Financial impact of the reform proposals

	Last year of the period of equilibrium with the present contribution rate	General average premium over the next 50 years	PAYG cost in 2050
Lower band			
Status quo	2013	13.8%	18.4%
A – Increase retirement age from 63 to 65	2015	12.9%	17.1%
B – Index pensions on CPI	2037	9.2%	11.1%
C – Higher investment return	2014	13.3%	18.4%
Combined reform options (A + B + C)	After 2050	8.2%	9.9%
Upper band			
Status quo	2021	8.7%	12.9%
A – Increase retirement age from 63 to 65	2024	7.9%	11.9%
B – Higher investment return	2023	8.3%	12.9%
Combined reform options (A + B)	2028	7.6%	11.9%

4.5. Impact on government cash flows

The proposed reform of the scheme reduces the size of the negative cash flow of the government to more acceptable levels. The cash flow situation for the government after 2015 will depend on the arrangements that will be taken as regards the reimbursement of the funds previously borrowed by the government from the Social Insurance Scheme.

	Positive cash flow		Negative cash flows			
	Newleane		Contribution	Interest		
	aranted to the	General	dovernment	payments	Net cash flow	As a % of
	government	government	as an	borrowed	to the	insurable
Year	by the scheme	subsidy	employer	money	government	earnings
2001	181	89	48	101	(57)	-2.6%
2002	191	96	52	110	(67)	-2.8%
2003	222	103	56	143	(79)	-3.1%
2004	249	110	59	157	(77)	-2.8%
2005	279	117	63	172	(73)	-2.5%
2006	303	125	67	186	(75)	-2.4%
2007	326	133	72	201	(79)	-2.4%
2008	344	141	76	216	(89)	-2.5%
2009	360	150	81	232	(103)	-2.7%
2010	387	159	86	248	(105)	-2.7%
2011	418	168	91	269	(110)	-2.6%
2012	436	178	96	292	(130)	-2.9%
2013	451	188	102	316	(154)	-3.3%
2014	467	199	107	340	(179)	-3.6%
2015	480	210	113	366	(209)	-4.0%

Table 21.Cash transfers between the government budget and the Social Insurance Fund (in million £)Under reform

4.6. Further reform options

After the completion of the actuarial review, the actuaries were asked to value some more structural reform options. This request responded to the need to incorporate into the pension system the special allowance that was introduced in the second half of 2002, following the increase of the value added tax. The results of these analyses are documented in a separate technical actuarial note.

5. Other issues

This chapter presents three specific issues that were raised during the visit of the actuary in Cyprus. They concern the effect of the child-care credit for a particular group of contributors and a request from the beneficiaries of the missing person's allowance.

5.1. Child-care credit

All women participating to the Social Insurance Scheme are entitled to a special credit of up to three years in respect of each child. These credits are used for the determination of eligibility and also influence the amount of the pension. It must be recalled that the scheme provides for the payment of a minimum pension equal to 85 per cent of the maximum pension.

The child-care credit will have important cost implications during the next decade as many female foreigners have immigrated to Cyprus during the 1990's. A large number of these women had many children. According to the provisions of the scheme, these persons need only 3 years of paid contributions to be eligible to the minimum pension. Moreover, with the possibility to pay voluntary contributions, they need only one year of paid contributions and two years of voluntary contributions to be eligible to the pension. The pension is exportable outside Cyprus after retirement.

With the combination of a generous minimum pension and low contribution requirements for eligibility, it appears that the child-care credit may create an unfair balance between contributions paid and benefits received by a specific group of insured persons. On the other hand, any modification to the scheme should not bring discriminatory provisions into the law with regard to sex, age or nationality.

Possible solutions to this problem include:

- 1. grant child-care credits only if a women was insured before a certain date. For example, contributions should have been paid before 1 January 1990 in order to benefit from the special credit;
- 2. increase the number of years of paid contributions necessary to be eligible to a pension. For example, require six years of paid contributions instead of three to be eligible. This appears to be the more neutral and easy-to-implement modification. Given the high level of the minimum pension as compared to the maximum, an increase of the required number of years of contributions for eligibility would be justifiable even outside the context of the child-care credit;
- 3. stop exporting the minimum pension. However, such a modification would be difficult to implement in the context of international social security agreement to which Cyprus is party, one particular objective of those agreements being specifically the exporting of benefits;
- 4. limit the recognised years of child-care to those years when the person was a resident of Cyprus or a resident of a country of the European Union.

5.2. Missing person's allowance

In 1977, the Social Insurance Scheme introduced the missing person's allowance for families of persons missing as a result of the Turkish invasion. The amount of benefit is the same as the basic widow's pension or the basic orphan's benefit as the case may be.

In the case of government employees, for missing persons in 1974, the government has continued to pay the salary to the families and also to pay the Social Insurance contributions on this salary. In addition, the Social Insurance Scheme has paid to them the allowance equal to the widow's and orphan's pensions.

Survivors of those missing persons now claim the old age pension on behalf of the missing person, arguing that Social Insurance contributions were paid on their behalf by the government for the whole period since they were missing.

The payment of an old age pension to the survivors of missing persons, in addition to the missing person's allowance that they already receive, would constitute a double benefit which appears unjustified and unrelated to the needs of the survivors. In addition, the payment of Social Insurance contributions by the government should be seen as a measure that intended to restore the status of the contributor in the event the missing person was reappearing at some point before retirement. But in the case the missing person is not found, there is no justification to pay an old age pension to anyone else.

The Social Insurance Scheme could decide to reimburse to these persons the contributions made by the government on behalf of the missing person and continue to treat them as survivors only. However, the question of paying interest on those past contributions would emerge and could represent important sums given the length of time since those persons disappeared.

It is thus recommended to decline any claim by the survivors of missing persons, considering that the scheme has paid, and continues to pay, its obligations to the survivors by means of the missing persons' allowance. It can be explained to those people that the payment of Social Insurance contributions by the government was a specific measure to restore the status of contributors in case the person was found before retirement and does not constitute a right to an old age pension for their survivors.

Annex 1. Overview of the legal provisions of the Cyprus Social Insurance Scheme

A1.1. 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, for families of persons missing as a result of the Turkish invasion.

A supplementary scheme (the upper band) was introduced on 6 October 1980. This new scheme is earnings-related.

A1.2. Coverage

The scheme covers compulsorily every person gainfully occupied in Cyprus, either employed or selfemployed. 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 not entitled to employment injury benefits. Other voluntary contributors are entitled only to marriage grant, maternity grant, funeral grant, old age pension and survivors' benefits.

A1.2.1. Voluntary insurance

Voluntary insurance is allowed to persons who wish to continue insurance after a prescribed period of compulsory insurance or to persons who work abroad in the service of Cypriot employers.

The conditions for continuation of insurance on a voluntary basis are that the person concerned:

- if ordinarily resident in Cyprus, has paid contributions to the basic part of the scheme on earnings which are not less than 52 times the basic insurable earnings; or
- if not ordinarily resident in Cyprus, has paid contributions to the basic part of the scheme on earnings which are not less than 156 times the basic insurable earnings.

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.

A1.3. Contributions

A1.3.1. 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 contribution conditions for old age pension must continue to pay contributions until satisfaction of the contribution conditions. In no case can contributions be paid after the age of 68.

A1.3.2. Insurable earnings

Insurable earnings are the gross earnings up to a maximum of six times the basic insurable earnings. In 2000, basic insurable earnings are fixed at $\pounds 63.27$ per week.²

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.

The total annual insurable earnings of every insured person are divided into two bands: the "lower band" includes insurable earnings up to the basic insurable earnings, and the "upper band" includes earnings above the basic insurable earnings. Insured persons are credited each year with "insurance points". One insurance point is equivalent to the yearly amount of basic earnings (in 2000, one point is credited for every £3398 of earnings). The first insurance point is assigned to the lower band and insurance points in excess of one are assigned to the upper band.

A1.3.3. Contribution rates

Employed persons Self-employed persons	12.6 per cent of insurable earnings, shared equally between the employer and the employee11.6 per cent of insurable income
Voluntary contributors working abroad for a Cypriot employer	12.6 per cent of either the basic insurable earnings or their normal earnings, as agreed in the contract of employment
Other voluntary contributors	10.0 per cent of an amount of earnings they fix, not exceeding insurable earnings in the last year (or last 3 years if higher)
National guard	Flat rate per week

 $^{^2}$ The conversion of earnings into insurance points is done by dividing the earnings of a given year by the basic insurable earnings of the following year. Accordingly, the maximum number of points that can be credited in the upper band for a year is normally around 4.7 instead of 5.0.

State contribution4.0 per cent of the insurable earnings of employed persons, self-
employed and voluntary contributors working abroad, and
3.5 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 contribution due and rising progressively with the time of delay.

A1.3.4. Financial provisions

The Social Insurance Fund maintains three separate accounts: The General Benefit Account, the Supplementary Benefit Account and the Unemployment Benefit Account. The Unemployment Benefit Account is credited with 6 per cent of the amount of contributions payable in respect of employed persons, and is charged with the payment of unemployment benefit and the related administration expenses. After calculations are made for the Unemployment Account,

- the General Benefit Account is credited with 9.5/15.5 of the total remaining contributions and charged with the payment of all basic periodical benefits, grants and with the administration expenses of the whole scheme (except unemployment benefits), and
- the Supplementary Benefit Account is credited with 6/15.5 of the total remaining contributions and is charged with all payments of the supplementary earnings related benefits (except unemployment benefits).

A1.3.5. Crediting of 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;
- any period of service in the National guard;
- 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 and, in addition, any period of unemployment (up to 26 weeks) for which no entitlement to benefit exists;
- 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.

Credits to insured women for childhood

Credits 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.

Special credits

Every insured person who was over the age of 50 and under the age of 63 on 6 October 1980 is credited with insurable earnings for every weekly contribution paid or credited under the repealed flat-rate scheme between his 50th birthday and 6 October 1980. The amount of earnings credited for each week is equal to the average weekly amount of insurable earnings of the person in the upper band during the period from 6 October 1980 to his 65th birthday, but the amount credited cannot exceed two times the basic insurable earnings.

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 upper band for the last five years.

The condition for the award of special credits is that the person qualifies for the basic 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. Other 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 1.04 times the basic insurable earnings, provided that the total value of such contributions in a given year do not exceed the equivalent of one insurance point.

A1.4. Benefits

A1.4.1. Benefit structure

The basic benefit is related to insurable earnings in the lower band. It includes increases for dependants. The supplementary benefit is related to insurable earnings in the upper band. No increases for dependants are payable on the supplementary benefit.

A1.4.2. Marriage grant

The contribution conditions are that a person:

- has been insured for 26 weeks and has paid contributions on insurable earnings not lower than 26 times the weekly amount of basic insurable earnings; and
- has paid or been credited, in the previous year, with contributions on insurable earnings not lower than 20 times the weekly amount of basic insurable earnings.

The amount of the marriage grant is $\pounds 269$ in 2001.

A1.4.3. Maternity grant

The contribution conditions for the maternity grant are the same as for the marriage grant (by either the woman or her husband). The amount of the maternity grant is $\pounds 199$ in 2001.

A1.4.4. 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 satisfies the contribution conditions for the marriage grant;
- 5. dependants of persons specified in (1) and (4) above.

Since 2001, the amount of the funeral grant is £269 for cases (1) to (4) above and £134.50 for dependants.

A1.4.5. Maternity allowance

The contribution conditions are that a person:

- has been insured for 26 weeks and has paid contributions on insurable earnings not lower than 26 times the weekly amount of basic insurable earnings; and
- ➤ has paid or been credited, in the previous year, with contributions on insurable earnings not lower than 20 times the weekly amount of basic insurable earnings.

The amount of the maternity allowance is 75 per cent of the earnings on which contributions were paid or credited in the previous 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 16 weeks beginning between the 2nd and the 6th week preceding the expected week of confinement.

A1.4.6. 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 contribution conditions for old age pension at 63 are allowed to draw benefit up to the date on which they satisfy the relevant contribution conditions but in no case after the age of 65.

The contribution conditions are that a person:

- has been insured for 26 weeks and has paid contributions on insurable earnings not lower than 26 times the weekly amount of basic insurable earnings; and
- ➤ has paid or been credited, in the previous year, with contributions on insurable earnings not lower than 20 times the weekly amount of basic insurable earnings.

To re-qualify for benefit, the person must have paid contributions on earnings not lower than 13 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 must have elapsed since the date of exhaustion.

The amount of the sickness benefit is:

- ➢ 60 per cent of insurable earnings up to the basic earnings, increased by 1/3 for the first dependant and 1/6 for each of the second and third dependants, plus
- ➢ 50 per cent of insurable earnings in excess of the basic earnings up to a maximum of two times the basic earnings.

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 3 days for employed persons and 18 days for self-employed persons. The benefit is payable for a maximum duration of one year in each period of interruption of employment.

A1.4.7. Unemployment benefit

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

The contribution conditions are that a person:

- has been insured for 26 weeks and has paid contributions on insurable earnings not lower than 26 times the weekly amount of basic insurable earnings; and
- ➤ has paid or been credited, in the previous year, with contributions on insurable earnings not lower than 20 times the weekly amount of basic insurable earnings.

Exceptionally, persons over the age of 60 who do not receive any pension under any occupational scheme or a lump sum from a Provident Fund, re-qualify for unemployment benefit under the same conditions as for sickness benefit.

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

A1.4.8. 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 or, in the case of persons between the ages of 60 and 63, more than $\frac{1}{2}$ of the aforesaid sum.

Contribution conditions are:

- 1. contributions paid in at least three years and insurable earnings in the lower band are not less than 156 times the weekly basic earnings;
- 2. contributions paid or credited, in the last year, corresponding to insurable earnings not lower than 20 times the weekly basic earnings. This condition is also satisfied if the average of the last two years is not lower than 20 times the basic earnings;
- 3. weekly average insurable earnings (paid or credited) in the lower band from 5 October 1964 (or the year of attainment of age 16) to the week of invalidation, equal to at least ¹/₄ of basic earnings.

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

The amount of the pension is equal to the old age pension. When the loss of earnings is partial, the following percentages are payable:

Loss of earning capacity	Percentage of the full pension
50 % to 66 2/3 %	60 % 75 %
66 2/3 % to 75 %	/5%
75 % to 99 %	85 %

A1.4.9. Old age pension

As a general rule, the old age pension is payable at the age of 65 for men and women. But it may be payable at an earlier age on certain conditions:

- > at age 63 for women born before 1 January 1935;
- at age 63 if the person satisfies the contribution conditions and has weekly average insurable earnings at least equal to 70 per cent of the weekly amount of basic earnings;
- miners are entitled to the old age pension one month earlier than the normal pensionable age for every 5 months of work in a mine, but in no case before the age of 58.

Contribution conditions are the same as conditions (1) and (3) under the invalidity pension. A 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 the invalidity pension if under the age of 63. Eligibility to the old-age pension is not conditional on retirement from regular employment.

The amount of the weekly pension is composed of:

- > basic pension: 60 per cent multiplied by the number of insurance points in the lower band, multiplied by the amount of the basic insurable earnings at the time the payment starts, divided by the number of weeks since 5 October 1964; this amount is increased by 1/3 for the first dependant and by 1/6 for each of the second and third dependants³, plus
- supplementary pension: 1.5 per cent multiplied by the number of insurance points in the upper band, multiplied by the amount of the basic insurable earnings at the time the payment starts, divided by 52.

A person who at pensionable age satisfies condition (i) of invalidity pension but not condition (iii) of the invalidity pension is entitled to a lump sum at age 68 equal to 15 per cent of the total amount of his insurable earnings (paid and credited).

A person may ask for postponement of the payment of the pension until the age of 68. In this case, the amount of the pension 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 these insurable earnings.

 $^{^{3}}$ Before October 2001, the supplement for dependants (for spouse and children) is paid only to male pensioners. From October 2001, female pensioners will be eligible to the supplement, but only on behalf of the children (1/6th for each child).

A widow is entitled to make use of her husband's insurance record for the period before his death, if this is more favourable.

A1.4.10. Widow's pension

The widow's pension is payable to the widow (or widower under certain conditions of dependence) of a person who satisfied the contribution conditions for the old age 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 if the contribution conditions for the funeral grant are satisfied.

The basic pension is assessed in the same way as the basic old age pension.

The supplementary pension 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;
- ➢ if the husband was in receipt of an old age pension, 60 per cent of the supplementary old age pension which was payable.

A lump sum is payable to a widow whose husband satisfies the first but not the third contribution condition of the invalidity pension. This lump sum is equal to 15 per cent of the total amount of his insurable earnings in the lower band plus 9 per cent of his total amount of insurable earnings in the upper band.

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

Following a recent decision of the court, new cases since 1999 are entitled to receive the total of the two pensions without limits. For old cases, double pensions are payable from 2001 onwards.

A1.4.11. Orphan's benefit

The orphan's benefit is payable for a minor:

- 1. whose both parents are dead or whose parents were separated and the one under whose care he was is dead; and one of the parents was an insured person; or
- 2. whose one of the parents died and the surviving parent is not entitled to widow's pension; and the deceased parent fulfils the contribution conditions for widow's pension; or
- 3. whose widowed mother, who was in receipt of widow's pension, remarried.

The amount of the benefit for case (1) is composed of:

- basic benefit: 40 per cent of basic earnings;
- supplementary benefit: 50 per cent of the widow's pension which was or would have been payable (calculated for a maximum of two orphans).

The amount of the benefit for cases (2) and (3) is equal to 20 per cent of the basic earnings for one orphan, 30 per cent for two orphans and 40 per cent for three or more 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

permanently incapable of self-support. A gratuity of one year's benefit is payable, in case (1), on termination of his entitlement other than by death before the age of 17.

A1.4.12. Missing person's allowance

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

A1.4.13. Employment injury benefits

Temporary incapacity (injury benefit)

The injury benefit is payable to an employed person incapable of work as a result of an industrial accident or occupational disease. The benefit is payable for a maximum of 12 months. The amount of the benefit is the same as the sickness benefit, except that the minimum benefit for persons with earnings below the basic earnings is the benefit corresponding to such 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.

The amount of the benefit is:

- for an incapacity between 10 per cent and 19 per cent, a disablement grant is paid, equal to £1427 (in 2001) for 10 per cent disablement, increasing proportionately to £2711 (in 2001) for 19 per cent disablement;
- for an incapacity of 20 per cent and above, a disablement pension is payable. For a 100 per cent incapacity, the pension consists of:
 - basic pension: 60 per cent of the weekly basic insurable earnings, increased by 1/3 for the first dependant and 1/6 for each of the second and third dependants;
 - supplementary pension: 60 per cent of the weekly average insurable earnings above the basic earnings, in 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.

A constant attendance allowance of £21.32 per week (in 2001) is payable for disablement pensioners needing constant care.

Death benefits

The widow's pension is composed of:

- basic pension: Same as basic disablement pension for 100 per cent disablement;
- supplementary pension: 60 per cent of the supplementary disablement pension the deceased was entitled to, for a 100 per cent disablement.

The pension ceases on remarriage with the payment of a lump sum equal to one year's pension excluding increases for dependants.

The orphan's benefit is composed of:

- basic benefit: Same as for the ordinary orphan's benefit;
- supplementary benefit: 50 per cent of the supplementary widow's pension, for a maximum of two orphans.

Parent's allowance

A parent's allowance is payable when the deceased is not survived by a spouse or by orphans. The allowance is composed of:

- basic allowance: 40 per cent of basic earnings per parent;
- supplementary allowance: 30 per cent of the supplementary disablement pension payable for a 100 per cent disablement.

A1.5. General provisions

A1.5.1. Revision of insurable earnings

The amount of the basic insurable earnings as well as the ceiling on such earnings is adjusted to the movement of the general level of insurable earnings every year. The adjustment is mandatory if the level of this increase is 5 per cent or more. The adjustment also applies to past insurable earnings, which are thus re-valued to the prevailing level of earnings.

A1.5.2. Revision of benefit rates after award

The rates of basic pensions are reviewed at the beginning of each year in accordance with the percentage of revision of the basic insurable earnings. The rates of the supplementary pensions are reviewed in accordance with the increase in the cost of living.

Furthermore, the rates of pensions are increased every July in accordance with 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.

A1.5.3. Beneficiaries under the repealed scheme

Beneficiaries in respect of pension payable before the introduction of the new scheme are receiving benefits corresponding to the basic benefits under the new scheme.

Annex 2. Methodology of the actuarial valuation

This actuarial review makes use of the new comprehensive methodology developed at the Financial and Actuarial Service of the ILO (ILO-FACTS) 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 Social Insurance 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 Social Insurance Scheme are determined and used in combination with the demographic/economic framework.

A2.1. Modelling the demographic and economic developments

The use of the ILO actuarial projection 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 basic and supplementary earnings levels and the future level of flat-rate benefits.

The selection of projection 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.

A2.1.1. General population

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

A2.1.2. Economic growth

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

A2.1.3. 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.

A2.1.4. 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.

A2.2. Modelling the financial development of the Social Insurance Scheme

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

For short-term benefits, income 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.

A2.2.1. Purpose of pension projections

The purpose of the pension model is twofold. First, it is used to assess the financial viability of the longterm benefits branch. This refers to the measure of the long-term balance between income and expenditures of the scheme. In case of imbalance, recommendations on the revision of the contribution rate or the benefit structure is 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.

A2.2.2. 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 social insurance 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.

A2.2.3. 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 income and expenditures of the scheme, but to check its financial viability. This entails evaluating the scheme with regard to the relative balance between future income and expenditures. This type of evaluation is crucial, especially in the case of the Cyprus scheme, which has not yet reached its mature stage.

Annex 3. Financial operations of the Social Insurance Scheme (1998-2000)

	GENERAL ACCOUNT			SUPP	LEMENTARY ACCOUNT	·	UNEMP	LOYMENT ACCOU	NT
_	1998	1999	2000	1998	1999	2000_	1998	1999	2000
RESERVE at 1 January	265 989 618	302 838 925	330 183 603	1170 932 389	1314 268 632	1472 369 721	6 772 859	3 721 136	-2 816 441
Revenue									
Contributions	171 568 996	177 861 179	191 692 352	108 359 366	112 333 376	121 068 854	16 173 480	16 871 157	18 286 649
Receipt from Consol. Fund	0	1 857 440	3 202 096	0	0	0	0	0	0
Interest earnings	26 279 119	21 456 476	22 178 053	75 615 886	91 730 641	96 347 650	295 157	2 372	- 372 459
Other income	2 007 939	1 679 930	1 772 239	688 710	584 452	633 032	69 847	59 945	66 946
Total revenue	199 856 054	202 855 025	218 844 740	184 663 962	204 648 469	218 049 536	16 538 484	16 933 474	17 981 136
Expenditure									
Benefits									
Pensions	143 746 484	156 324 822	174 327 112	34 233 465	39 557 015	42 242 344	0	0	0
Short-term benefits	14 521 113	14 258 488	18 293 954	6 470 520	6 284 345	8 405 904	18 971 764	22 851 680	23 604 708
Employment injury benefits	2 225 624	2 408 832	2 571 192	623 734	706 020	791 283	0	0	0
Administrative expenses	2 513 526	2 518 205	2 703 456	0	0	0	618 443	619 371	660 508
Total expenditure	163 006 747	175 510 347	197 895 714	41 327 719	46 547 380	51 439 531	19 590 207	23 471 051	24 265 216
RESERVE at 31 December	302 838 925	330 183 603	351 132 629	1314 268 632	1472 369 721	1638 979 726	3 721 136	-2 816 441	-9 100 521

Annex 4. Scheme-specific data and assumptions

In addition to the demographic and economic assumptions presented in the Chapter 2, the projection of the future financial development of the Social Insurance 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 lower band and for the upper band. In addition, base data and assumptions have been divided according to the sex of insured persons. The model makes separate projections for these four sub-groups.

A4.1. Insured population

Data on the insured population were obtained from the Social Insurance Department. The data base presents a population of 294116 active insured persons having contributed in 2000. Out of these persons, 221765 had annual earnings over £3398 and have thus accumulated insurance points in the upper band. The distribution of these populations by age and sex is presented in Table A4.1.

Age group	Active insured persons			Out of which have	e contributed in th	e upper band
	Males	Females	Total	Males	Females	Total
16-19	3 242	4 156	7 398	292	586	878
20-24	13 809	15 503	29 312	8 195	8 222	16 417
25-29	19 801	19 929	39 730	15 760	13 425	29 185
30-34	21 567	19 168	40 735	18 150	12 496	30 646
35-39	22 653	18 044	40 697	19 849	11 900	31 749
40-44	23 236	17 663	40 899	20 797	12 159	32 956
45-49	20 046	13 887	33 933	18 129	10 099	28 228
50-54	18 365	10 608	28 973	16 860	8 123	24 983
55-59	12 676	5 963	18 639	11 547	4 565	16 112
60-64	9 060	3 328	12 388	7 724	2 317	10 041
65+	1 057	355	1 412	459	111	570
Total	165 512	128 604	294 116	137 762	84 003	221 765

 Table A4.1.
 Active insured persons under the Social Insurance Scheme (2000)

In addition to the persons who have contributed in 2000, the scheme covers another 131422 persons who have contributed to the scheme in the past, but not in 2000. 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. A part of that population has been considered in the present valuation: the 61010 persons who have contributed in the upper band in the past. Those former contributors are considered to have a greater probability to keep their insured status in the future and to re-enter the scheme.

Age group	Inactive insured persons			e group Inactive insured persons Out of which have contribu				contributed in the	upper band
	Males	Females	Total	Males	Females	Total			
16-19	2 269	693	2 962	147	5	152			
20-24	4 069	5 521	9 590	604	504	1 108			
25-29	6 726	11 380	18 106	2 556	2 829	5 385			
30-34	8 635	15 453	24 088	4 481	4 884	9 365			
35-39	7 315	11 989	19 304	4 620	5 858	10 478			
40-44	6 347	10 125	16 472	4 298	5 099	9 397			
45-49	4 612	7 158	11 770	3 178	3 688	6 866			
50-54	3 609	6 557	10 166	2 592	3 781	6 373			
55-59	2 599	4 927	7 526	2 085	3 199	5 284			
60-64	2 560	4 368	6 928	2 132	2 826	4 958			
65+	1 037	3 473	4 510	629	1 015	1 644			
Total	49 778	81 644	131 422	27 322	33 688	61 010			

 Table A4.2.
 Inactive insured persons under the Social Insurance Scheme (2000)

A4.2. Insurable earnings

Credits under the Social Insurance Scheme are computed in terms of points. For the year 2000, one insurance point is equivalent to annual earnings of £3398. The first insurance point is credited to the lower band and annual earnings in excess of £3398 and up to £19764 are converted into insurance points in the upper band. Table A4.3 presents average annual insurable earnings of active contributors for specific ages.

Age	Males	Females
17	1 937	2433
22	4 881	4129
27	6 473	5487
32	7 477	5777
37	8 248	6234
42	9 026	6915
47	9 514	7474
52	10 198	7926
57	9 592	7438
62	7 120	5080
Total	7 767	5 596

 Table A4.3.
 Average annual insurable earnings of active contributors in 2000

The average earnings of the insured population are projected to increase in line with the assumption regarding the rate of increase of the national average wage (see Section 2.2.3).

To attribute annual earnings correctly to the lower and upper bands, the actuarial projection model uses a distribution of earnings. A distribution of contributors according to the number of points earned in 2000, by sex, was obtained from the Social Insurance Department. These data are shown in Table A4.4. They were used to establish a distribution of earnings in the two bands and to separate active contributors into three sub-groups of earnings: the lowest 30 per cent, a medium range of 40 per cent and the highest 30 per cent.

Number of insurance points	Number of contributor		
	Males	Females	
0 to 1.00	27 746	44 597	
1.01 to 2.00	57 193	45 734	
2.01 to 3.00	36 024	19 390	
3.01 to 4.00	19 111	8 255	
4.01 to 5.00	10 807	4 957	
5.01 to 6.00	14 626	5 666	

Table A4.4.	Distribution of contributors according to the number of insurance points (2000))
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A4.3. Accrued past credits

Accrued insurance points in the upper band, for the active and inactive insured populations, were obtained from the administrative file of the Social Insurance Department. Average data are presented in Table A4.5. For each age and sex group, the average number of past insurance points has been distributed over a given span of number of points in order to better reflect the effect of eligibility conditions on the number of emerging pensions.

Table A4.5.	Assumed average past accrued insurance points in the upper band for active and inactive insured persons, as of 31 December 2000

	Number of insurance points in the upper band						
Age	Active ins	ured persons	Inactive insured persons				
	Males	Females	Males Females				
17	0.5	0.3	0.4 0.4				
22	1.7	1.3	0.6 0.5				
27	5.1	4.7	1.4 1.1				
32	10.4	8.4	2.1 1.5				
37	17.2	12.4	3.4 2.1				
42	25.8	18.0	5.1 2.8				
47	32.4	23.2	6.4 3.6				
52	38.8	28.2	8.9 4.9				
57	39.0	28.4	24.8 7.3				
62	29.3	15.0	35.0 15.0				

A4.4. Demographic assumptions related to the scheme

A4.4.1. 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). 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.

	Ма	ales	Females			
	2000	2050	2000	2050		
0	0.01903	0.00394	0.00569	0.00546		
1	0.00096	0.00039	0.00043	0.00042		
2	0.00051	0.00039	0.00043	0.00042		
3	0.00036	0.00039	0.00043	0.00042		
4	0.00029	0.00039	0.00043	0.00042		
5	0.00022	0.00011	0.00030	0.00029		
6	0.00017	0.00008	0.00020	0.00019		
7	0.00013	0.00006	0.00014	0.00013		
8	0.00011	0.00005	0.00010	0.00009		
9	0.00011	0.00004	0.00009	0.00008		
10	0.00012	0.00005	0.00009	0.00008		
11	0.00013	0.00005	0.00011	0.00010		
12	0.00015	0.00006	0.00013	0.00012		
13	0.00018	0.0008	0.00016	0.00015		
14	0.00022	0.00010	0.00020	0.00019		
15	0.00027	0.00022	0.00023	0.00022		
16	0.00032	0.00030	0.00026	0.00025		
17	0.00038	0.00038	0.00029	0.00020		
18	0.00042	0.00046	0.00031	0.00030		
19	0.00040	0.00000	0.00033	0.00032		
20	0.00054	0.00003	0.00032	0.00031		
21	0.00054	0.00073	0.00034	0.00033		
22	0.00061	0.00086	0.00036	0.00035		
23	0.00065	0.00090	0.00038	0.00037		
25	0.00068	0.00093	0.00040	0.00039		
26	0.00070	0.00094	0.00042	0.00041		
27	0.00073	0.00094	0.00043	0.00042		
28	0.00075	0.00093	0.00045	0.00044		
29	0.00078	0.00091	0.00047	0.00046		
30	0.00081	0.00088	0.00048	0.00047		
31	0.00084	0.00085	0.00050	0.00049		
32	0.00087	0.00083	0.00053	0.00052		
33	0.00091	0.00082	0.00056	0.00055		
34	0.00095	0.00082	0.00060	0.00059		
35	0.00090	0.00075	0.00065	0.00063		
36	0.00102	0.00082	0.00070	0.00068		
37	0.00117	0.00095	0.00077	0.00074		
38	0.00137	0.00112	0.00083	0.00081		
39	0.00161	0.00134	0.00091	0.00088		
40	0.00213	0.00186	0.00100	0.00097		
41	0.00234	0.00204	0.00109	0.00106		
42	0.00240	0.00213	0.00120	0.00110		
43 11	0.00200	0.00210	0.00131	0.00127		
44 15	0.00200	0.00211	0.00140	0.00159		
40	0.00214	0.00163	0.00171	0.00166		
47	0.00234	0.00180	0.00188	0.00182		
48	0.00263	0.00211	0.00205	0.00199		
49	0.00304	0.00257	0.00225	0.00219		
50	0.00384	0.00359	0.00249	0.00242		
51	0.00438	0.00412	0.00271	0.00263		
52	0.00493	0.00458	0.00294	0.00286		
53	0.00549	0.00498	0.00318	0.00309		
54	0.00604	0.00531	0.00344	0.00334		
55	0.00649	0.00528	0.00370	0.00358		
56	0.00712	0.00561	0.00401	0.00388		
57	0.00782	0.00602	0.00436	0.00422		
58	0.00860	0.00652	0.00475	0.00460		
59	0.00947	0.00712	0.00520	0.00503		
60	0.01048	0.00801	0.00577	0.00558		
61	0.01156	0.00875	0.00630	0.00610		
62	0.01274	0.00954	0.00689	0.00666		

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

	М	ales	Fer	nales
	2000	2050	2000	2050
63	0.01403	0.01038	0.00754	0.00728
64	0.01547	0.01129	0.00826	0.00798
65	0.01707	0.01234	0.00907	0.00875
66	0.01881	0.01343	0.01002	0.00965
67	0.02072	0.01465	0.01111	0.01071
68	0.02283	0.01602	0.01239	0.01193
69	0.02517	0.01761	0.01388	0.01336
70	0.02769	0.01916	0.01564	0.01506
71	0.03058	0.02144	0.01764	0.01699
72	0.03381	0.02419	0.01996	0.01923
73	0.03739	0.02746	0.02262	0.02181
74	0.04138	0.03129	0.02568	0.02479
75	0.04584	0.03598	0.02909	0.02812
76	0.05066	0.04090	0.03311	0.03204
77	0.05594	0.04635	0.03770	0.03653
78	0.06170	0.05237	0.04290	0.04163
79	0.06798	0.05897	0.04875	0.04738
80	0.07480	0.06611	0.05538	0.05389
81	0.08225	0.07405	0.06263	0.06103
82	0.09034	0.08274	0.07062	0.06892
83	0.09912	0.09221	0.07940	0.07758
84	0.10861	0.10248	0.08899	0.08707
85	0.11886	0.11352	0.09932	0.09730
86	0.12991	0.12552	0.11069	0.10857
87	0.14179	0.13842	0.12299	0.12078
88	0.15454	0.15224	0.13626	0.13397
89	0.16816	0.16696	0.15050	0.14813
90	0.18278	0.18300	0.16614	0.16371
91	0.19820	0.19933	0.18212	0.17964
92	0.21453	0.21644	0.19897	0.19646
93	0.23179	0.23436	0.21671	0.21418
94	0.24997	0.25309	0.23537	0.23283
95	0.26906	0.27264	0.25494	0.25242
96	0.28903	0.29300	0.27545	0.27296
97	0.30986	0.31416	0.29688	0.29445
98	0.33150	0.33612	0.31924	0.31688
99	0.35391	0.35885	0.34250	0.34024
100	1.00000	1.00000	1.00000	1.00000

A4.4.2. Invalidity incidence

Rates of entry into invalidity have been calculated from the scheme's experience over the years 1996 and 1997. Invalidity incidence rates are kept constant for the whole projection period. The rates are presented in Table A4.7.

Age	Males	Females
17	0.00000	0.00000
22	0.00027	0.00003
27	0.00049	0.00013
32	0.00051	0.00014
37	0.00102	0.00049
42	0.00175	0.00115
47	0.00250	0.00184
52	0.00494	0.00424
57	0.00916	0.00797
62	0.01206	0.01188

Table A4.7. Rates of entry into invalidity

A4.4.3. 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 chapter provides the number of persons employed each year. For a given age (at which retirement is possible under the social insurance 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. Most retirements take place at age 63.

A4.4.4. Family structure

Information on the family structure of the insured persons is necessary for the projection of survivors' benefits. In the case of the Cyprus scheme, these data are also used to project the dependents' supplement paid under the lower band. Assumptions have to be established on the probability of being married at death, on the age difference between spouses, on the average number or children possibly eligible to an orphan's benefit and on the average age of the 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 1992 Census. The age differential between spouses was calculated from data of the 1996 Demographic Report of the Department of Statistics and Research. The average number of children has been assumed equal to 0.2, 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.

Age	Probability to be married at death	Average age of the spouse	Average age of orphans
17	.01	17	1
22	.18	20	1
27	.58	24	2
32	.83	29	4
37	.92	34	7
42	.95	39	10
47	.95	44	13
52	.96	49	16
57	.96	54	17
62	.95	59	18
67	.91	64	-
72	.86	69	-
77	.78	74	-
82	.67	80	-
87	.49	85	-

Table A4.8. Assumptions on the family structure

A4.5. Other assumptions

A4.5.1. Special credits

An additional 7 years of credit was assumed for females participants to take into account the provisions of the scheme providing for a 3 year of credit per child under 12.

An additional 1 year of credit was assumed for male participants to take into account the compulsory service for the National Guard.

A4.5.2. Administrative expenses

Administrative expenses are totally affected to the lower band and are determined as the amount paid in 2000 indexed with the assumed nominal rate of increase in wages determined for the economic framework of the valuation (see Section 2.2.3).

A4.6. Pensions in payment in July 2000

Old age pensions

	Lower band				Upper band			
Age		Males		Females		Males		Females
group	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension
60-64	4 097	2 486	1 354	1 884	3 729	1 644	864	1 109
65-69	11 454	2 349	5 533	1 808	8 995	1 264	2 302	818
70-74	9 895	2 282	3 748	1 805	7 533	809	1 539	514
75-79	7 250	2 280	2 310	1 816	5 561	620	965	424
80-84	4 828	2 264	1 455	1 836	3 427	370	535	283
85-89	2 684	2 240	848	1 853	-	-	-	-
90+	1 097	2 183	378	1 893	-	-	-	-
Total	41 305	2 313	15 626	1 823	29 245	968	6 205	676

Note: The number of old age pensions paid to females in the upper band has decreased since the last valuation. This is due to a change that occurred in 1998 under which, for pensioners who have pensions in both the lower and the upper band, a part of the upper band pension is transferred from the upper band to the lower band so that the amount of the lower band pension reaches the maximum basic pension. Since many of the present female pensioners had only small amounts paid in the upper band, this transfer caused an important reduction of the number of upper band pensions previously paid to females.

Invalidity pensions

	Lower band				Upper band			
Aqe		Males		Females		Males		Females
group	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension
20-24	10	1 707	-	-	4	212	-	-
25-29	32	1 870	9	1 644	22	547	4	445
30-34	92	2 044	36	1 663	58	834	23	500
35-39	155	2 206	74	1 661	105	1039	49	803
40-44	305	2 372	130	1 621	219	1298	56	1034
45-49	407	2 236	163	1 614	286	1264	77	1051
50-54	662	2 134	258	1 586	443	1566	118	1310
55-59	891	2 099	392	1 559	633	1481	188	1132
60-64	845	2 051	373	1 561	646	1208	183	822
Total	3 399	2 135	1 435	1 584	2 416	1 336	698	016

Widows' pensions

	Lower band	ł			Upper ban	d			
Aqe		Males		Females		Males	Females		
group	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension	
20-24	12	-	26	1 383	-	-	7	683	
25-29	15	1250	49	2 284	6	98	27	1 090	
30-34	24	1316	54	2 562	7	98	36	1 012	
35-39	59	1316	121	2 577	16	98	78	1 229	
40-44	90	1316	265	2 501	12	98	187	1 399	
45-49	104	1316	400	2 234	9	98	251	1 371	
50-54	123	1316	770	1 968	8	98	473	1 201	
55-59	90	1316	1 156	1 909	2	98	672	1 013	
60-64	57	1316	2 143	1 892	-	-	1 229	677	
65-69	14	1316	2 438	1 881	1	98	1 291	470	
70-74	3	1297	3 511	1 894			1 553	360	
75-79	-	-	3 552	1 911			1 196	293	
80-84	-	-	3 445	1 927			558	214	
85-89	-	-	2 148	1 945			145	149	
90-94	-	-	911	1 962			-	-	
Total	591	1 314	20 989	1 932	61	98	7 703	585	
Note: For	the purpose o	f actuarial proje	ctions, orpha	ans aged 25 an	d over were class	ified as widowe	ers.		

Orphans' pensions

	Lower band				Upper ban	d		
Age		Males		Females		Males		Females
group	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension	Number	Average annual pension
0-4	64	576	53	533	2	530	-	-
5-9	90	573	65	562	6	530	4	523
10-14	61	549	48	545	3	530	3	523
15-19	25	647	14	941	6	530	3	523
20-24	-	-	-	-	3	530	2	523
Total	240	575	180	578	20	530	12	523
Note: Fo	r the purpose of	f actuarial proj	ections, orph	ans aged 25 ar	nd over were class	sified as widowe	ers.	

Annex 5. Detailed results of the valuation

This annex presents detailed financial projections of revenue and expenditure for long-term benefits over the next 50 years, separately for the lower and the upper band. Projections are presented under *status quo* and separately under each reform option considered in the report. The tables also include the general average premium calculated over 50 years.

		Total		Reve	enue					
	Contribution	insurable	Contri-	Transfer	Investment		Expenditure	Reserve	Reserve	PAYG
Yea	r rate	earnings	butions	Cons Fund*	earnings	Total	-	(end of year)	ratio	cost
2001	8.6%	2 220	191	6	18	214	192	374	1.9	8.6%
2002	8.6%	2 398	206	7	19	231	208	397	1.9	8.7%
2003	8.6%	2 570	221	7	20	248	225	420	1.9	8.8%
2004	8.6%	2 741	236	8	21	264	243	441	1.8	8.9%
2005	8.6%	2 921	251	8	22	281	260	463	1.8	8.9%
2006	8.6%	3 115	268	9	22	299	278	484	1.7	8.9%
2007	8.6%	3 318	285	10	23	318	299	502	1.7	9.0%
2008	8.6%	3 528	303	11	23	337	323	517	1.6	9.1%
2009	8.6%	3 744	322	12	23	357	347	527	1.5	9.3%
2010	8.6%	3 966	341	13	23	377	376	528	1.4	9.5%
2011	8.6%	4 197	361	14	23	397	407	518	1.3	9.7%
2012	8.6%	4 443	382	15	22	419	438	499	1.1	9.9%
2013	8.6%	4 698	404	16	21	441	471	470	1.0	10.0%
2014	8.6%	4 963	427	18	19	464	508	426	0.8	10.2%
2015	8.6%	5 239	451	19	17	487	548	364	0.7	10.5%
2020	8.6%	6 782	583	29	-10	602	805	-326	-0.4	11.9%
2025	8.6%	8 659	745	44	-84	705	1 185	-2 125	-1.8	13.7%
2030	8.6%	11 081	953	63	-234	782	1 680	-5 727	-3.4	15.2%
2035	8.6%	14 207	1 222	86	-491	817	2 282	-11 841	-5.2	16.1%
2040	8.6%	18 069	1 554	115	-897	771	3 034	-21 473	-7.1	16.8%
2045	8.6%	22 912	1 970	152	-1 516	606	4 025	-36 102	-9.0	17.6%
2050	8.6%	29 046	2 498	201	-2 445	254	5 354	-58 015	-10.8	18.4%

Table A5.1.Lower band financial projections (in million £)

Status quo

* For financing the increase of the minimum pension of 10% in 1999 and 10% in 2000.

General average premium over 50 years = 13.8%

59

					Revenue		Total		
P/	Reserve	Reserve	Expenditure		Investment	Contri-	insurable	ntribution	Coi
	ratio	(end of year)		Total	earnings	butions	earnings	rate	Year
8	1.9	368	192	208	18	191	2 220	8.6%	2001
8	1.8	384	208	225	18	206	2 398	8.6%	2002
8	1.8	399	225	240	19	221	2 570	8.6%	2003
8	1.7	417	238	256	20	236	2 741	8.6%	2004
8	1.7	437	251	272	21	251	2 921	8.6%	2005
8	1.7	459	268	289	21	268	3 115	8.6%	2006
8	1.7	480	286	307	22	285	3 318	8.6%	2007
8	1.6	498	307	326	22	303	3 528	8.6%	2008
8	1.6	512	331	345	23	322	3 744	8.6%	2009
8	1.5	528	349	364	23	341	3 966	8.6%	2010
8	1.5	544	368	385	24	361	4 197	8.6%	2011
8	1.4	553	397	406	24	382	4 443	8.6%	2012
9	1.3	552	429	428	24	404	4 698	8.6%	2013
9	1.2	541	463	451	24	427	4 963	8.6%	2014
9	1.0	517	498	474	23	451	5 239	8.6%	2015
10	0.1	70	733	590	6	583	6 782	8.6%	2020
12	-1.2	-1 354	1 094	694	-51	745	8 659	8.6%	2025
14	-2.9	-4 542	1 586	771	-182	953	11 081	8.6%	2030
15	-4.7	-10 241	2 178	802	-420	1 222	14 207	8.6%	2035
15	-6.7	-19 306	2 876	751	-803	1 554	18 069	8.6%	2040
16	-8.7	-32 952	3 768	591	-1 380	1 970	22 912	8.6%	2045
17	-10.7	-53 218	4 969	260	-2 238	2 498	29 046	8.6%	2050

12.9%

Table A5.2.Lower band financial projections (in million \pounds)Increase of the retirement age

General average premium over 50 years =

					Revenue		Total		
PAY	Reserve	Reserve	Expenditure		Investment	Contri-	insurable	ntribution	Co
COS	ratio	(end of year)		Total	earnings	butions	earnings	rate	Year
8.6%	1.9	368	192	208	18	191	2 220	8.6%	2001
8.7%	1.8	384	208	225	18	206	2 398	8.6%	2002
8.5%	1.9	407	218	240	19	221	2 570	8.6%	2003
8.3%	1.9	437	226	256	21	236	2 741	8.6%	2004
8.0%	2.0	476	234	273	22	251	2 921	8.6%	2005
7.8%	2.2	524	243	292	24	268	3 115	8.6%	2006
7.7%	2.3	581	255	311	26	285	3 318	8.6%	2007
7.6%	2.4	645	267	332	28	303	3 528	8.6%	2008
7.5%	2.5	716	282	353	31	322	3 744	8.6%	2009
7.5%	2.6	791	299	374	33	341	3 966	8.6%	2010
7.6%	2.7	872	317	398	37	361	4 197	8.6%	2011
7.6%	2.9	958	336	422	40	382	4 443	8.6%	2012
7.6%	3.0	1 052	355	448	44	404	4 698	8.6%	2013
7.6%	3.0	1 150	377	475	48	427	4 963	8.6%	2014
7.7%	3.1	1 252	401	503	53	451	5 239	8.6%	2015
8.2%	3.2	1 776	558	659	76	583	6 782	8.6%	2020
9.0%	2.8	2 159	781	838	94	745	8 659	8.6%	2025
9.6%	2.1	2 249	1 060	1 052	99	953	11 081	8.6%	2030
9.8%	1.4	1 993	1 396	1 311	90	1 222	14 207	8.6%	2035
10.19	0.7	1 199	1 820	1 611	57	1 554	18 069	8.6%	2040
10.5%	-0.2	-516	2 403	1 958	-13	1 970	22 912	8.6%	2045
11.19	-1.2	-3 959	3 216	2 343	-155	2 498	29 046	8.6%	2050

9.2%

Table A5.3.Lower band financial projections (in million \pounds)Indexing of pensions based on CPI

General average premium over 50 years =

		Total		Revenue						
	Contribution	insurable	Contri-	Transfer	Investment		Expenditure	Reserve	Reserve	PAYG
Yea	r rate	earnings	butions	Cons Fund*	earnings	Total		(end of year)	ratio	cost
2001	8.6%	2 220	191	6	21	218	192	377	2.0	8.6%
2002	8.6%	2 398	206	7	23	235	208	405	1.9	8.7%
2003	8.6%	2 570	221	7	24	252	225	432	1.9	8.8%
2004	8.6%	2 741	236	8	26	269	243	458	1.9	8.9%
2005	8.6%	2 921	251	8	27	287	260	485	1.9	8.9%
2006	8.6%	3 115	268	q	28	305	278	512	1.8	8.9%
2000	8.6%	3 318	285	10	29	324	299	537	1.8	9.0%
2008	8.6%	3 528	303	11	30	344	323	558	1.7	9.1%
2009	8.6%	3 744	322	12	31	364	347	575	17	9.3%
2010	8.6%	3 966	341	13	31	384	376	584	1.6	9.5%
_0.0	0.070	0000	011		01	001	0.0			01070
2011	8.6%	4 197	361	14	31	406	407	583	1.4	9.7%
2012	8.6%	4 443	382	15	31	428	438	572	1.3	9.9%
2013	8.6%	4 698	404	16	30	450	471	552	1.2	10.0%
2014	8.6%	4 963	427	18	28	473	508	516	1.0	10.2%
2015	8.6%	5 239	451	19	26	495	548	463	0.8	10.5%
2020	8.6%	6 782	583	20	-6	607	805	-101	-0.2	11 0%
2020	8.6%	8 650	745	23	-05	603	1 185	-191	-0.2	13.7%
2023	8.6%	11 081	053	63	-95	731	1 680	-2 000	-1.7	15.7 %
2030	0.078 8.6%	14 207	1 222	00	-200	697	2 292	12 267	-5.4	16.1%
2035	8.6%	14 207	1 222	115	-021	500	2 202	-12 307	-3.4	16.8%
2040	0.0%	22 012	1 004	110	-1 100	100	3 034 4 025	-23 043	-7.0	17.6%
2040	0.0%	22 312	2 400	102	-2 022	626	4 020	-39 004 65 205	-9.9 10.0	10.10/
2050	0.0%	29 040	2 498	201	-3 334	-030	5 354	-05 205	-12.2	10.4%

Table A5.4.Lower band financial projections (in million \pounds)Higher investment return

* For financing the increase of the minimum pension of 10% in 1999 and 10% in 2000.

General average premium over 50 years = 13.3%

PAYG cost	Reserve ratio	Reserve (end of year)	Expenditure		Revenue		Total		
					Investment	Contri-	insurable	ntribution	Cor
				Total	earnings	butions	earnings	rate	Year
8.6%	1.9	368	192	208	18	191	2 220	8.6%	2001
8.7%	1.8	384	208	225	18	206	2 398	8.6%	2002
8.5%	1.9	411	218	244	23	221	2 570	8.6%	2003
8.1%	2.0	449	223	261	25	236	2 741	8.6%	2004
7.8%	2.2	501	227	279	28	251	2 921	8.6%	2005
7.5%	2.4	565	234	298	31	268	3 115	8.6%	2006
7.3%	2.6	642	243	319	34	285	3 318	8.6%	2007
7.2%	2.9	729	254	341	38	303	3 528	8.6%	2008
7.1%	3.1	826	267	364	42	322	3 744	8.6%	2009
6.9%	3.4	940	275	388	47	341	3 966	8.6%	2010
6.8%	3.8	1 071	284	415	54	361	4 197	8.6%	2011
6.8%	4.0	1 214	300	443	61	382	4 443	8.6%	2012
6.8%	4.3	1 369	318	473	69	404	4 698	8.6%	2013
6.8%	4.6	1 536	337	505	78	427	4 963	8.6%	2014
6.8%	4.8	1 716	357	538	87	451	5 239	8.6%	2015
7.3%	5.6	2 771	494	725	142	583	6 782	8.6%	2020
8.0%	5.8	4 014	695	953	208	745	8 659	8.6%	2025
8.7%	5.6	5 338	959	1 231	278	953	11 081	8.6%	2030
8.9%	53	6 7 9 4	1 270	1 577	355	1 222	14 207	8.6%	2035
9.1%	5.1	8 4 4 4	1 641	1 996	443	1 554	18 069	8.6%	2040
9.4%	4.8	10 259	2 146	2 510	539	1 970	22 912	8.6%	2045
9 Q%	4 1	11 782	2 874	3 1 2 2	624	2 498	29 046	8.6%	2050

Table A5.5.Lower band financial projections (in million £)Combined reform options (increase of retirement age, indexing based on CPI, higher investment return)

8.2%

General average premium over 50 years =

	Expenditure	Revenue			Total		
Reserv		Investment		insurable	Contribution		
(end of yea		Total	earnings	Contributions	earnings	rate	Year
1 79	50	208	84	124	2 220	5.6%	2001
1 96	58	226	92	134	2 398	5.6%	2002
2 14	67	244	100	144	2 570	5.6%	2003
2 32	77	262	109	153	2 741	5.6%	2004
2 52	87	282	118	164	2 921	5.6%	2005
2 72	98	300	125	174	3 1 1 5	5.6%	2006
2 93	112	318	133	186	3 318	5.6%	2007
3 14	128	337	139	198	3 528	5.6%	2008
3 34	146	356	146	210	3 744	5.6%	2009
3 55	170	374	152	222	3 966	5.6%	2010

235

249

263

278

293

380

485

621

796

1 012

1 283

1 6 2 7

8.7%

161

170

178

187

195

226

228

181

69

-136

-481

-1 038

396

418

441

465

488

606

713

802

865

876

802

589

Reserve

3 754

3 953

4 148

4 337

4 515

5 183

5 139

3 942

1 221

-3 698

-11 921

-25 171

195

219

246

276

311

513

802

1 1 5 0

1 557

2 0 7 9

2786

3734

ratio

35.9

33.7

31.9

30.2

29.1

27.8

26.2

24.6

22.9

20.9

19.3

18.0

16.8

15.7

14.5

10.1

6.4

3.4

0.8

-1.8

-4.3

-6.7

PAYG

cost

2.3%

2.4%

2.6%

2.8%

3.0%

3.1%

3.4%

3.6%

3.9%

4.3%

4.6%

4.9%

5.2%

5.6%

5.9%

7.6%

9.3%

10.4%

11.0%

11.5% 12.2%

12.9%

Table A5.6. Upper band financial projections (in million £) Status quo

4 197

4 4 4 3

4 698

4 963

5 2 3 9

6 782

8 659

11 081

14 207

18 069

22 912

29 046

64

General average premium over 50 years =

5.6%

5.6%

5.6%

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5.6%

5.6%

2011

2012

2013

2014

2015

2020

2025

2030

2035

2040

2045

2050
		Total	Revenue						
Cor	ntribution	insurable		Investment		Expenditure	Reserve	Reserve	PAYO
Year	rate	earnings_	Contributions	earnings	Total		(end of year)	ratio	cos
2001	5.6%	2 220	124	84	208	50	1 797	35.9	2.3%
2002	5.6%	2 398	134	92	226	58	1 965	33.7	2.4%
2003	5.6%	2 570	144	100	244	67	2 142	31.9	2.6%
2004	5.6%	2 741	153	109	263	74	2 330	31.6	2.7%
2005	5.6%	2 921	164	119	282	80	2 533	31.8	2.7%
2006	5.6%	3 115	174	126	301	90	2 744	30.6	2.9%
2007	5.6%	3 318	186	134	320	101	2 962	29.2	3.1%
2008	5.6%	3 528	198	141	339	116	3 185	27.5	3.3%
2009	5.6%	3 744	210	148	358	133	3 410	25.7	3.5%
2010	5.6%	3 966	222	155	377	146	3 641	25.0	3.7%
2011	5.6%	4 197	235	166	401	160	3 882	24.3	3.8%
2012	5.6%	4 443	249	176	425	183	4 124	22.6	4.1%
2013	5.6%	4 698	263	187	450	209	4 366	20.9	4.4%
2014	5.6%	4 963	278	197	475	236	4 605	19.5	4.8%
2015	5.6%	5 239	293	208	501	267	4 840	18.2	5.1%
2020	5.6%	6 782	380	255	635	450	5 883	13.1	6.6%
2025	5.6%	8 659	485	282	767	721	6 431	8.9	8.3%
2030	5.6%	11 081	621	270	890	1 058	6 042	5.7	9.6%
2035	5.6%	14 207	796	203	999	1 450	4 391	3.0	10.2%
2040	5.6%	18 069	1 012	61	1 073	1 936	952	0.5	10.7%
2045	5.6%	22 912	1 283	-192	1 091	2 576	-5 116	-2.0	11.2%
2050	5.6%	29 046	1 627	-618	1 008	3 457	-15 284	-4.4	11.9%

Table A5.7.Upper band financial projections (in million £)Increase of the retirement age

General average premium over 50 years =

		Total		Revenue					
tributi	ion	insurable		Investment		Expenditure	Reserve	Reserve	PAYG
ra	ate	earnings	Contributions	earnings	Total		(end of year)	ratio	cost
5.6	6%	2 220	124	84	208	50	1 797	35.8	2.3%
5.6	6%	2 398	134	92	226	58	1 965	33.7	2.4%
5.6	6%	2 570	144	120	264	67	2 161	32.0	2.6%
5.6	6%	2 741	153	132	285	78	2 369	30.5	2.8%
5.6	6%	2 921	164	144	308	87	2 590	29.7	3.0%
5.6	6%	3 115	174	155	329	99	2 820	28.6	3.2%
5.6	6%	3 318	186	166	351	113	3 059	27.1	3.4%
5.6	6%	3 528	198	176	374	129	3 304	25.6	3.7%
5.6	6%	3 744	210	187	396	148	3 553	24.0	3.9%
5.6	6%	3 966	222	197	419	171	3 801	22.2	4.3%
5.6	6%	4 197	235	210	445	196	4 049	20.6	4.7%
5.6	6%	4 4 4 3	249	223	472	222	4 300	19.4	5.0%
5.6	6%	4 698	263	237	500	249	4 551	18.3	5.3%
5.6	6%	4 963	278	250	528	279	4 801	17.2	5.6%
5.0	6%	5 239	293	263	557	314	5 044	16.1	6.0%
5.6	6%	6 782	380	323	702	517	6 117	11.8	7.6%
5.6	6%	8 659	485	353	838	808	6 613	8.2	9.3%
5.6	6%	11 081	621	331	952	1 157	6 085	5.3	10.4%
5.6	6%	14 207	796	236	1 031	1 564	4 133	2.6	11.0%
5.6	6%	18 069	1 012	29	1 041	2 086	18	0.0	11.5%
5.6	6%	22 912	1 283	-351	932	2 7 9 1	-7 494	-2.7	12.2%
5.6	6%	29 046	1 627	-1 007	620	3 7 3 7	-20 377	-5.5	12.9%

8.3%

Table A5.8.Upper band financial projections (in million £)Higher investment return

General average premium over 50 years =

				Revenue			Total		
е	Reserve	Reserve	Expenditure		Investment		insurable	Contribution	
0	ratio	(end of year)		Total	earnings	Contributions	earnings	rate	Year
8	35.8	1 797	50	208	84	124	2 220	5.6%	2001
7	33.7	1 965	58	226	92	134	2 398	5.6%	2002
0	32.0	2 161	67	264	120	144	2 570	5.6%	2003
0	32.0	2 373	74	285	132	153	2 741	5.6%	2004
4	32.4	2 601	80	308	145	164	2 921	5.6%	2005
.4	31.4	2 841	90	330	156	174	3 115	5.6%	2006
3	30.3	3 092	102	353	167	186	3 318	5.6%	2007
7	28.7	3 351	117	376	178	198	3 528	5.6%	2008
0	27.0	3 616	134	399	190	210	3 744	5.6%	2009
6	26.6	3 893	146	423	201	222	3 966	5.6%	2010
9	25.9	4 182	161	451	216	235	4 197	5.6%	2011
3	24.3	4 479	184	481	232	249	4 443	5.6%	2012
7	22.7	4 779	211	511	248	263	4 698	5.6%	2013
3	21.3	5 082	238	542	264	278	4 963	5.6%	2014
0	20.0	5 386	269	574	280	293	5 239	5.6%	2015
.1	15.1	6 868	455	740	360	380	6 782	5.6%	2020
0	11.0	8 027	727	910	425	485	8 659	5.6%	2025
9	7.9	8 436	1 065	1 072	452	621	11 081	5.6%	2030
3	5.3	7 770	1 457	1 218	423	796	14 207	5.6%	2035
8	2.8	5 485	1 943	1 322	311	1 012	18 069	5.6%	2040
3	0.3	681	2 581	1 353	70	1 283	22 912	5.6%	2045
4	-2.4	-8 254	3 461	1 245	-382	1 627	29 046	5.6%	2050

Table A5.9.Upper band financial projections (in million £)Combined reform options (increase of retirement age, higher investment return)

General average premium over 50 years =