British Virgin Islands

Report to the Government

Eighth actuarial review of the Social Security system as of 31 December 2003

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Foreword

Section 17 of the *Social Security Ordinance, 1979* requires that the Social Security Board, with the assistance of an actuary approved by the Minister, review the operation of the system every three years. The last actuarial review was covering the period 1998-2000. The present review, the eighth since the entry into force of the system, covers the period 2001 to 2003.

The actuarial report is divided into five Sections. Section 1 presents the experience of the system since the last actuarial review. Section 2 describes the demographic and economic environment of the BVI and provides the framework within which the Social Security system will evolve over the next 50 years. Section 3 presents the projected revenue and expenditure of the various Branches of the system under the present legal provisions. Section 4 shows the impact of modifications to the system. Section 5 presents considerations on statistics.

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Abbreviations and acronyms

BVI	British Virgin Islands
СРІ	Consumer price index
EIB	Employment Injury Benefit Branch
GAP	General average premium
GDP	Gross domestic product
LTB	Long-term Benefit Branch
NAW	National average wage
OECD	Organisation for Economic Co-operation and Development
Reserve ratio/ funding ratio	Reserve at year-end as a ratio of annual expenditure
STB	Short-term Benefit Branch
US\$	United States dollar

Acknowledgements

The ILO appointed Mr. Pierre Plamondon, Senior Actuary, and Mr. Charles Crevier, Actuarial Assistant, to undertake this assignment. Mr. Plamondon was in Roadtown from 7 to 11 June 2004 to collect the statistical information for the valuation and to discuss the terms of reference with the authorities of the Social Security Board.

The Director-General of the ILO wishes to express his sincere thanks to Ms. Antoinette Skelton, Director of the Social Security Board, Ms. Yvonne Thomas, Senior Executive Assistant, Ms. Glenda Smith, Information Technology Manager and Mr. Clarence Faulkner, Investment Manager, for their collaboration and continuous assistance during all phases of this project.

Executive summary

The three Benefit Branches administered by the Social Security Board are in good financial condition, the investment policy is adequate and the level of administrative expenses is reasonable considering the BVI context and the size of the system. The BVI Social Security system fully covers the work force of the territory. There does not appear to exist any problem of non-compliance to the payment of contributions.

The main recommendations of this report consider the need to introduce an automatic adjustment of system's parameters, to modify the calculation of the Age pension in order to improve equity between the various categories of beneficiaries, and to adopt a schedule of contribution rates for the future. In addition a transfer of reserves between the Short-term Benefit Branch and the Long-term Benefit Branch is recommended.

Financial situation as of valuation date

The BVI Social Security system is relatively young. It started its operations in 1980. Hence the Long-term Benefit Branch has not reached a state of maturity, and the cost of pensions expressed as a percentage of insurable earnings is still increasing. The annual expenditure of the Branch represents, in 2004, 2.3 per cent of insurable earnings and it will gradually increase to 15.7 per cent in 2050. If the Branch had to be financed by a constant contribution rate over the next 50 years, this rate (the general average premium¹, or GAP) would be 8.5 per cent. The GAP may be compared to the current contribution rate devoted to pensions, which is 6.5 per cent of insurable earnings. (See Section 3.1)

Despite the anticipated increase in expenditure, the reserve is not expected to decrease during the next three decades. The reserve of the Long-term Benefit Branch will increase in absolute value until 2036. The reserve ratio (reserve expressed as a ratio of annual expenditure) is presently 36.5. It will be greater than 3.0 until 2044 and the reserve would be depleted only in 2050 on the basis of the assumptions established for this valuation. There is thus no emergency for adjusting the contribution rate in the very short-term. It is however recommended to adopt a regular and orderly mechanism of contribution rate increases for the future to guarantee the long-term financial sustainability. (See Section 3.4)

The BVI Social Security system operates in a particular context where the labour force is greatly affected by the movement of workers in and out of the territory. Migrant workers often pay contributions for relatively short periods. This affects the proportion of contributors eligible for pensions (versus grants). It also affects the rate of accumulation of pension rights and the average pension. The present valuation attempts to take into account this phenomenon.

¹ The GAP is calculated here as the present value of scheme's expenditure of the period 2004-2050 divided by the present value of total insurable earnings for the same period. The initial reserve as at 31 December 2003 is not considered. It is possible to calculate the GAP by considering the initial reserve. However, the choice has been made here to ignore the initial reserve because the GAP is used extensively in this report to compare the various reform scenarios and sensitivity tests, and the inclusion of the reserve would have reduced significantly the sensitivity of the indicator.

	Year of reserve depletion	PAYG cost rate in 2050	General average premium
Base scenario	2050	15.7%	8.5%

The reserve of the Short-term Benefit Branch represents, at the end of 2003, 21.6 times the annual expenditure. This reserve is far higher than the level normally recommended as a contingency reserve for this type of short-term benefits. It is recommended to keep a reserve equivalent to two years of expenditure and to transfer the excess (US\$34,366,548) to the Long-term Benefit Branch. The present contribution rate allocated to the Short-term Benefit Branch of 1.5 per cent (1.0 per cent for civil servants) should remain unchanged.

The reserve of the Employment Injury Benefit Branch represents, at the end of 2003, 7.6 times the annual expenditure. This reserve is considered adequate when considering the need to maintain a contingency reserve as regards benefits of a short-term nature, plus a reserve equivalent to the present value of pensions-in-payment for disablement and survivors' pensions. The present contribution rate allocated to the Employment Injury Benefit Branch of 0.5 per cent devoted to the Employment Injury Benefit Branch should remain unchanged.

As mentioned above, it is recommended to adopt a schedule of increasing contribution rates for the future considering the projected increase of the cost of the Long-term Benefit Branch. Table ES2 indicates the recommended contribution rate for the Long-term Benefit Branch, which should increase to 8.5 per cent of insurable earnings ultimately. This schedule takes into account the recommended immediate transfer of reserve of US\$34,366,548 from the Short-term to the Long-term Branch.

Table ES2 further provides the details of the recommended contribution rate increases for all benefit branches. Overall, the long-term contribution rate should increase to a level of 10.5 per cent of insurable earnings. It is advisable that this schedule be reflected in the BVI Social Security regulations and future actuarial valuations should compare their results to ascertain this schedule remains valid to ensure the long-term financial sustainability of the whole social security system.

Period	Long-term	Short-term Benefit Branch		Employment	Total
i chou	Benefit Branch	Sickness	Other	Branch	i otai
2004-2019	6.5	1.0	0.5	0.5	8.5
2020-2029	7.0	1.0	0.5	0.5	9.0
2030-2039	7.5	1.0	0.5	0.5	9.5
2040-2049	8.0	1.0	0.5	0.5	10.0
2050 +	8.5	1.0	0.5	0.5	10.5

Table ES2: Recommended contribution rates (as % of insurable earnings)

Recommendations

A series of benefit improvements are recommended:

 Modification to the pension formula with a flat accrual rate for the Age pension and the gradual introduction of a longer reference period of average earnings used in the calculation of pensions and subject to the availability of the required time-series for national average wage (see Section 4.1);

- Increase of the minimum pension from its current level of US\$104 per month to 60 per cent of the minimum wage this implies a change to the legal definition of the minimum pension (see Section 4.2); an alternative option would be to increase the minimum pension to 40 percent of the minimum wage as a first step and to later consider the increase to 60 per cent of the minimum wage;
- Introduction of a mechanism for the automatic adjustment of pensions-in-payment and system's parameters (see Section 4.3); an ad hoc increase of the earnings' ceiling should be considered at the time (or before) the automatic indexing is introduced;
- Ad hoc increase of 10 per cent of pensions-in-payment at the date of introduction of the preceding modifications (see Section 4.4);

Only the increase of the minimum pension has a significant impact on the system's financial projections. The increase of the minimum pension to 60 per cent of the minimum wage would increase the general average premium (the cost of the Long-term Benefit Branch on a constant long-term basis) from 8.5 per cent to 9.2 per cent of insurable earnings and would cause a slightly faster depletion of the reserve (2045 compared 2050 under the base scenario). If the minimum pension is increased to only 40 per cent of the minimum wage, the general average premium increases to 8.8 per cent instead of 9.2 per cent. All other modifications would have only minor financial implications in the long run.

The change to the pension formula should only be introduced once consultations have taken place to clarify what are the long-term income replacement objectives and contributing capacity for the different population groups covered by the BVI Social Security. An in-depth study to identify winners and losers should precede the adoption of the more predominant reforms to the benefit provisions, such as the pension formula.

	Year of reserve depletion	PAYG cost rate in 2050	General average premium
New pension formula	2050	15.6	8.4
Increase and modify definition of the minimum pension (to 60 per cent of the minimum wage)	2045	17.0	9 .2 ¹
Automatic adjustment of parameters	2050	15.7	8.5
Ad hoc adjustment of pensions-in-payment	2049	15.7	8.5
All modifications combined	2044	17.4	9.4

 Table ES3:
 Indicators of the financial condition of the Long-term Benefit Branch under various reform proposals (as % of insurable earnings)

¹ If the minimum pension is increased to 40 per cent of the minimum wage instead of 60 per cent, the general average premium is increased to 8.8 per cent.

The SSB is a leader in The Caribbean as regards its investment policy. Its investment portfolio is diversified and past returns have been good (see Section 1.3). Two considerations are brought to the attention of management:

- The proportion of the portfolio allocated to short-term investments could be reduced; and
- The Board could consider adopting an official investment policy.

The level of administrative expenses is considered reasonable when considering the level observed in other Caribbean systems and given the size of the BVI Social Security Board (see Section 1.4).

1. Experience since the last actuarial review of 2000

1.1. Amendments to the law

The following changes took effect on 1 January 2001:

- The maximum insurable earnings per annum were increased from US\$18,096 to US\$23,400;
- Pensions awarded prior to January 1998 were increased by 10 per cent and pensions awarded from January 1998 to December 1999 were increased by 5 per cent;
- The payment of the funeral grant was extended to children aged over 15 (until age 21) if the child attends school;
- The contribution condition for eligibility to Invalidity and Survivors' pensions was extended to 500 weeks, to be in line with the Age pension;
- Survivors' benefits were made gender neutral.

1.2. Benefit experience

This section analyses the experience of the three Benefit Branches since the last actuarial review. Detailed financial results for the period 2001-2003 appear in Annex 3.

The cost of Age pensions in terms of a percentage of insurable earnings has been increasing steadily over the years, reflecting the maturing process of the scheme. The total cost of the Long-term Benefit Branch represented 2.09 per cent of insurable earnings in 2003 (Table 1.1). This may be compared to the present contribution rate attributed to pensions of 6.5 per cent. Section 3 will show that the cost of this Branch will, however, continue increasing in future to levels exceeding the present 6.5 per cent contribution rate. The number of pensioners has increased each year for all types of pensions (Table 1.2).

Table 1.1: Long-term Benefits Branch expenditure, 2001-2003 (as % of insurable earnings)

	2001	2002	2003
Age pensions	0.80	0.85	0.97
Age grants	0.03	0.05	0.07
Invalidity pensions	0.15	0.16	0.16
Invalidity grants	0.01	0.01	0.00
Survivors' pensions	0.18	0.18	0.19
Survivors' grants	0.01	0.02	0.01
Administration, depreciation and amortization	0.79	0.97	0.69
Total	1.97	2.24	2.09

Table 1.2:	Pensions-in-payment under LTB Branch, awarded and terminated, 20	01-2003
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Pension type	In payment on 31 Dec. 2000	Awarded over 2001-2003	Terminated over 2001-2003	In payment on 31 Dec. 2003
Age	436	172	50	558
Invalidity	68	46	35	79
Survivors'	188	105	48	245

Pensions-in-payment have received an ad hoc increase in 2001 that mainly explains the increase of average pensions between 2000 and 2001. Since pensions-in-payment are not automatically indexed, the average Invalidity and Survivors' pensions have been relatively stable between 2002 and 2003. The increase of the average Age pension between 2001 and 2003 reflects the increase of the average length of service and reference earnings (used in the pension formula) of new Age pensioners (Table 1.3).

Table 1.3: Average monthly pensions-in-payment under LTB Branch at year-end 2000-2003 (US\$)

Pension type	2000	2001	2002	2003
Age	257	270	283	296
Invalidity	295	311	323	322
Survivor	126	131	130	132

Table 1.4 presents the expenditure of the Short-term Benefits Branch expressed as a percentage of insurable earnings. The cost expressed as a percentage of insurable earnings has been relatively stable over the period 2001-2003.

As regards Sickness benefits, the number of female beneficiaries is about twice the number of males. The average duration of benefit is 15 days. The Maternity allowance is paid on average to 285 persons each year for an average duration of 62 days, which means that most beneficiaries use the maximum period of 13 weeks allowed for that benefit. The Maternity grant has been paid to a larger number of persons than the allowance (432 in 2002 and 439 in 2003) since the grant is paid to women who do not necessarily have a recent attachment to the labour force.

Table 1.4: Short-term Benefits Branch expenditure, 2001-2003 (as % of insurable earnings)

	2001	2002	2003
Sickness benefits	0.34	0.32	0.32
Maternity allowances	0.37	0.35	0.32
Maternity grants	0.06	0.05	0.05
Funeral grants	0.06	0.05	0.06
Administration, depreciation and amortization	0.21	0.25	0.16
Total	1.04	1.02	0.91

The Employment Injury Benefit Branch paid benefits during 16 days on average in 2001 and 2002 and 11 days in 2003. The reimbursement of medical expenses represents a total expenditure varying between US\$30,000 and US\$45,000 per year (an average expenditure of US\$354 per case). At the end of 2003, nine Disablement pensions and ten Survivors' pensions (following the death of an injured worker) were in payment.

Table 1.5:	Employment Injury Benefits Bra	nch expenditure, 2001-2003	(as % of insurable earnings)
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	2001	2002	2003
Injury benefits	0.05	0.03	0.03
Medical expenses	0.04	0.02	0.03
Disablement and death	0.03	0.06	0.03
Funeral grants	0.00	0.00	0.00
Disablement grants	0.01	0.00	0.00
Administration, depreciation and amortization	0.12	0.14	0.09
Total	0.25	0.25	0.18

1.3. Investments

The investments of the Social Security Fund were distributed, over the past three years, as shown in Table 1.6. As regards investments, the BVI has two advantages compared to other Caribbean islands: the use of the US dollar for currency and the easy access to the US market.

In 2003, short-term investments represent 32 per cent of the portfolio, compared to the target allocation of 10 per cent specified in the investment policy. It will be important to reduce the proportion of the portfolio in short-term investments given the investment policy target and the very low return on this type of assets.

Socio-economic loans represent loans to government agencies, which are oriented towards the economic development of the BVI. The proportion of these loans in the total SSB portfolio has decreased from 12 per cent in 2001 to 6 per cent in 2003. Fixed-income securities are composed of short-term and mid-term bonds issued by the US Treasury and various government agencies. They have taken an increasing part of the portfolio since 2001, now representing 50 per cent of total investments.

The equity portfolio is invested in US and international equity. This portfolio is actively managed and the SSB uses external consultants for the management of these assets. The percentage of the portfolio invested in equities (US and international) varied between 12 per cent and 14 per cent in recent years.

Table 1.6: Asset allocation of the Social Security Fund, 2001-2003 (as % of total portfolio)

	2001	2002	2003
Short-term assets	37	34	32
Socio-economic loans	12	9	6
Fixed-income securities	37	44	50
Equities	14	13	12
Total	100	100	100

Figure 1.1 presents the rate of return of the Fund for the period 1991-2003. If the period 2000-2002 is excluded, the rate of return of the Fund has averaged 7 per cent over that period. Despite the difficulties encountered by most investment funds during 2001 and 2002, the Social Security Fund of the BVI has been able to maintain a positive rate of return, due mainly to its low exposure to equities, quick mechanisms for rebalancing the portfolio when required, a large part of the portfolio allocated to US government fixed-income securities and a close monitoring of its investment managers network.

Figure 1.1: Historical rates of return (nominal) of the Social Security Fund, 1991-2003



Note: Investment income includes, regular investment income, rental income and realized and unrealized capital gains and losses on investments. The rate of return is calculated as (2 x I) ÷ (A + B – I), where I is the investment income for the year, A is the Fund at the beginning of the year and B is the Fund at the end of the year.

The SSB has been innovative in establishing clear and complete investments guidelines. Most of its current investment practices are outlined in an investment policy statement. This policy statement deals notably with the investment objectives, target asset allocation, target rate of return and relationship with external investment managers. However, the Social Security Board has not yet officially adopted the investment policy. The formal adoption by the Board should take place as soon as possible.

1.4 Administrative expenses

Administrative expenses of the SSB are relatively low when compared to most Caribbean islands. They represented less than 1 per cent of insurable earnings in 2003. When expressed as a percentage of total benefits paid, administrative expenses represent around 50 per cent of total benefit expenditure. This high ratio reflects the fact that the scheme is not mature and benefit expenditures have not reached their long-term stabilized level.

Administrative expenses have decreased in 2003 as compared to 2002, due principally to a reduction of SSB employees' pension fund payments and a reduction of the contribution to the Joshua Smith Fund.

Table 1.7: Administrative expenses, 2001-2003

	2001	2002	2003
Administration, depreciation and amortization (US\$)	1,935,361	2,573,339	1,962,094
As % of contribution revenue	13.3	16.2	11.3
As % of total benefit expenditure	53.4	64.5	43.8
As % of insurable earnings	1.1	1.4	0.9

2. Demographic and macro-economic framework

2.1 Demographic framework

The BVI has a total population estimated at 21,332 persons in 2003, of which 11,047 are expatriates. Nationals thus represent only 48 per cent of the population. Migration has an important effect on the development of the population. The population has grown at an average rate of 2 per cent per year since 1991. The BVI has experienced fertility rates comparable to North American and Western European countries (between 1.6 and 2.0 over the last five years). Life expectancy has fluctuated around 73 for males and 79 for females over recent years.

The last census has been conducted in 2001, but the results are not yet published. Most of the available population data are thus estimates from the 1991 census, adjusted with the annual population movements since that date.

The Social Security system covers all workers in the territory. The population considered in the following projections thus includes both nationals and expatriates. For the purpose of the population projections, the total fertility rate has been assumed constant at 1.6 children per woman for the whole projection period. Life expectancy at birth is assumed to increase from the current observed levels (73.0 years for males and 79.0 years for females) to 76.6 years for males and 82.2 years for females in 2050. The migration assumption is a more delicate matter. Even if data are available as regards inward migration, no precise data are available on emigration from the territory. Based on recent national data, a net migration of 250 persons per year is assumed for the future, composed of 750 immigrants and 500 emigrants distributed by age as illustrated in Figure 2.1.



Figure 2.1: Assumed distribution of net migrants by age

On the basis of these assumptions, the population of 21,332 persons in 2003 is projected to increase to 33,164 persons in 2030 and 38,911 in 2050. The population thus increases on average by 1.6 per cent per year from 2003 to 2030 and by 0.8 per cent per year from 2030 to 2050. Migration represents an important factor of the increase of the population. Population projections also reveal an aging of the population that will bring upward the ratio of the population aged 65 and over to the population aged 15 to 64 (the dependency ratio). The dependency ratio will increase continuously from 7.1 per cent in 2003 to 26.4 per cent in 2050. Section 3 will show that the increase of the dependency ratio of the

population will have a direct impact on the cost of the Long-term Benefits Branch of the SSB.

Maran		Number of persor	ns by age group:	
Year	0-14	15-64	65+	Total
2003	5,464	14,820	1,048	21,332
2010	4,942	17,907	1,503	24,352
2020	5,109	21,051	2,841	29,001
2030	5,653	22,634	4,876	33,163
2040	5,632	24,765	5,949	36,346
2050	5,943	26,078	6,890	38,911
		Distribution by a	i ge (as % of total):	
2003	25.6	69.5	04.9	100.0
2010	20.3	73.5	06.2	100.0
2020	17.6	72.6	09.8	100.0
2030	17.0	68.3	14.7	100.0
2040	15.5	68.1	16.4	100.0
2050	15.3	67.0	17.7	100.0
		Depender	ncy ratio:	
		Population 65+ ove	r population 15-64	
2003		7.	1	
2010		8.	4	
2020		13	.5	
2030		21	.5	
2040		24	.0	
2050		26	.4	

Table 2.1: Projection of the general population, 2003-2050

2.2. Labour force and economic environment

The BVI experienced a sustained economic growth over the past two decades. Nominal GDP grew by more than five times during the period 1990-2002. Real GDP growth has averaged 4.3 per cent per year over the last five years. It is projected that this high level of growth will be maintained until around 2010, when it will start to decrease to a long-term real growth rate of 2.3 per cent per year from 2025. The wage share of GDP stands presently around 34 per cent. It is projected that this share will increase gradually to 40 per cent in 2050.

The combination of these GDP growth assumptions with the labour force projections presented in Section 2.2.2 lead to productivity increases and annual employment growth as shown in Table 2.2.

Figure 2.2: Projected population by age groups for selected years



Table 2.2: Assumed GDP growth, productivity and growth of employment (as annual %)

Year	Real GDP growth	Increase of productivity per worker	Increase of no. of workers
2004	4.0	0.9	3.0
2005	4.0	1.0	3.0
2006	4.0	1.1	2.9
2010	3.8	1.3	2.5
2020	2.8	1.6	1.1
2030	2.3	1.6	0.7
2040	2.3	1.4	0.9
2050	2.3	2.0	0.3

The government of the BVI does not conduct labour force surveys. Employment data come from the Social Security Board. The official unemployment rate published by the Development Planning Unit (3.56 per cent) is taken from the 1991 census and is kept as the official figure year after year as no other official data are available. Considering the good economic conditions of the country and the facility for immigrants to find employment, an unemployment rate at this level appears reasonable for the future. The projected labour force, employment and unemployment for the period 2003-2050 are presented in Table 2.3.

For the purpose of labour force projections, the labour force participation rates by age are supposed constant for the next 50 years. The increase of the global participation rate is thus the effect of an ageing of the working population, participation rates generally increasing with age. The unemployment rate is assumed constant at 3.5 per cent for the future and the employed population is obtained from subtracting unemployment from the labour force.

	2003	2010	2020	2030	2040	2050
Population						
Male	10,970	12,421	14,651	16,609	18,042	19,191
Female	10,362	11,932	14,349	16,554	18,303	19,720
Total	21,332	24,353	29,000	33,163	36,345	38,911
Population 15 to 64						
Male	7,662	9,176	10,706	11,454	12,483	13,064
Female	7,158	8,731	10,345	11,180	12,281	13,014
Total	14,820	17,907	21,051	22,634	24,764	26,078
Labour force						
Male	7,270	8,725	10,345	11,094	12,064	12,685
Female	6,774	8,281	9,988	10,821	11,869	12,647
Total	14,044	17,006	20,333	21,915	23,933	25,332
Labour force participation rate						
Male (%)	94.9	95.1	96.6	96.9	96.6	97.1
Female (%)	94.6	94.9	96.5	96.8	96.6	97.2
Total (%)	94.8	95.0	96.6	96.8	96.6	97.1
Employed persons						
Male	7,016	8,420	9,983	10,706	11,642	12,241
Female	6,537	7,991	9,638	10,442	11,453	12,204
Total	13,553	16,411	19,621	21,148	23,095	24,445
Unemployment rate (%)	3.5	3.5	3.5	3.5	3.5	3.5

Table 2.3: Projected labour force balance, 2003-2050

Over the past decade, inflation has been relatively low in the BVI, as shown in Table 2.4. It may be assumed that inflation will remain low in the future, around the values observed for the United States. A constant 3 per cent inflation is thus assumed for the whole projection period.

Table 2.4:Historical inflation rate in the BVI, 1997-2003

Year	Annual inflation rate (%)
1997	5.9
1998	4.4
1999	2.3
2000	2.8
2001	3.1
2002	0.4
2003	3.6

According to SSB data, the average insurable earnings have increased by approximately 5 per cent per year between 2001 and 2003. Under the macro-economic frame established for this valuation, the wage share of GDP is projected to increase from 34 per cent in 2003 to 40 per cent in 2050. Consequently, the growth of the average wage will be higher, initially, than the increase of the productivity per worker but will gradually converge to the rate of increase of productivity over the next 50 years. Nominal salary increases are expected to fluctuate around 5 per cent for the whole projection period (see Table 2.5).

As regards the assumed future yield on SSB reserves, it must be remembered that the BVI economic growth is highly dependent on external factors such as tourism and financial services. It is observed that interest rates in the BVI are tied to the US market. Banks in the BVI are generally subsidiaries of US or Canadian banks. Their interest rates thus follow US and Canadian interest rates. On the other hand, the BVI government does not need borrowing and does not issue bonds. The future assumed yield of the Social Security Fund also considers the investment policy of the SSB. Investment objectives of the Social Security Board, outlined in its investment policy, are aimed at ensuring a minimum nominal rate of return of 7 per cent annually and ensuring a real rate of return of 4 per cent

(above the inflation rate), inflation being defined here as the increase in the US Consumer Price Index. Accordingly, the nominal rate of return of the Social Security Fund is assumed constant at 7 per cent per year for the whole projection period.

Year	Inflation rate	Annual nominal Inflation rate increase in average wage		
2004	3.0	4.3	7.0	
2005	3.0	4.4	7.0	
2006	3.0	4.5	7.0	
2007	3.0	4.6	7.0	
2008	3.0	4.7	7.0	
2009	3.0	4.7	7.0	
2010	3.0	4.7	7.0	
2020	3.0	5.0	7.0	
2030	3.0	5.0	7.0	
2040	3.0	4.7	7.0	
2050	3.0	5.3	7.0	

Table 2.5: Projected inflation rate, wage increase and rate of return (as annual % characteristic)	ange)
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3. Actuarial projections under present provisions

This valuation deals with the ability of the Social Security system 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 with the SSB 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 presented in Section 2 and on the basis of the database and scheme-specific assumptions presented in Annex 4.

The main purpose of the valuation is to find out whether the financing of the SSB 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 administered by the SSB: Short-term benefits, Employment Injury benefits and Long-term benefits. The key area of concern will be the Long-term Benefit Branch, since it counts for the largest proportion of future expenditure. It is certain that this proportion will grow significantly in the future due to the current immature state of that Branch. Long-term benefits will attain a mature state only after the youngest persons of the first generation of contributors will have become pensioner, have died and all survivors' pensions paid on their behalf have ceased. This requires that the situation of the scheme be analysed over the next 50 years.

The general methodology of the valuation is described in Annex 2.

3.1 Long-term Benefit Branch

3.1.1 Demographic projections

The BVI Social Security system evolves in a very particular demographic context. A large number of persons come temporarily to the territory and work for a few years. They acquire rights under the system, but their contribution record may not be sufficient to meet the eligibility criteria for a pension. This movement of workers in and out of the scheme will thus affect the number of pensions (versus grants) eventually paid under the scheme, as well as the amount of pensions. As described in Annex 4, an attempt has been made to simulate the entry and exit of contributors in line with the migration assumption of the general demographic framework described in Section 2 to reflect this reality. However, since data on this phenomenon are scarce, sensitivity tests have been performed to illustrate the impact of different migration assumptions on the finances of the scheme (see Section 3.1.4).

The projection of the number of pensioners and beneficiaries of the various categories, under the base scenario, is presented in Table 3.1. The total number of contributors follows the rate of growth of the population aged 15 to 64 (1.2 per cent on average for the period 2004-2050).² The number of pensioners grows faster than the number of contributors

 $[\]frac{1}{2}$ It must be noted here that the number of contributors is larger than the total employed population (see labour force balance of Section 2) because of the movement of people in and out of the labour force. Workers contribute on average during 80 per cent of the year (density of contribution). In the context of labour force statistics, they are considered as 80 per cent of a whole-year worker. However for Social Security purposes, they represent fully recognized contributors for that year.

because of the increasing entitlement to benefits of the successive generations. The ratio of pensioners to contributors represents a good indicator of the increasing cost of the scheme. This ratio is 6.4 per cent in 2004 and increases gradually to 20.5 per cent in 2025 and 42.2 per cent in 2050. This directly affects the pay-as-you-go cost of the scheme, as presented in the next section.

Table 3.1 also reveals that the number of grants (Age, Invalidity and Survivors') is also increasing with time. This is the result of the high number of expatriates that work for a short while in the BVI and leave before having contributed for the minimum of ten years required for eligibility to the Age pension.

Table 3.1:	Demographic projections -	 Long-term Benefit Branch, 	, 2004-2050 (number of persons)
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				Beneficiaries				Ratio (%) of			
Year		Contributors		Age	Age		Invalidity		Survivors Total		pensioners to
	Males	Females	Total	Pensions	Grants	Pensions	Grants	Pensions	Grants	pensions	contributors
2004	7,918	8,100	16,018	637	2	100	5	282	7	1,019	6.4
2005	8,129	8,322	16,451	722	13	128	6	315	8	1,165	7.1
2006	8,344	8,550	16,894	802	26	156	7	351	8	1,309	7.7
2007	8,563	8,787	17,350	877	38	184	8	387	9	1,448	8.3
2008	8,785	9,030	17,815	947	52	213	10	423	10	1,583	8.9
2009	9,007	9,279	18,286	1,027	56	241	11	456	11	1,724	9.4
2010	9,227	9,531	18,758	1,116	71	270	13	486	13	1,872	10.0
2015	10,270	10,740	21,010	1,568	153	405	22	617	19	2,590	12.3
2020	11,103	11,675	22,778	2,248	231	531	27	761	22	3,540	15.5
2025	11,597	12,210	23,807	3,264	328	648	28	965	23	4,877	20.5
2030	11,814	12,490	24,304	4,571	476	743	28	1,222	24	6,536	26.9
2035	12,105	12,845	24,950	5,812	459	819	28	1,525	24	8,156	32.7
2040	12,609	13,409	26,018	6,621	517	888	31	1,855	27	9,364	36.0
2045	13,071	13,969	27,040	7,294	700	961	36	2,170	31	10,425	38.6
2050	13,327	14,298	27,625	8,203	745	1,039	39	2,416	32	11,658	42.2

Note: Invalidity pensioners are supposed here to continue receiving their Invalidity pension for life, even if the law provides for their transfer to the Age pension at age 65 with the same pension amount. This does not affect the total expenditure of the scheme.

It appears from Table 3.1 that the number of Social Security Age pensioners becomes, after 2025, greater than the BVI population aged 65 and over. This is possible considering the important number of pensions that will be paid abroad in the future because of the high level of migration.

3.1.2 Financial projections

Average pensions

An indicator of the maturing process of the system is the replacement ratio or the ratio of the average pension to the average earnings subject to contributions (Table 3.2). It indicates what proportion of their earnings people are expected to replace when they become pensioners. In 2004, the average pension paid to the present Age pensioners represents around 28 per cent of the average wage of contributors. This is low when compared to the pension formula (30 per cent for ten years plus 1 per cent per additional year), but this reflects the fact that most pensions-in-payment have not been indexed regularly since the date they started. By comparison, the average pension of new

pensioners represents 40 per cent of current wages in 2004 and will gradually grow to 47 per cent in 2050 (Table 3.3).

For Invalidity pensioners, replacement ratios are slightly lower than those projected for the Age pension because people become Invalidity pensioners at a lower age. The replacement ratios of surviving spouses represents a little more than 50 per cent of the replacement rate of the Age pension, this being the result of (1) the pension formula that provides 67 per cent of the Age pension to the surviving spouse, (2) the fact that people who die before retirement have not accumulated as much service as Age pensioners, and (3) pensions are assumed to be indexed with CPI and pension increases continuously stand behind wage increases.

 Table 3.2:
 Projected average pension replacement ratios
 - Long-term Benefit Branch, 2004-2050 (as % of average insurable earnings

Voor	Age		Inva	llidity	Surviving spouse	
real	Males	Females	Males	Females	Males	Females
2004	29.3	27.3	33.1	28.7	18.6	19.3
2005	30.7	29.1	33.6	30.1	18.6	19.7
2006	31.8	30.5	33.8	31.0	18.6	19.9
2007	32.6	31.6	33.8	31.5	18.7	20.0
2008	33.3	32.5	33.8	31.9	18.7	20.1
2009	34.1	33.5	33.8	32.2	18.8	20.2
2010	34.7	34.4	33.8	32.5	18.9	20.3
2015	37.1	38.1	33.9	33.3	19.5	20.9
2020	38.7	40.3	33.7	33.3	20.2	21.2
2025	39.8	40.7	33.4	33.0	20.9	21.3
2030	40.1	40.5	33.2	32.8	21.6	21.4
2035	40.1	40.3	33.3	32.9	22.2	21.8
2040	40.2	40.3	33.7	33.4	22.6	22.0
2045	40.1	40.0	33.9	33.6	22.6	21.9
2050	39.9	39.7	33.6	33.3	22.2	21.4

Table 3.3 presents the replacement ratios of new pensioners only. It shows an ultimate replacement ratio around 47 per cent, revealing an average period of contribution of 27 years (30 per cent for the first ten years and 1 per cent for the following 17 years) for those persons who will reach the age of 65 after 2035. The projections do not reveal any noticeable difference by gender.

Total income and expenditure

Age pensions represent 71 per cent of total benefit expenditure in 2004 and the percentage is expected to reach 76 per cent in 2050. Grants take a growing part of total expenditure as the scheme matures. This reflects the high number of persons who are expected to work and migrate out of the BVI while keeping rights under the system. Table 3.4 assumes invalidity pensioners continue receiving their invalidity pension for life. This does not bear any significant impact on the results.

Year	Males	Females
2004	40	39
2005	40	40
2006	41	41
2007	42	42
2008	42	44
2009	42	43
2010	43	44
2015	44	48
2020	46	46
2025	46	46
2030	46	45
2035	47	47
2040	47	48
2045	47	48
2050	47	48

Table 3.3:Projected average pension replacement ratios for new Age pensioners
(as % of average insurable earnings)

Tuble 0.1. Trojection of benefit experiance by type Long torm Benefit Branon (in medsand 00	Table 3.4:	Projection of benefi	t expenditure by type	- Long-term Benefit E	Branch (in thousand US
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	Voor	Age ¹		Invalidity ¹		Survivors'		Tatal
pensioners are	rear	Pensions	Grants	Pensions	Grants	Pensions	Grants	TOTAL
supposed here to continue	2004	2,482	8	425	57	486	47	3,505
receiving their Invalidity pension	2005	3,093	11	585	50	605	43	4,387
for life, even if the law provides for	2006	3,730	23	758	48	736	41	5,336
their transfer to	2007	4,394	43	945	51	880	41	6,354
at age 65 with the	2008	5,088	71	1,148	58	1,034	44	7,442
amount. This	2009	5,913	83	1,368	70	1,199	49	8,682
the total expenditure of the	2010	6,877	131	1,606	88	1,375	57	10,134
scheme.	2015	13,204	528	3074	243	2,492	136	19,677
	2020	25,306	1,042	5,122	380	4,261	205	36,316
	2025	47,816	1,924	7,913	515	7,145	277	65,590
	2030	85,543	4,305	11,496	642	11,775	356	114,117
	2035	136,708	5,407	16,053	819	18,978	456	178,421
	2040	195,613	7,300	22,162	1,149	29,553	640	256,417
	2045	272,560	10,921	30,666	1,651	43,933	915	360,647
	2050	392,599	14,949	42,430	2,288	62,166	1,225	515,657

The pay-as-you-go cost rate represents the contribution rate that would be required just to meet the expenditure of the Branch, year after year, in the absence of reserve. In 2004, the PAYG rate is 2.3 per cent, thus significantly lower than the actual contribution rate devoted to pensions (6.5 per cent). However, the PAYG rate is expected to increase in the future and reach 15.7 per cent in 2050. Figure 3.1 compares the present contribution rate to the projected PAYG rate for the next five decades. It illustrates that there will be a need to increase the contribution rate in the future.

Figure 3.1: Projected pay-as-you-go cost rate / Long-term Benefit Branch, 2004-2050



From Table 3.5, some critical years can be identified in the future evolution of the Long-term Benefit Branch:

- Contributions alone are sufficient to meet the total expenditure of the Branch until 2021;
- From 2022 to 2036, part of the investment earnings are used, in addition to contributions, to meet the scheme's expenditure;
- From 2037, the total of contributions and investment earnings is no more sufficient to meet the scheme's expenditure and the reserve starts decreasing; and
- In 2050, the reserve is depleted as shown in Figures 3.2 and 3.3.

The reserve may be expressed as a ratio of annual expenditure. It is generally considered that, at maturity, a reserve between 2 and 3 times the annual expenditure is sufficient to ensure the financial stability of a public pension scheme. This ratio, for the SSB Long-term Benefit Branch, is presently at 36.5. It will decrease to 20.1 in 2020, 5.2 in 2040 and zero in 2050.

The general average premium of the LTB Branch is equal to 8.5 per cent. This represents the constant contribution rate that, if applied over the period 2004-2050, would be sufficient to meet the expenditure of the scheme over that period. It is calculated here as the present value of scheme's expenditure of the period 2004-2050 divided by the present value of total insurable earnings for the same period. The initial reserve as at 31 December 2003 is not considered.³ The GAP may be considered as the constant long-term cost of the LTB Branch. This indicator will be used later in the report to compare various scenarios of scheme's modifications and sensitivity tests.

 $^{^{3}}$ It is also possible to calculate the GAP by considering the initial reserve. The choice has been made to ignore the initial reserve because the GAP is used extensively in this report to compare the various reform scenarios and sensitivity tests. The inclusion of the reserve would have reduced significantly the sensitivity of the indicator.

C	Contribution rate	Total insurable	Re	venue (US\$)		Expe	enditure (US\$)		Reserve		PAYG cost rate
	% of insurable	earnings		Investment					(end of year)	Reserve	% of insurable
Year	earnings	(US\$)	Contributions	earnings	Total	Benefits	Admin.	Total	(US\$)	ratio	earnings
2004	6.5	217,901	14,164	11.561	25,725	3,506	1.500	5,006	180.642	36.1	2.3
2005	6.5	233.591	15.183	13.016	28,199	4.387	1.560	5.947	202.894	34.1	2.5
2006	6.5	250.635	16.291	14.580	30.871	5.336	1.622	6.958	226.807	32.6	2.8
2007	6.5	269,163	17.496	16.260	33.756	6.354	1.687	8.041	252.522	31.4	3.0
2008	6.5	289,178	18,797	18,067	36,864	7,445	1,755	9,200	280,186	30.5	3.2
2009	6.5	310,568	20,187	20,009	40,196	8,684	1,825	10,509	309,873	29.5	3.4
2010	6.5	333,379	21,670	22,088	43,758	10,137	1,898	12,035	341,596	28.4	3.6
2015	6.5	470,534	30,585	34,775	65,360	19,678	2,309	21,987	534,799	24.3	4.7
2020	6.5	649,610	42,225	51,442	93,667	36,318	2,809	39,127	786,518	20.1	6.0
2025	6.5	867,915	56,414	70,927	127,341	65,591	3,418	69,009	1,076,085	15.6	8.0
2030	6.5	1,130,642	73,492	88,982	162,474	114,118	4,159	118,277	1,335,342	11.3	10.5
2035	6.5	1,465,042	95,228	98,800	194,028	178,422	5,060	183,482	1,462,875	8.0	12.5
2040	6.5	1.919.455	124,765	93.974	218,739	256.418	6.156	262.574	1.363.368	5.2	13.7
2045	6.5	2.536.377	164.864	64.838	229.702	360.647	7.490	368.137	884.058	2.4	14.5
2050	6.5	3,344,371	217,384	-9,111	208,273	515,657	9,112	524,769	-300,036	-0.6	15.7
First negative	reserve					2050					
General avera	age premium over	50 years (% of ins	urable earnings)		-	8.5					
PAYG cost rat	te in 2050 (% of ir	surable earnings)	arabio carningo)			15.7					

Table 3.5:Financial projections - Long-term Benefit Branch, Present provisions (2004-2050)

Note: The content of this table is repeated in table A5.1 of Annex 5



Figure 3.2: Projected reserve - Long-term Benefit Branch (in thousand US\$)

Figure 3.3: Projected ratio of the reserve to the annual expenditure - Long-term Benefit Branch



3.1.3 Reconciliation of LTB projection results with those of the valuation of 2000

The ultimate cost of the scheme as determined in the present valuation is slightly higher than the cost determined in the last actuarial report. On the other hand, it appears that the PAYG cost was increasing faster in the last review but was stabilizing at a lower ultimate level. For example, the PAYG cost of the Branch in 2050 was projected at 14.5 per cent in the last review, as compared to 15.7 per cent in the present valuation. The main factors that explain these differences are the following:

- In the last review, no mortality improvements were assumed; in the present report, life expectancy, and consequently the expected duration of pensions, increases with time, thus increasing the cost of the scheme;
- The last review assumed a constant increase of the insured population of 2 per cent per year. For the present valuation, the growth of the insured population has been determined in line with the labour force development of the economic framework

(Section 2); consequently, the employed population in the present report increases at an annual rate higher than 2 per cent until 2015, but lower than 2 per cent after 2020; globally, it increases by 1.2 per cent per year on average during the period 2004-2050;

- The impact of migration on the scheme uses a different approach as regards outward migration: a link is kept with emigrants and the model simulates payment of pensions or grants at retirement depending on the length of their participation; it means more pensions and grants but lower average pensions; in addition, the pension model used for the present review takes into consideration a population of inactive insured persons at the date of valuation.
- In the present report, pensions-in-payment are assumed to be indexed with CPI in the future, as compared to a wage index in the last report; this represents a factor that decreases cost; a sensitivity test is presented in Section 3.1.4 to measure the impact a wage indexing would have had in the present valuation.
- The invalidity incidence rates of the present valuation are lower than those assumed in the last report.

3.1.4 Sensitivity tests of the LTB Branch projections

The actuarial valuation of a social security scheme cannot, of course, pretend to project the future with perfect accuracy. Projections are based on imperfect models and assumptions, and the variables used in the models may react to unpredictable factors. When using a deterministic model, sensitivity analysis is the only way of showing the potential variability of results. It can be performed on assumptions that have the most impact on future costs or, alternatively, on those assumptions that present a lower level of credibility because of a lack of data. Four sensitivity tests are proposed:

- A lower rate of return of the Social security Fund has been tested. The rate of return assumed in the base scenario is 7 per cent per year. Projections were tested with a rate of return of 6 per cent instead of 7 per cent. A lower rate of return of the Fund would not change the PAYG cost, but it would increase the present value of future benefits, thus increasing the GAP from 8.5 per cent to 9.0 per cent. The reserve would be depleted five years earlier.
- Migration is important in the BVI and only scarce data are available from the Development Planning Unit. In the base scenario, it was assumed that there would be a constant number of 750 immigrants and 500 emigrants per year for the next 50 years. In the sensitivity test, it was assumed that, instead of absolute figures on migration, migration would represent a constant percentage of the population over time. Since the population of the BVI is projected to increase each year, the number of migrants would also increase each year under this sensitivity test. Higher migration would increase the size of the population of the BVI and, as a consequence, the total employment. More contributors would generate more insurable earnings causing a decrease of the PAYG cost. On the benefit side, higher migration means a higher proportion of grants versus pensions and a lower GAP at 7.9 per cent instead of 8.5 per cent.
- In order to recognize the impact of latent contributors (inactive insured persons) in the Social Security system, the base scenario assumes that 3,000 persons have contributed in the past to the scheme, in addition to the 15,600 present contributors. Under the sensitivity test, it is assumed that the number of inactive insured persons is 15,000 on 31 December 2003, instead of 3,000. A larger number of inactive insured persons would cause an increase of the total liabilities

of the scheme at the valuation date, thus causing an increase of the PAYG cost in the short and medium term, and an increase of the GAP.

A higher rate for the indexing of pensions-in-payment was tested. The base scenario uses an indexing of pension in payment based on CPI. This test uses indexing based on a wage index. Higher indexing of pensions translates into a direct impact on pension expenditure, thus increasing the PAYG cost and the GAP. Under that test, the GAP would increase from 8.5 per cent to 9.7 per cent.

Summary results of the sensitivity tests appear in Table 3.6. More details are presented in Annex 5.

	Year when	PAYG cost rate in 2050	General average premium
Sensitivity tests	reserve depleted	(% of insura	ble earnings)
Lower rate of return of the Social Security Fund	2045	15.7	9.0
Higher migration	After 2050	13.2	7.9
Larger number of inactive persons	2048	16.0	8.8
Indexing of pensions based on a wage index (instead of CPI)	2043	19.0	9.7

Table 3.6: Results of sensitivity tests of LTD Branch projections

3.2 Short-term Benefit Branch

Short-term benefits are normally financed under the pay-as-you-go system. It means that the contributions collected during a year finance the benefits of the same year. Only a small contingency reserve is normally maintained for this Branch.

At the end of 2003, the reserve of the Short-term Benefit Branch represents 21.6 times annual expenditure. This is far higher than what is usually required for this type of benefits. Normally, a reserve equal to one to two years of expenditure is considered sufficient for short-term benefits since the annual expenditure is relatively stable over time and the cost is highly predictable. We recommend the transfer from the Short-term Benefit Branch to the Long-term Benefit Branch of an amount of US\$34,366,548, which is equivalent to the reserve of the Short-term Benefit Branch (as of 31 December 2003) that is in excess of two times the expenditure of 2003.

The present contribution rate of that STB Branch is 1.5 per cent of insurable earnings (1.0 per cent for civil servants). The cost of the STB Branch is projected to remain lower than 1.21 per cent of insurable earnings in future (Table 3.7). It is recommended to maintain the current contribution rate of 1.5 per cent for that Branch, at least until the next actuarial review.

Benefit type	Cost
Sickness benefit	0.40
Maternity allowance	0.40
Maternity grant	0.10
Funeral grant	0.10
Administrative expenses ¹	0.21
Total	1.21

Table 3.7: Estimated cost of the STB Branch, 2004 (% of insurable earnings)

¹ Administrative expenses are expected to decrease as a % of insurable earnings over time.

3.3 Employment Injury Benefit Branch

Employment injury benefits of a short-term nature include the Injury benefit, Medical expenses and Disablement grant. They are normally financed under the pay-as-you-go financing system. It means that the contributions collected during a year finance the benefits of the same year. Only a small contingency reserve is maintained for those benefits. The Disablement and Survivors' pensions, however, are normally financed in a manner that takes into account the long-term nature of these benefits and the annual cost must consider the present value of all future payments related to the accidents of a given year.

If benefits of a long-term nature were excluded, a reserve equivalent to two years of expenditure would be equal to US\$1,212,016. The additional reserve equivalent to the present value of employment injury pensions-in-payment on 31 December 2003 is estimated at US\$1,094,012. The total reserve required for the Employment Injury Benefit Branch would thus be equal to US\$2 306 028. This value may be compared to the actual reserve of the Branch, which is US\$2,776,641 as of 31 December 2003. Given the greater fluctuation of experience in that Branch (as compared to the Short-term Benefit Branch), no transfer of reserve is recommended from the Employment Injury Benefit Branch.

As presented in Table 3.8, it is estimated that the annual expenditure of the Branch will represent 0.39 per cent of insurable earnings in 2004, as compared to the contribution rate allocated to the Branch of 0.50 per cent of insurable earnings.

Table 3.8:	Estimated cost of the EIB Branch, 200	4 (as % of insurable earnings
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Benefit type	Cost
Injury	0.05
Medical expenses	0.05
Disablement pensions	0.09
Survivors' pensions	0.10
Disablement and death grants	0.01
Administrative expenses ¹	0.09
Total	0.39

¹ Administrative expenses are expected to decrease as a % of insurable earnings over time.

The future cost of the EIB Branch is expected to remain lower than the present contribution rate of 0.5 per cent devoted to that EIB Branch. As the cost of long-term EIB for Disablement and Survivors' pensions is less predictable in future, the low number of cases experienced in the past may or may not continue. It is thus recommended to keep the present contribution rate of 0.5 per cent for the EIB Branch until the next actuarial review.

3.4 Recommended contribution rates

The financing of a social security system should take into account the nature of the benefits paid, the demographic environment and the maturing process of each type of benefit.

As mentioned in the preceding sections, the cost of the STB and EIB Branches is expected to stay stable over time. They are usually financed on a pay-as-you-go basis, except for the employment injury benefits of a long-term nature for which the cost takes into account the present value of future payments related to accidents occurring during a given year. As shown in Sections 3.2 and 3.3, the present contribution rates for these two Benefit Branches may be maintained until a future actuarial review reveals any unexpected increase in cost.

The cost of the LTB Branch, on the other hand, is expected to increase over time as new generations of contributors will reach the retirement age. It is thus recommended to adopt a schedule of contribution rates for the LTB Branch that will take into account this projected increase in costs. It is generally considered that, at maturity, a reserve between 2 and 3 times the annual expenditure is sufficient to ensure the financial stability of a public pension scheme. In the case of the BVI, this state of maturity is projected for only after 2050. Tests performed on the financial projections of the scheme show that an increase of the contribution rate of the LTB Branch starting in 2020 with a step-increases every ten years (Table 3.9) would lead to a reserve equivalent to 3.5 times the annual expenditure in 2050. Under that schedule, the contribution rate applicable after 2050 would reach the General Average Premium, which represents the long-term stable cost of the LTB Branch. Financial projections on the basis of the recommended schedule are presented in Table A5.2 of Annex 5. Such a schedule would leave enough time to plan for each contribution rate increase. It would contribute to maintain a sufficient reserve over time and would ensure the financial stability of the scheme. If adopted, this recommended contribution rate schedule should be included in the BVI Social Security regulations.

Period	Long-term	Short-term Be	enefit Branch	Employment	Total	
i choù	Benefit Branch	Sickness	Other	Branch		
2004-2019	6.5	1.0	0.5	0.5	8.5	
2020-2029	7.0	1.0	0.5	0.5	9.0	
2030-2039	7.5	1.0	0.5	0.5	9.5	
2040-2049	8.0	1.0	0.5	0.5	10.0	
2050 +	8.5	1.0	0.5	0.5	10.5	

Table 3.9: Recommended contribution rates (as % of insurable earnings)

4. Recommendations on benefit improvements and coverage

This Section presents the impact of four specific modifications to the BVI Social Security benefit provisions. They should not be seen in isolation since they are all interrelated. In general, the proposed options are oriented toward a new pension formula and an automatic adjustment of the scheme's parameters. The financial effect of those modifications assumes their introduction on 1 January 2005. More details are provided in Annex 5.

4.1 Modifications to the pension formula

The Age pension is presently calculated as 30 per cent of reference earnings for ten years of contribution, plus 1 per cent for each year of contribution in excess of ten. Reference earnings are defined as the average insurable earnings over the highest three of the last 15 years preceding the beginning of the pension. A person is eligible for an Age pension after ten years of service. If ineligible a grant is awarded. The present final-average earnings pension formula may need reconsideration on the basis of the three issues presented below.

4.1.1 Issues concerning the present pension formula

Issue #1 - Benefit accrual rates

The present pension formula provides an income replacement of 3 per cent per year of contribution for a person with a total career of ten years, whereas a person with a career of 40 years receives an average benefit accrual rate of 1.5 per cent per year of contribution (see Table 4.1). While additional contributions provide higher benefits in aggregate, the average annual benefit accrual rate keeps decreasing as more contributions are paid. This measure appears to protect workers with relatively shorter periods of regular employment, especially those engaged in irregular forms of employment and women caring for children.

The present pension formula meets the minimum standards of the ILO Convention no. 102 on social security that recommends, in broad terms, that a worker with a 15-year record should receive a pension equivalent to no less than 40 per cent of his/her average insurable earnings.

Table 4.1: Benefit accrual rates (as % of 3-year average of reference earnings)

Number of years of contribution	Cumulated income replacement at retirement	Average annual benefit accrual rate
10	30	3.00
15	35	2.33
20	40	2.00
25	45	1.80
30	50	1.67
35	55	1.57
40	60	1.50

Issue #2 - Reference earnings

Although contributions are based on actual insurable earnings of each year during one's career, only the earnings of the best three of the last fifteen years are used to calculate pensions.

The public social security system normally defines reference earnings to account for the following factors, which can sometimes become contradictory:

- the need to ensure there is a minimum link between earnings used in the past to collect contributions and earnings used to determine future pensions; and
- the need to provide meaningful income replacement in relation to the living standards enjoyed in the later years of active life prior to retirement.

At present the pension formula is based on the average of the final years of insurable earnings preceding retirement. Whilst this can help insured workers obtain a pension more closely related to their final living standard preceding retirement, this provides a limited link between the pension definition and the contributory earnings over someone's career. It also provides more possibility for the abuses where employers and workers agree to declare higher insurable earnings in the years immediately preceding retirement so that a higher pension can be obtained.

Issue #3 - Voluntary contributions at time of retirement

The relatively low requirement for eligibility to the Age pension combined with the possibility to make voluntary contributions allow people with less than ten years of contribution to pay just enough voluntarily contributions to reach the minimum of ten years and be eligible for a lifetime pension. This is financially too costly and not actuarially fair. The case is illustrated in Table 4.2. In that example, the person has paid contributions for nine years (from age 56 to age 64) and has the possibility to voluntarily contribute one year on his 65th birthday to be eligible to the Age pension. The present value of the pension of US\$673 per month payable for life from age 65 is around US\$93,000, compared to a value of US\$25,301 for the accumulated contributions. The gain is evident. On the other hand, if the person does not pay voluntary contributions at age 64, then a grant is paid for nine years of contributions and the amount of the grant is US\$23,324. This amount is significantly lower than the value of the pension, but close to the value of the accumulated contributions.
Table 4.2:	Accumulated contributions after ten	years
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Age	Salary	Annual contributions	Accumulated contributions
56	19,112	1,625	1,625
57	20,068	1,706	3,444
58	21,071	1,791	5,476
59	22,125	1,881	7,741
60	23,231	1,975	10,258
61	24,392	2,073	13,049
62	25,612	2,177	16,139
63	26,893	2,286	19,555
64	28,237	2,400	23,324
Voluntary cont.	28,237	1,977	25,301
Assumptions: Person reaches age	of 65 in 2003. Ten years of	contribution to the SSB: (Contributed at 8.5 per cent (employer and

Assumptions: Person reaches age of 65 in 2003; Ten years of contribution to the SSB; Contributed at 8.5 per cent (employer and employee combined); Salary increases by 5 per cent per year; Funds accumulate at 7 per cent per year.

Results: Age pension paid at 65 = US\$673 per month

4.1.2 Proposed modifications to the pension formula

A set of significant changes is recommended for consideration. In view of their impact on individual cases, it is recommended to review in further depth the objective of the social security system in terms of what is the target career length and target income replacement level for various typical groups of insured persons. Consultations should address in conjunction the target income replacement objective and the overall desired affordability of the pension and other social security benefits. Each reform should be based on a policy review and costing of its long-term financial implications.

Introducing a flat benefit accrual rate

The annual accrual rate selected will depend on the replacement rate desirable for persons with a full career. For example, the current maximum pension rate is 60 per cent of reference earnings. Therefore, if 60 per cent of average indexed career earnings is considered to be an appropriate maximum Age pension after 40 years of contributions, then the flat annual accrual rate should be 1.5 per cent.

It is recommended however to introduce a flat annual benefit accrual rate of 2.0 per cent. This flat annual benefit accrual rate of 2.0 per cent could provide an equivalent pension as per the present final average pension formula – for a typical contributor who reaches age 65 in 2005 with 20 years of contributions. The PAYG cost of the scheme over the next 50 years under the formula using an accrual rate of 2.0 per cent is nearly identical to the PAYG rate under the current provisions. This is an indication that this formula would not affect significantly the pension amount of the average contributor. A thorough review of all cases should be completed. It appears that the period of contributions established for this valuation and will not extend well over 20 to 25 years. This relatively short period of contribution projected for the future, when compared to the potential 40 years of contribution for a career running from age 25 to age 65, is explained by the particular context of high migration in which the BVI Social Security system operates.

In case of invalidity or death before the age of 65, these persons generally have shorter periods of contribution than Age pensioner and they could be penalized with a flat benefit accrual pension formula. It is recommended to calculate, in those cases, the career-average (proportional) formula by adding fictitious earnings to their record to cover the period between the date of invalidity (or death) and the age of 65. The fictitious earnings would be equal to the average earnings actually recorded for the past. With this adjustment, they would not be penalized under the proportional pension calculation.

For reference, it is only in some OECD countries, such as Canada, where a flat benefit accrual rate is credited per year of contributory service. Most Latin American and Caribbean states use decreasing schedules of accrual rates.

Extending the period for the calculation of reference earnings

It is recommended moving towards a longer reference period to determine the average of past insurable earnings used to calculate the pension of a new beneficiary. In view of the resulting impact of the past economic developments, such former earnings must be indexed to determine their real value of today. A gradual extension of the reference period to ten years should be considered. The extension from three to ten years should be done over a seven-year period to avoid distortions in the calculation of new pensions. Consideration may be given to the desirability and feasibility of later introducing an indexed career-average earnings pension formula (see next subsection). This later approach may not be so desirable if it is shown that nearly all income groups end up receiving a lower pension in the end – unless the primary objective of the SSB is to maintain a very low contribution rate.

The present final average pension formula satisfies the principles of solidarity as adopted under the ILO Convention no. 102 on minimum standards of social security. When considering a pension formula moving towards a career-average earnings basis, one may bear in mind that it moves away from these basic social security principles and rather satisfies individualistic approaches as found in private insurance.

The adoption of a longer reference period necessarily requires an indexation basis to reflect the real value of former insurable earnings appropriately. This must rely on an elaborate administration and statistical reporting and maintenance system. As regards the choice of an index for the adjustment of past earnings to bring them to a current value, it is recommended to use the CPI index until a reliable wage index is developed at the national level. When available, a wage index should be used. Another way to adjust past earnings could be to use the ratio of the earnings' ceiling of the year of retirement divided by the earnings' ceiling of the year in which the actual wage was earned. However, this latter method should be used only after a method of automatic adjustment of the earnings' ceiling has been adopted.

Some of the advantages of extending the reference period for earnings include:

- Under the present final-average earnings pension formula, persons with incomes that decline toward the end of their career are disadvantaged because the formula uses only the last 15 years of earnings. This is not the case under the indexed career earnings approach.
- Persons with large increases in wages towards the end of their career will not obtain disproportionately higher pensions under the indexed career-average earnings pension proposed formula.
- Employers and insured workers would no longer have the opportunity to abuse by way of declaring higher earnings in the final three years before reaching age 65 to obtain a larger pension.

Possibility to later extend to a career average earnings formula

Most countries in Latin America and the Caribbean use a final-average earnings pension formula at present whilst most OECD countries, where national statistics databases are well developed, provide some form of average indexed career-earnings pensions. The extension of the reference period for past insurable earnings should be achieved over a gradual period to account for the lack of past time series on national average wage data. A gradual phasing-in of the extension would also diminish the potential impact of a sudden increase in the ceiling on reference period would require the establishment of an official national average wage statistics.

In most OECD countries, special provisions exist to account for the years during which a worker may receive lower earnings due to irregular employment (part-time and temporary work), spells of unemployment or child rearing.

In practice, the proposed indexed career-average earnings pension formula works as follows:

- (1) Obtain annual insurable earnings in each past year of insurance upon which contributions were made;
- (2) Using a cumulative wage, adjust each year's insurable earnings so that it is revalued to current US dollars (see Figure 4.1); and
- (3) Sum all indexed insurable earnings and divide the total earnings by the number of years of contribution to obtain the average annual indexed insurable earnings;
- (4) Impute the average indexed insurable earnings to each year of special credit (e.g. child-rearing years)
- (5) Apply the flat benefit accrual rate, e.g. 2 per cent, to the sum of indexed wages (paid and credited) to obtain the annual pension amount.

The concept of indexing is depicted in Figure 4.1 where the lower section of each bar indicates the actual insurable wages while the upper portion represents the amount of the adjusted (indexed) wage. The height of each bar, therefore, indicates what each year's insurable wages are worth in the current year. In this individual example, past earnings are adjusted with an index equivalent to the increase in the national average wage and remained equal to the national average wage in the country over the years.

Figure 4.1. Illustrative example of the pension formula approach using indexed insurable earnings over someone's career



Table 4.3 summarises the differences between the current approach, which may be referred to as a final average formula, and the indexed career-average earnings pension formula.

Table 4.3: Comparison of current and proposed pension formulae

	Final average	Indexed career-average
Earnings considered	Best 3 years of the last 15 years	Insurable earnings over the whole career
Weighting given to each year of contributions	First 10 years get greater weight (3 per cent per year) and years over 10 get lesser weight (1 per cent per year)	All years receive equal weight
Relationship between contributions and pensions	Weak	Strong
Bias	Favours those with higher insurable earnings in last few years; works against those with higher insurable earnings in earlier years.	Special provisions must be introduced to provide better protection to vulnerable groups, e.g. with irregular employment.
		Strong need for a sufficient minimum pension.

Future pensioners will be affected by changing to a longer reference period in the method of calculating pensions. If the main aim is to reduce the overall long-term cost of the scheme, benefit reductions should be carefully assessed to ensure they do not fall below the replacement rate for old-age pensions as prescribed by the ILO Convention no.102. According to Articles 28 and 29, in conjunction with the Schedule to part X of ILO Convention no.102, the old-age pension shall amount to at least 40 per cent of the former earnings of the beneficiary whereas the former earnings have to be equal to the earnings of a skilled manual male employee at the moment of retirement. As employees usually earn less at the beginning of their working life, the pension will be lower when using the indexed career-average formula.

4.1.3 Financial impact of a longer reference earnings period and flat accrual pension formula

The use of final 10-year reference earnings instead of the final 3-year earnings does not have significant financial impact on the scheme since it is proposed to index past earnings used in the average according to a national wage index.

In addition, a pension formula using 2.0 per cent per year of contribution instead of the current formula (30 per cent plus 1 per cent for years over ten) does not have a significant impact on the expenditure of the scheme on the basis of the projected length of participation of SSB contributors. It appears that the PAYG cost for the next 50 years is almost identical as the one projected under current provisions.

4.2 Increase and strengthen legal definition of minimum pension

The level of the minimum pension at US\$24 per week, or US\$104 per month, is very low as it represents only 15 per cent of the minimum wage.⁴

It is recommended to establish the minimum pension at 60 per cent of the national minimum wage assuming it is regularly updated. So anytime the minimum wage would be adjusted, the minimum pension would follow. This modification would increase the GAP of the scheme from 8.5 per cent of insurable earnings under the current provisions to 9.2 per cent under the modification. The PAYG cost at maturity (2050) would be 17.0 per cent of insurable earnings with the higher minimum pension – compared to 15.7 per cent with the present one.

The ILO Convention no.102 recommends using a basis equivalent in the end to a minimum pension of 40 per cent of the average wage of unskilled male workers.

The increase of the minimum pension to 60 per cent of the minimum wage would however represent an important increase of pensions presently in payment since the average pension of Age pensioners is presently around US\$300. Another possibility would be to increase the minimum pension to 40 per cent of the minimum wage initially, and to make a further step to 60 per cent at a later stage when the average contributor will have accumulated a longer period of contribution to the SSB. An increase of the minimum pension to 40% of the minimum wage would increase the GAP from 8.5 per cent to 8.7 per cent and the PAYG cost in 2050 from 15.7 per cent to 16.2 per cent.

4.3 Automatic indexation of pensions-in-payment and scheme parameters

Four elements of the system need to be adjusted to keep their value over time:

- the ceiling on insurable earnings;
- the minimum pension;
- pensions-in-payment; and
- the Funeral grant.

⁴ The minimum wage is presently US\$4 per hour, which represents US\$160 per week or US\$693 per month.

The ceiling on insurable earnings has been indexed only three times since the introduction of the BVI Social Security system in 1980. The last increase took place in 2001. The law does not provide for regular indexation. The minimum pension has not been adjusted for a long period. Pensions-in-payment are adjusted on an *ad hoc* basis, but adjustments are often made with a time lag such that pensioners receive lower and lower pensions in real terms over time.

It is recommended to introduce automatic indexation of scheme's parameters. The choice of the index may be focused on CPI increases or changes in the national average wage. A NAW index is more appropriate since the ceiling on earnings would follow the evolution of earnings. However this index does not exist presently in the BVI and would have to be developed from the BVI Social Security database. It is thus recommended to index the scheme parameters and pensions-in-payment each year, and to use for the moment the rate of increase of CPI for the annual adjustment until a reliable NAW index is developed.

Determining the wage index from the SSB database could be done as follows:

- Calculate the total insurable earnings for a given month (e.g. September) of year T;
- Calculate the total number of contributors for the same month;
- Calculate the average insurable earnings for the same month by dividing total insurable earnings by the total number of contributors;
- Make the same calculation for the month of September of each year
- Calculate the indexing percentage on the 1st of January of year T+1 by dividing the average earnings for September of year T by the average insurable earnings for the month of September in year T-1.

A more sophisticated method may be developed by calculating the average earnings for each month of the year and calculating annual averages instead of using a single month.

The effect on the financial projections is included in the base results presented in Table 3.5 since projections assumed an indexation of schemes parameters on a basis as follows:

- Ceiling on earnings: wage index
- Minimum pension: wage index
- Pensions-in-payment: CPI increase
- Funeral grant: CPI index

At the same time the automatic indexing is introduced, it may be advisable to make an ad hoc increase to the earnings' ceiling in order to catch up the part of gross earnings that have been gradually excluded from coverage because of the non-indexing of the ceiling since 2001. In 2003, total insurable earnings were representing 74 per cent of total gross earnings. Thus 26 per cent of total earnings were not subject to contributions to the SSB. This has two important impacts: it reduces the contribution revenue of the SSB and results in insufficient benefit levels for a portion of the insured population.

Table 4.4 presents the effect of an ad hoc increase of the ceiling to various levels in 2005 on the total contribution base and on annual contribution revenue.

Earnings ceiling US\$	Percentage of gross earnings covered by the SSB (%)	Annual contribution revenue (million US\$)
23,400	72.3	15.2
30,420	80.2	16.8
31,200	80.9	17.0
32,760	82.2	17.3

4.4 Ad hoc adjustment of pensions-in-payment

The projections of the present report provide for regular indexing of wages and pensions in order to present a realistic view of the future cost of the scheme, otherwise pensions would gradually lose their significance over time and the scheme's cost would be understated on a going concern basis. On that basis, it was assumed that pensions-in-payment at the date of introduction of the preceding modifications would receive an ad hoc increase of 10 per cent. This is estimated to grossly reflect the CPI increase since the last ad hoc adjustment in 2001.

If this ad hoc benefit improvement were introduced with effect on 1 January 2005, then the total pension expenditure would increase by US\$262,000 in 2005.

4.5 Financial impact if all modifications were implemented

The modification that has the most important financial impact on the scheme is the increase of the minimum pension. All other modifications taken individually have a relatively modest impact. However, when all modifications are combined, the global effect is greater than the sum of individual modifications because of the interaction of two modifications:

- the increase of the minimum pension; and
- the new proportional benefit formula.

In fact, the new flat accrual rate pension formula presents the same global expenditure as under present provisions. The reason behind that neutral global effect on the scheme is that persons with a short service history will receive lower pensions with a flat accrual rate pension formula, and persons with long service will receive higher pensions. A higher minimum pension would thus have a greater impact with the proportional formula since it would affect to a greater extent the pension amounts paid to persons with short service.

With all modifications taken together, including the increase of the minimum pension at 60 per cent of the minimum wage, the reserve would be depleted in 2044, as compared to 2050 under the present provisions. The PAYG cost in 2050 is 17.4 per cent when considering all modifications (compared to 15.7 per cent under the base scenario). The GAP is 9.4 per cent of insurable earnings under the combined modifications (compared to 8.5 per cent under the present provisions). A scenario with all modifications combined, but with an increase of the minimum pension at 40 per cent of the minimum wage instead of 60 per cent would increase the GAP of the system to 8.8 per cent of insurable earnings.

4.6 Coverage of apprentices

The British Virgin Islands are bound by the legal requirements of the Workmen's Compensation (Accidents) Convention, 1925 (No. 17). Following the direct request of the ILO Committee of Experts on the Application of Conventions and Recommendations regarding the application of Article 2, paragraph 1 of the Convention, it has to be ensured that the Social Security (Employment Injury Benefits) Regulations of 1994 apply also to apprentices.

5. Considerations on statistics

5.1 Data required for the actuarial review

Certain weaknesses of the statistical system have been identified during the data collection mission of the actuary. First, a certain number of data and information were not available from the SSB. This has been the case for data on the inactive insured persons. These former contributors represent a liability to the scheme and the value of their accrued rights should be considered in the actuarial valuation, especially in the BVI context where the labour force is constantly moving. Data on their number and past contribution credits would be necessary. In addition, a certain number of general demographic and labour force data should be available from the Development Planning Unit.

- The general demographic framework requires detailed statistics on migration. This
 element is critical to the production of an actuarial review in the BVI context and
 more detailed and recent information should be made available on immigrants and
 emigrants, their distribution by age and sex, and their evolution over the years;
- A labour force survey should be conducted regularly. Most labour force data come presently from the SSB. While the database of the SSB appears to be complete as regards those who actually pay contributions, it provides no information on the extent of non-compliance in the territory. The future development of the economy and the enlargement of the labour force could reveal in the future a certain number of salaried or self-employed persons who are not actually covered by the SSB database;
- The results of the 2001 census should be made available as soon as possible. If final results are not available, preliminary information should be released rapidly. Census data are useful for general population data, labour force information and family statistics (probability to be married, age difference between spouses, number and age of children).

The ILO publication⁵ Social Security data required for the valuation of a national social security system may be used as a guide for the extraction and tabulation of statistics in a format adapted to the requirements of the actuarial model.

5.2 Statistics appearing in the annual report

The annual report of the SSB presents a certain number of statistics. The information provided could be improved by the addition of a few tables. In particular, the number of contributors for the current year, by age group and sex should be added.

In addition, it has been observed that some data appearing in the annual report were different from those extracted directly from the SSB records, notably concerning pensionsin-payment. The SSB should devise a single source of information and a series of computer programs (for the data extraction) that would be used to feed both the annual report and the actuarial reviews. This consistency in the information provided would add to the credibility of these two instruments.

⁵ Available on the ILO website at:

http://www.ilo.org/public/english/protection/socfas/research/stat/tabeng.doc

Annex 1. Main provisions of the Social Security system

A1.1 General

The Social Security system came into effect on 2 July 1980 under the *Social Security Ordinance*, 1979. The Social Security Board (SSB) administers the scheme. The Chief Minister appoints the members of the Board, which is composed of:

- two members representing employers;
- two members representing employees;
- two members representing the government; and
- the Director of the SSB.

A1.2 Coverage

The scheme covers employed persons, self-employed and voluntary insured persons. Workers are covered from age 15 to age 65. Employed persons in the private sector (including the self-employed) are covered for Long-term benefits (Age, Disability, Survivors), Short-term benefits (Sickness, Maternity and Funeral) and Employment injury benefits. Civil servants are not covered for Sickness benefits. Voluntary contributors are covered only for Age, Invalidity, Survivors and Funeral benefits.

A.1.3 Financing

Table A.1.1 Financing of scheme by employers' and employees' contributions (as % of insurable earnings)

	Employee	Employer	Total
Employed persons in the private sector	4.0	4.5	8.5
Civil servants	3.5	4.0	7.5
Self-employed	8.5	ō	8.5
Voluntary insured	7.0)	7.0

Contributions are paid on all elements of remuneration (except gratuities) subject to a ceiling of US\$23,400. The same ceiling has been in application since 1 January 2001.

Table A.1.2 Contribution rate allocated by Benefit Branch (% of insurable earnings)

Short-term benefits	Sickness	1.0
	Maternity and Funeral	0.5
Employment injury		0.5
Long-term benefits		6.5
Total		8.5

A.1.4 Benefit provisions

A1.4.1 Sickness benefits

Eligibility

The person must have paid a minimum of 26 weeks of contributions, and at least 8 weeks in the last 13 weeks immediately preceding the sickness.

Benefit amount

66 2/3 per cent of average insurable earnings over the 13 weeks immediately preceding the sickness.

Waiting period

3 days.

Maximum duration

26 weeks.

A1.4.2 Maternity allowances

Eligibility

The person must have paid a minimum of 26 weeks of contributions, and at least 20 weeks in the last 39 weeks immediately preceding the week of confinement.

Benefit amount

 $66\ 2/3$ per cent of the average insurable earnings over the 39 weeks immediately preceding the week of confinement.

Maximum duration

13 weeks (provided the person does not return to work).

A1.4.3. Maternity grants

Eligibility

The person must have paid a minimum of 26 weeks of contributions.

Benefit amount

US\$200.

A1.4.4. Funeral grants

Eligibility

The person must have paid a minimum of 26 weeks of contributions. The grant is paid in case of death of the insured person, the wife or husband of an insured person, or the dependant child of an insured person.

Benefit amount

- US\$300 for a child aged less than 1;
- US\$1,300 for a child aged between 1 and 15; and
- US\$2,000 for a person aged more than 15.

A1.4.5. Age pensions

Eligibility

Age 65, with a minimum contribution period of ten years. No retirement possible before age 65. Pension not tied to retirement.

Benefit amount

30 per cent of reference earnings for ten years of contribution, plus 1 per cent for each year of contribution in excess of ten. Reference earnings defined as average salary over the highest 3 of the last 15 years preceding the beginning of the pension. The pension cannot exceed 60 per cent of the reference earnings.

Minimum pension: US\$104 per month.

A1.4.6. Age grants

Eligibility

Age 65 with at least 1 year of contribution, but less than 10 years.

Benefit amount

Six times the average weekly insurable earnings multiplied by the number of complete years of contributions.

A1.4.7. Invalidity pensions

Eligibility

Person has been unable to work for 6 months and is likely to remain permanently unable to work; has paid contributions for at least 10 years; has not reached age 65.

Benefit amount

Same as for the Age pension.

Duration

Pension payable until age 65 and then converted to an Age pension.

A1.4.8. Invalidity grants

Eligibility

Person has been unable to work for 6 months and is likely to remain permanently unable to work; has paid contributions for at least 1 year; has not reached age 65.

Benefit amount

Six times the average weekly insurable earnings multiplied by the number of complete years of contributions.

A1.4.9. Survivors' pensions

Eligibility

Minimum of 10 years of contribution.

Benefit amount

- Widow or widower (gender neutral): 2/3 of the Age pension earned up to the death;
- Orphan: 2/3 of the Age pension earned up to the death; and
- Children: 1/3 of the Age pension earned up to the death.

(Eligible children are those aged under age 15 or in full-time education under the age of 21.)

A1.4.10. Survivors' grants

Eligibility

Minimum of 1 year of contributions, but less than 10 years.

Benefit amount

- Widow or widower: 2/3 of the Age grant;
- Orphan: 2/3 of the Survivors' grant; and
- Children: 1/3 of the Survivors' grant.

A1.4.11. Employment injury benefits

Injury benefit

75 per cent of the average weekly insurable earnings paid for a maximum of 26 weeks.

Medical expenses

Refund of expenses incurred for medical, surgical, dental, hospital, nursing, artificial limbs and travelling for obtaining these services. Maximum refund of US\$30,000 per accident.

Disablement benefits

Disablement pension equal to 75 per cent of the average weekly insurable earnings for a degree of disablement of 100 per cent. Pro rata pension for degree of disablement of 30 per cent or more. A Disablement grant is paid when the degree of disablement is less than 30 per cent.

Funeral grants

US\$2,000.

Death benefits

75 per cent of the average weekly insurable earnings of the deceased allocated as follows:

- Widow: 1/2 of the death benefit;
- Children: 1/6 of the death benefit to each;
- Persons wholly maintained by the deceased: up to 1/2 of the maximum death benefit

Annex 2. Methodology of the actuarial valuation

This actuarial review makes use of the comprehensive methodology developed at the Financial, Actuarial and Statistical Services of the ILO for reviewing the long-term actuarial and financial status of national pension schemes. The review has been undertaken by modifying the generic version of the ILO modelling tools in order to fit the situation of the BVI and of the Social Security system 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 the BVI. Next, projection factors specifically related to the Social Security system 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 maximum insurable earnings and the future level of flatrate benefits.

The selection of projection assumptions takes into account the recent experience of the BVI 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. An unemployment rate is assumed for the future and aggregate employment is calculated as the difference between labour force and unemployment.

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 to gradually converge to 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 and Employment injury benefits, income and expenditures are projected using simple projection methods based on recent experience.

Projections for pensions are done for each sex separately. However, there is no separation by groups of insured (workers of the private sector, workers of the public sector, selfemployed 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 Long-term Benefits Branch. This refers to the measure of the long-term balance between income and expenditures of the scheme. In case of imbalance, a 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;
- 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 revenue and expenditure. This type of evaluation is crucial, especially in the case of the BVI scheme, which has not yet reached its mature stage.

Annex 3. Financial results for the period 2001-2003

2001 2002 (provis	2001 2002 (pro	2003 ovisional)
14,468,249 14,561,398 24,96	14,468,249 14,561,398 24	4,966,271
11,422,894 12,467,663 13,51	11,422,894 12,467,663 1	3,512,057
2,940,620 1,984,225 11,33	2,940,620 1,984,225 1	1,334,918
27,484 31,716 5	27,484 31,716	53,521
76,303 76,707 6	76,303 76,707	64,826
948 1,087	948 1,087	949
3,444,554 4,260,672 4,37	3,444,554 4,260,672	4,377,769
1,401,125 1,630,286 2,02	1,401,125 1,630,286	2,021,157
59,394 95,671 15	59,394 95,671	152,003
259,573 297,883 33	259,573 297,883	335,539
20,140 22,265	20,140 22,265	8,764
308,930 338,202 40	308,930 338,202	402,342
14,483 30,387 1	14,483 30,387	16,631
1,319,093 1,778,755 1,31	1,319,093 1,778,755	1,318,914
61,816 67,223 12	61,816 67,223	122,419
11,023,695 10,300,726 20,58	11,023,695 10,300,726 20	0,588,502

Table A3.1: Financial results - Long-term Benefit Branch, 2001-2003 (US\$)

	2001	2002	2003 (provisional)
Revenue	3,553,573	2,407,303	3,873,447
Contributions	2,274,593	2,498,975	2,717,605
Investment income	1,249,420	- 121,515	1,124,992
Surcharge	7,757	8,643	13,840
Rental income	21,535	20,904	16,764
Other income	268	296	246
Expenditure	1,681,395	1,831,006	1,750,499
Benefits			
Sickness	471,005	496,162	530,949
Maternity allowance	645,589	672,414	660,051
Maternity grant	111,387	95,024	94,208
Funeral grant	98,640	97,002	131,738
Administration	292,960	403,182	305,804
Depreciation and amortization	61,814	67,222	27,749
Annual surplus	1,872,178	576,297	2,122,948
Reserve at end of year	35,168,301	35,744,598	37,867,546

Table A3.2: Financial results - Short-term Benefit Branch, 2001-2003 (US\$)

Table A3.3: Financial results - Employment Injury Benefit Branch, 2001-2003 (US\$)

	2001	2002	2003 (provisional)
Revenue	909,267	946,494	1,076,880
Contributions	854,777	934,170	1,011,433
Investment income	53,503	10,974	63,700
Surcharge	259	391	784
Rental income	719	946	949
Other income	9	13	14
Expenditure	433,337	470,775	364,943
Benefits			
Iniury	85,812	60,626	57,186
Medical expenses	73,097	43,932	52,854
Disablement and death	55,920	109,260	61,939
Funeral grant			416
Disablement grant	18,830		5,340
Administration	137,864	189,735	174,150
Depreciation and amortization	61,814	67,222	13,058
Annual surplus	475,930	475,719	711,937
Reserve at end of year	1,588,985	2,064,704	2,776,641

Annex 4. Database and assumptions

In addition to the demographic and economic assumptions presented in the Section 2, the projection of the future financial development of the BVI Social Security system requires a data base specific to its provisions, namely on the characteristics of insured persons and pensions-in-payment, and some additional actuarial assumptions. Details are presented below.

A4.1. Insured population database as of December 2003

A4.1.1. Number of insured persons

Data on the insured population were obtained from the Social Security Board. The database presents a population of 15,600 insured persons who have contributed in 2003. In addition, to simulate the impact on the scheme of workers who have migrated out of the BVI but who have accumulated a certain number of contribution credits, it has been assumed that the scheme counts 3,000 inactive insured persons. No data were available on inactive insured persons, so a sensitivity test is presented in Section 3.1.4 to measure the impact of a different assumption on the financial projections of the scheme. The distribution of these populations by age and sex is presented in Table A4.1.

Table A4.1: Insured persons in 2003

	A	ctive persons		Inact	ive persons	
Age	Male	Female	Total	Male	Female	Total
15 - 19	252	269	521	-	-	-
20 - 24	839	865	1,704	375	375	750
25 - 29	1,055	1,181	2,236	375	375	750
30 - 34	1,193	1,335	2,528	375	375	750
35 - 39	1,206	1,267	2,473	375	375	750
40 - 44	1,059	1,037	2,096	-	-	-
45 - 49	782	785	1,567	-	-	-
50 - 54	599	525	1,124	-	-	-
55 - 59	405	358	763	-	-	-
60 - 64	323	265	588	-	-	-
Total:	7,712	7,886	15,600	1,500	1,500	3,000

The projection of the insured population is calculated by applying a constant coverage rate (by age and sex) to the employed population as determined under the economic framework. In addition, the model simulates the impact of migration of the active insured population. Explicit rates of exits are applied each year to the active insured population. These rates are set equal to the ratio of the number emigrants by age and sex to the corresponding general population at that age.

Age	2004		2050	
	Male	Female	Male	Female
17	6.9	8.0	5.9	6.7
22	8.4	8.7	6.1	5.9
27	7.1	5.9	4.1	3.2
32	3.9	2.8	2.3	1.7
37	1.8	1.3	1.4	0.9

Table A4.2: Exit rates (active insured population leaving during a year) (as % of total insurable population)

A4.1.2. Insurable earnings

Table A4.3 presents the average annual insurable earnings of active contributors in 2003, by age and sex.

Table A4.3:	Average annual	earnings of	active	contributors	in 2003
	The and a second	currings of	ucuvc	contributor 5	11 2000

	SSB insurable ea	arnings	Actual total ear	nings
Age	Males	Females	Males	Females
15 – 19	4,082	4,224	4,222	4,369
20 – 24	10,162	9,629	10,877	10,314
25 – 29	12,659	12,976	14,743	15,818
30 – 34	14,400	13,482	19,424	17,596
35 – 39	15,420	13,870	21,809	18,637
40 - 44	15,261	14,161	21,822	18,600
45 – 49	16,073	13,938	24,092	18,168
50 – 54	15,487	14,647	23,029	21,112
55 – 59	14,984	14,258	23,681	19,384
60 - 64	14,690	13,779	20,901	19,695
65 – 69	3,776	4,168	18,438	14,573
Total	13,770	12,890	19,060	16,770

The dispersion of earnings, the effect of the earnings' ceiling and of the minimum pension can be interpreted through a coefficient of variation applied to average earnings by age groups and for each year of projection. In addition, the average earnings of the insured population have been separated into three sub-groups of earnings: the lowest 30 per cent, a medium range of 40 per cent and the highest 30 per cent.

A4.1.3. Density of contributions

Since there is no important variation by age and sex, it has been assumed that the density of contribution (the proportion of the year during which the average contributor pays contributions) is 80 per cent. This density factor was assumed constant for the whole projection period.

A4.1.4. Accrued past credits

Accrued past credits for the active insured populations were obtained from the administrative records of the Social Security Board. Average data are presented in Table A4.4. For inactive insured persons, data were estimated. For each age and sex group, the average number of contribution years has been distributed over a range of possible values

(using a normal distribution) in order to better reflect the effect of eligibility conditions on the number of emerging pensions and grants.

	Active insur	ed persons	Inactive ins	ured persons
Age	Males	Females	Males	Females
17	1.0	1.0	1.0	1.0
22	2.0	2.0	2.0	2.0
27	4.0	5.0	4.0	5.0
32	6.0	7.0	5.8	7.0
37	9.0	9.0	7.0	7.0
42	11.0	12.0	7.0	7.0
47	12.0	13.0	7.0	7.0
52	12.0	15.0	7.0	7.0
57	13.0	15.0	7.0	7.0
62	15.0	16.0	7.0	7.0
67	16.0	16.0	7.0	7.0

Table A4.4: Average past record of annual contributions, as of 31 December 2003

A4.2. Pensions-in-payment in December 2003

Table A4.5: Age pensions

	Males		Fema	ales	Total		
Age	Number	Average monthly pension (US\$)	Number	Average monthly pension (US\$)	Number	Average monthly pension (US\$)	
65-69	134	394	118	308	252	354	
70-74	91	293	59	239	150	272	
75-79	61	238	33	218	94	231	
80-84	33	226	17	190	50	214	
85-89	2	114	0	0	2	114	
90-94	0	0	0	0	0	0	
95-99	0	0	0	0	0	0	
Total	321	317	227	268	548	297	

Table A4.6: Widows' and widowers' pensions

	Male		Female			Total		
Age	Number	Average monthly pension (US\$)	Number	Average monthly pension (US\$)	Number	Average monthly pension (US\$)		
30-34	0	0	1	267	1	267		
35-39	0	0	7	243	7	243		
40-44	0	0	8	234	8	234		
45-49	1	233	12	217	13	218		
50-54	1	473	10	205	11	229		
55-59	3	175	18	201	21	197		
60-64	1	310	21	222	22	226		
65-69	4	158	12	143	16	147		
70-74	4	158	12	143	16	147		
Total	14	200	101	200	115	200		

Table A4.7 Invalidity pensions

	Males		Fema	lles	Tot	Total	
Age	Number	Average monthly pension (US\$)	Number	Average monthly pension (US\$)	Number	Average monthly pension (US\$)	
30-34	2	361	0	0	2	361	
35-39	1	290	0	0	1	290	
40-44	1	232	3	362	4	330	
45-49	4	365	2	330	6	353	
50-54	11	370	8	316	19	347	
55-59	8	365	5	218	13	308	
60-64	12	382	15	266	27	318	
Total	39	366	33	283	72	328	

Table A4.8: Orphans' pensions

	Male	Males		les	Total	
Age	Number	Average monthly pension (US\$)	Number	Average monthly pension (US\$)	Number	Average monthly pension (US\$)
0-4	13	68	19	75	32	72
5-9	14	68	20	75	34	72
10-14	14	68	20	75	34	72
15-19	20	61	30	63	50	62
Total	61	66	89	71	150	69

A4.3. Scheme-specific demographic assumptions

A4.3.1. Mortality

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 A4.9). Mortality rates are assumed to decline continuously during the projection period in line with the assumed increase of the average life expectancy. This mortality pattern is also used to project survivors' benefits payable on the death of insured persons or pensioners, and also for invalidity pensioners.

Table A4.9: Projected mortality rates for selected years

Ago		Males			Females	
Ауе	2003	2028	2053	2003	2028	2053
0	0.03383	0.02152	0.00476	0.00739	0.00530	0.00411
5	0.00070	0.00045	0.00025	0.00036	0.00028	0.00022
10	0.00028	0.00016	0.00004	0.00012	0.00007	0.00003
15	0.00029	0.00026	0.00033	0.00026	0.00021	0.00015
20	0.00036	0.00040	0.00075	0.00038	0.00031	0.00026
25	0.00043	0.00050	0.00099	0.00044	0.00038	0.00034
30	0.00056	0.00056	0.00094	0.00053	0.00046	0.00040
35	0.00083	0.00074	0.00099	0.00076	0.00062	0.00053
40	0.00134	0.00118	0.00148	0.00114	0.00095	0.00081
45	0.00224	0.00194	0.00224	0.00182	0.00149	0.00125
50	0.00378	0.00337	0.00411	0.00285	0.00238	0.00204
55	0.00640	0.00561	0.00609	0.00428	0.00351	0.00295
60	0.01085	0.00944	0.00946	0.00669	0.00546	0.00453
65	0.01833	0.01596	0.01496	0.01070	0.00854	0.00693
70	0.03083	0.02689	0.02367	0.01871	0.01466	0.01174
75	0.05140	0.04623	0.04247	0.03347	0.02747	0.02260
80	0.08452	0.07813	0.07425	0.06543	0.05290	0.04549
85	0.13591	0.12806	0.12252	0.10850	0.09595	0.08583
90	0.21133	0.20193	0.19154	0.17831	0.16210	0.14998
95	0.31342	0.30216	0.28020	0.26891	0.25075	0.23814
100	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

A4.3.2. Pattern of entry into retirement

The actuarial model used for the present actuarial review considers new retirement cases as the residual element of a series of factors. Based on the macro-economic frame described in the previous section that provides the number of persons employed each year, the number of insured persons in each future year is derived and distributed by age. For a given age and given year at which retirement is possible under the Social Security scheme, the difference between the number of insured persons between two consecutive years and subsequent ages is considered to be the number of new retirees from that age group in the given year.⁶ Consistency checks are performed to reproduce the retirement pattern observed under the scheme.

⁶ For example: $ACT(x)^{y_1}$ minus $ACT(x-1)^{y_0} = new RET(x)^{y_1}$

where "ACT(x) y^{1} " means actives of age x in year 1 and "new RET y^{1} " means new retirement cases of age x in year 1.

A4.3.3. Invalidity incidence

The general age pattern of the rates of entry into invalidity has been taken from a table reflecting the Caribbean experience. This table has been adjusted to fit the specific BVI experience. Invalidity incidence rates are kept constant for the whole projection period. The assumed rates are presented in Table A4.10.

Age	Males	Females
17	-	-
22	-	-
27	0.0001	0.0001
32	0.0004	0.0005
37	0.0004	0.0004
42	0.0009	0.0003
47	0.0035	0.0030
52	0.0072	0.0052
57	0.0120	0.0074
62	0.0168	0.0096

Table A4.10: Assumed rates of entry into invalidity (as % of insured population)

A4.3.4. Family structure

Information on the family structure of the insured persons is necessary for the projection of survivors' benefits. Assumptions have to be established on the probability of being married at death, the average age of the spouses, the average number or children potentially eligible for a benefit and the average age of the children. Sample assumptions appear in Table A4.11.

Table A4.11: Family statistics

		Ма	Males				Females		
Age	Prob. of being married (%)	Average age spouse	Average number of children	Average age of children	Prob. of being married (%)	Average age spouse	Average number of children	Average age of children	
22	06	20	-	-	07	24	0.1	5.4	
27	24	24	0.1	6.5	28	30	0.3	6.9	
32	44	29	0.5	7.7	47	35	0.7	9.4	
37	60	34	0.9	9.5	60	40	1.0	12.0	
42	66	39	1.0	11.3	66	45	1.0	12.5	
47	72	44	1.0	11.1	70	50	1.0	13.1	
52	72	49	0.8	12.6	67	55	0.9	13.9	
57	74	54	0.5	12.2	66	60	0.2	14.5	
62	73	59	0.6	12.6	64	65	0.1	15.5	
67	67	64	0.2	13.2	68	70	-	-	
72	64	69	0.2	13.8	60	75	-	-	
77	65	74	0.2	14.1	53	80	-	-	
82	59	80	0.1	15.0	47	84	-	-	

A4.4. Scheme-specific economic and financial assumptions

A4.4.1. Macro-economic assumptions relevant to social security

Inflation is assumed constant at 3 per cent per year. The rate of growth of earnings fluctuates around 5 per cent. The rate of return of the Social Security Fund is assumed constant at 7 per cent per year (real rate of return of 4 per cent per year). Detailed assumptions appear in Table A4.12.

Year	Inflation rate	Annual nominal increase of the average wage	Rate of return of the Social Security Fund
2004	3.0	4.3	7.0
2005	3.0	4.4	7.0
2006	3.0	4.5	7.0
2007	3.0	4.6	7.0
2008	3.0	4.7	7.0
2009	3.0	4.7	7.0
2010	3.0	4.7	7.0
2020	3.0	5.0	7.0
2030	3.0	5.0	7.0
2040	3.0	4.7	7.0
2050	3.0	5.3	7.0

 Table A4.12:
 Projected inflation rate, wage increase and rate of return (as % per annum)

A4.4.2. Indexation of pensions-in-payment and scheme's parameters

An assumed earnings' ceiling of US\$23,400 in 2004 and the minimum pension of US\$104 per month are indexed annually in line with the wage growth assumption. Under the base scenario, in future, pensions-in-payment will be assumed to be indexed in line with the CPI increase.

A4.4.3. Administrative expenses

Administrative expenses are determined as the amount paid in 2003 indexed at 4 per cent per year, being the average between the long-term salary increase and price inflation.

Annex 5 Details on results of the valuation of the Long-term Benefit Branch

This annex presents a series of tables with the detailed results of the different scenarios analysed in this report. Each table presents, as additional indicators, the year of reserve depletion, the general average premium over 50 years and the PAYG cost in 2050.

Except for Table A5.2, the financial projections presented in this Annex do not consider the transfer of reserve that is recommended from the Short-term to the Long-term Benefit Branch in Section 3.2 and the new contribution rate schedule recommended in Section 3.4.

	Contribution rate	Total insurable	Re	evenue (US\$)		E
	% of insurable	earnings		Investment		
Voor	earnings	(US\$)	Contributions	earnings	Total	Benefits

Table A5.1 Financial projections - Long-term Repetit Branch 2004-2050

Contribution rate		Total insurable	Revenue (US\$)			Expe	enditure (US\$)		Reserve	PAYG cost rate	
	% of insurable	earnings		Investment					(end of year)	Reserve	% of insurable
Year	earnings	(US\$)	Contributions	earnings	Total	Benefits	Admin.	Total	(US\$)	ratio	earnings
2004	6.5	217,901	14,164	11,561	25,725	3,506	1,500	5,006	180,642	36.1	2.3
2005	6.5	233,591	15,183	13,016	28,199	4,387	1,560	5,947	202,894	34.1	2.5
2006	6.5	250,635	16,291	14,580	30,871	5,336	1,622	6,958	226,807	32.6	2.8
2007	6.5	269,163	17,496	16,260	33,756	6,354	1,687	8,041	252,522	31.4	3.0
2008	6.5	289,178	18,797	18,067	36,864	7,445	1,755	9,200	280,186	30.5	3.2
2009	6.5	310,568	20,187	20,009	40,196	8,684	1,825	10,509	309,873	29.5	3.4
2010	6.5	333,379	21,670	22,088	43,758	10,137	1,898	12,035	341,596	28.4	3.6
2015	6.5	470,534	30,585	34,775	65,360	19,678	2,309	21,987	534,799	24.3	4.7
2020	6.5	649,610	42,225	51,442	93,667	36,318	2,809	39,127	786,518	20.1	6.0
2025	6.5	867,915	56,414	70,927	127,341	65,591	3,418	69,009	1,076,085	15.6	8.0
2030	6.5	1,130,642	73,492	88,982	162,474	114,118	4,159	118,277	1,335,342	11.3	10.5
2035	6.5	1,465,042	95,228	98,800	194,028	178,422	5,060	183,482	1,462,875	8.0	12.5
2040	6.5	1,919,455	124,765	93,974	218,739	256,418	6,156	262,574	1,363,368	5.2	13.7
2045	6.5	2,536,377	164,864	64,838	229,702	360,647	7,490	368,137	884,058	2.4	14.5
2050	6.5	3,344,371	217,384	-9,111	208,273	515,657	9,112	524,769	-300,036	-0.6	15.7
First negativ	First negative reserve				=	2050					
General ave	rage premium over	50 years (% of ins	urable earnings)		=	8.5					
PAYG cost	ate in 2050 (% of ir	nsurable earnings)	0,		=	15.7					

Note: The content of this table is repeated in Table 3.5 of Section 3.

Co	Contribution rate Total insur		Re	venue (US\$)		Expe	enditure (US\$)		Reserve	PAYG cost rate		
	% of insurable	earnings		Investment					(end of year)	Reserve	% of insurable	
Year	earnings	(US\$)	Contributions	earnings	Total	Benefits	Admin.	Total	(US\$)	Reserve ratio 43.4 40.7 38.6 37.0 35.7 34.4 33.0 27.8 23.0 18.2 13.7 10.6 8.2 6.0 3.5	earnings	
2004	6.5	217,901	14,164	13,967	28,131	3,506	1,500	5,006	217,415	43.4	2.3	
2005	6.5	233,591	15,183	15.590	30.773	4.387	1.560	5.947	242.241	40.7	2.5	
2006	6.5	250.635	16.291	17.334	33.625	5.336	1.622	6.958	268,908	38.6	2.8	
2007	6.5	269,163	17,496	19,207	36,703	6,354	1,687	8,041	297,570	37.0	3.0	
2008	6.5	289,178	18,797	21,220	40,017	7,445	1,755	9,200	328,387	35.7	3.2	
2009	6.5	310,568	20,187	23,383	43,570	8,684	1,825	10,509	361,448	34.4	3.4	
2010	6.5	333,379	21,670	25,698	47,368	10,137	1,898	12,035	396,781	33.0	3.6	
2015	6.5	470,534	30,585	39,839	70,424	19,678	2,309	21,987	612,200	27.8	4.7	
2020	7.0	649,610	45,473	58,655	104,128	36,318	2,809	39,127	898,437	23.0	6.0	
2025	7.0	867,915	60,754	82,554	143,308	65,591	3,418	69,009	1,256,022	18.2	8.0	
2030	7.5	1,130,642	84,798	107,472	192,270	114,118	4,159	118,277	1,623,727	13.7	10.5	
2035	7.5	1,465,042	109,878	129,890	239,768	178,422	5,060	183,482	1,945,555	10.6	12.5	
2040	8.0	1,919,455	153,556	144,623	298,179	256,418	6,156	262,574	2,152,207	8.2	13.7	
2045	8.0	2,536,377	202,910	149,133	352,043	360,647	7,490	368,137	2,191,912	6.0	14.5	
2050	8.5	3,344,371	284,271	127,210	411,481	515,657	9,112	524,769	1,817,739	3.5	15.7	
negative re	serve				=	After 2050						
eral average	e premium over	50 years (% of ins	urable earnings)		=	8.5						
G cost rate	in 2050 (% of in	surable earnings)	0,		_	15 7						

Table A5.2 Financial projections - Long-term Benefit Branch, Present provisions, transfer of reserve from Short-term Benefit Branch and new recommended contribution rate schedule, 2004-2050 (in thousand dollars)

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Table A5.3 Financial projections - Long-term Benefit Branch, New pension formula (2.0 per cent per year) with career-average reference earnings, 2004-2050 (in thousand dollars)

Со	ntribution rate	Total insurable	Revenue (US\$)			Expe	enditure (US\$)		Reserve	PAYG cost rate	
9	% of insurable	earnings		Investment					(end of year)	Reserve	% of insurable
Year	earnings	(US\$)	Contributions	earnings	Total	Benefits	Admin.	Total	(US\$)	ratio	earnings
2004	6.5	217,901	14,164	11.561	25,725	3,506	1.500	5,006	180,642	36.1	2.3
2005	6.5	233,591	15,183	13,017	28,200	4,362	1,560	5,922	202,920	34.3	2.5
2006	6.5	250,635	16,291	14 584	30,875	5 264	1 622	6,886	226,909	32.9	27
2007	6.5	269,163	17,496	16,271	33,767	6,244	1,687	7,931	252,745	31.9	2.9
2008	6.5	289,178	18,797	18,088	36,885	7,303	1,755	9.058	280.572	31.0	3.1
2009	6.5	310.568	20.187	20.042	40.229	8,510	1.825	10.335	310,466	30.0	3.3
2010	6.5	333,379	21,670	22,136	43,806	9,931	1,898	11,829	342,443	28.9	3.5
2015	6.5	470,534	30,585	34,934	65,519	19,457	2,309	21,766	537,343	24.7	4.6
2020	6.5	649,610	42,225	51,710	93,935	36,337	2,809	39,146	790,615	20.2	6.0
2025	6.5	867,915	56,414	71,222	127,636	65,987	3,418	69,405	1,080,391	15.6	8.0
2030	6.5	1.130.642	73,492	89,175	162,667	114,693	4,159	118.852	1.337.993	11.3	10.5
2035	6.5	1.465.042	95.228	98.923	194,151	178.534	5.060	183.594	1.464.684	8.0	12.5
2040	6.5	1,919,455	124,765	94,180	218,945	256.124	6,156	262.280	1.366.668	5.2	13.7
2045	6.5	2 536 377	164 864	65 345	230,209	359 777	7 490	367 267	892 250	2.4	14.5
2050	6.5	3,344,371	217,384	-7,903	209,481	514,013	9,112	523,125	-280,744	-0.5	15.6
First negative res	serve				=	2050					
General average	premium over	50 years (% of ins	urable earnings)		=	8.4					
PAYG cost rate i	in 2050 (% of ir	surable earnings)	0-7		=	15.6					

Table A5.4 Financial projections - Long-term Benefit Branch, Increase of the minimum pension at 60 per cent of the minimum wage, 2004-2050 (in thousand dollars)

	Contribution rate	Total insurable	Revenue (US\$)			Expe	enditure (US\$)		Reserve	Paganya	PAYG cost rate
Year		(US\$)	Contributions	earnings	Total	Benefits	Admin	Total	(end of year) (LIS\$)	ratio	
Tear	carrings	(00\$)	Contributions	carnings	Total	Denents	Admin.	Total	(00\$)	Tatio	carnings
2004	6.5	217,901	14,164	11,561	25,725	3,506	1,500	5,006	180,642	36.1	2.3
2005	6.5	233,591	15,183	12,986	28,169	5,277	1,560	6,837	201,974	29.5	2.9
2006	6.5	250,635	16,291	14,480	30,771	6,356	1,622	7,978	224,767	28.2	3.2
2007	6.5	269,163	17,496	16,077	33,573	7,510	1,687	9,197	249,143	27.1	3.4
2008	6.5	289,178	18,797	17,786	36,583	8,732	1,755	10,487	275,239	26.2	3.6
2009	6.5	310,568	20,187	19,613	39,800	10,114	1,825	11,939	303,100	25.4	3.8
2010	6.5	333,379	21,670	21,559	43,229	11,720	1,898	13,618	332,711	24.4	4.1
2015	6.5	470,534	30,585	33,259	63,844	22,032	2,309	24,341	510,426	21.0	5.2
2020	6.5	649,610	42,225	48,165	90,390	39,901	2,809	42,710	734,603	17.2	6.6
2025	6.5	867,915	56,414	64,498	120,912	71,504	3,418	74,922	974,813	13.0	8.6
2030	6.5	1,130,642	73,492	76,873	150,365	124,174	4,159	128,333	1,145,124	8.9	11.4
2035	6.5	1,465,042	95,228	76,657	171,885	194,511	5,060	199,571	1,116,210	5.6	13.6
2040	6.5	1,919,455	124,765	55,177	179,942	279,272	6,156	285,428	758,703	2.7	14.9
2045	6.5	2.536.377	164.864	-270	164.594	391.861	7.490	399.351	-127.035	-0.3	15.7
2050	6.5	3,344,371	217,384	-115,205	102,179	559,476	9,112	568,588	-1,944,036	-3.4	17.0
First negative	First negative reserve					2045					
General ave	General average premium over 50 years (% of insurable earnings)					9.2					
PAYG cost r	ate in 2050 (% of ir	nsurable earnings)			=	17.0					

Table A5.5
Financial projections - Long-term Benefit Branch, Automatic
adjustment of scheme's parameters, 2004-2050
(in thousand dollars)

Co	Contribution rate		Revenue (US\$)			Expe	enditure (US\$)		Reserve		PAYG cost rate	
C	% of insurable	earnings		Investment					(end of year)	Reserve	% of insurable	
Year	earnings	(US\$)	Contributions	earnings	Total	Benefits	Admin.	Total	(US\$)	ratio	earnings	
2004	6.5	217 901	14 164	11 561	25 725	3 506	1 500	5 006	180 642	36.1	23	
2004	6.5	233 591	15 183	13,016	28,199	4 387	1,560	5 947	202 894	34.1	2.0	
2000	6.5	250,635	16,100	14 580	30,871	5,336	1,000	6 958	202,004	32.6	2.0	
2007	6.5	269 163	17 496	16,260	33 756	6,354	1,687	8 041	252 522	31.4	3.0	
2008	6.5	289,178	18,797	18,067	36,864	7,445	1,755	9,200	280,186	30.5	3.2	
2009	6.5	310,568	20,187	20.009	40,196	8,684	1,825	10,509	309,873	29.5	3.4	
2010	6.5	333,379	21,670	22,088	43,758	10,137	1,898	12,035	341,596	28.4	3.6	
2015	6.5	470,534	30,585	34,775	65,360	19,678	2,309	21,987	534,799	24.3	4.7	
2020	6.5	649,610	42,225	51,442	93,667	36,318	2,809	39,127	786,518	20.1	6.0	
2025	6.5	867.915	56.414	70.927	127.341	65.591	3.418	69.009	1.076.085	15.6	8.0	
2030	6.5	1.130.642	73.492	88.982	162.474	114.118	4,159	118.277	1.335.342	11.3	10.5	
2035	6.5	1.465.042	95.228	98.800	194.028	178,422	5.060	183.482	1.462.875	8.0	12.5	
2040	6.5	1.919.455	124,765	93.974	218.739	256.418	6,156	262.574	1.363.368	5.2	13.7	
2045	6.5	2,536,377	164,864	64,838	229,702	360,647	7,490	368,137	884.058	2.4	14.5	
2050	6.5	3,344,371	217,384	-9,111	208,273	515,657	9,112	524,769	-300,036	-0.6	15.7	
First negative re	irst negative reserve				=	2050						
General average	premium over	50 years (% of ins	urable earnings)		=	8.5						
PAYG cost rate	in 2050 (% of ir	nsurable earnings)	0,		=	15.7						
Cor	ntribution rate	Total insurable	Re	venue (US\$)		Exp	enditure (US\$)		Reserve		PAYG cost rate	
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9	6 of insurable	earnings		Investment					(end of year)	Reserve	% of insurable	
Year	earnings	(US\$)	Contributions	earnings	Total	Benefits	Admin.	Total	(US\$)	Reserve ratio 36.1 32.6 31.3 30.3 29.5 28.6 27.6 23.9 19.8 15.4 11.1 7.8 5.1 2.3 -0.7	earnings	
2004	6.5	217,901	14,164	11,561	25,725	3,506	1,500	5,006	180,642	36.1	2.3	
2005	6.5	233,591	15,183	13,007	28,190	4,649	1,560	6,209	202,623	32.6	2.7	
2006	6.5	250,635	16,291	14,552	30,843	5,600	1,622	7,222	226,244	31.3	2.9	
2007	6.5	269,163	17,496	16,211	33,707	6,619	1,687	8,306	251,645	30.3	3.1	
2008	6.5	289,178	18,797	17,997	36,794	7,710	1,755	9,465	278,974	29.5	3.3	
2009	6.5	310,568	20,187	19,915	40,102	8,949	1,825	10,774	308,302	28.6	3.5	
2010	6.5	333,379	21,670	21,969	43,639	10,402	1,898	12,300	339,641	27.6	3.7	
2015	6.5	470,534	30,585	34,503	65,088	19,930	2,309	22,239	530,519	23.9	4.7	
2020	6.5	649,610	42,225	50,965	93,190	36,536	2,809	39,345	779,122	19.8	6.1	
2025	6.5	867,915	56,414	70,180	126,594	65,757	3,418	69,175	1,064,586	15.4	8.0	
2030	6.5	1,130,642	73,492	87,879	161,371	114,227	4,159	118,386	1,318,422	11.1	10.5	
2035	6.5	1.465.042	95.228	97.218	192.446	178.486	5.060	183.546	1.438.659	7.8	12.5	
2040	6.5	1.919.455	124,765	91,735	216.500	256,455	6.156	262.611	1.329.124	5.1	13.7	
2045	6.5	2,536,377	164,864	61,685	226.549	360,670	7,490	368,160	835,857	2.3	14.5	
2050	6.5	3,344,371	217,384	-13,539	203,845	515,670	9,112	524,782	-367,736	-0.7	15.7	
t negative res	erve				=	2049						
eral average	premium over	50 years (% of ins	urable earnings)		=	8.5						
'G cost rate i	n 2050 (% of in	surable earnings)			-	15.7						

Table A5.6 Financial projections - Long-term Benefit Branch, Ad hoc increase of pensions in payment of 10 per cent, 2004-2050 (in thousand dollars)

Table A5.7 Financial projections - Long-term Benefit Branch, Combined modifications, 2004-2050 (in thousand dollars)

Cor	tribution rate	Total insurable	Re	venue (US\$)		Expe	enditure (US\$)		Reserve		PAYG cost rate	
%	of insurable	earnings		Investment					(end of year)	Reserve	% of insurable	
Year	earnings	(US\$)	Contributions	earnings	Total	Benefits	Admin.	Total	(US\$)	Reserve ratio 36.1 29.1 27.9 26.9 26.1 25.3 24.4 20.9 16.9 12.6 8.5 5.1 2.2 -0.9 -4.0	earnings	
2004	6.5	217.901	14,164	11.561	25.725	3.506	1.500	5.006	180.642	36.1	2.3	
2005	6.5	233,591	15,183	12,982	28,165	5.378	1.560	6.938	201.869	29.1	3.0	
2006	6.5	250.635	16.291	14.470	30.761	6.431	1.622	8.053	224.577	27.9	3.2	
2007	6.5	269,163	17,496	16.062	33.558	7.562	1.687	9.249	248.886	26.9	3.4	
2008	6.5	289.178	18.797	17.767	36.564	8.767	1.755	10.522	274.928	26.1	3.6	
2009	6.5	310,568	20.187	19,591	39.778	10.132	1.825	11.957	302.749	25.3	3.9	
2010	6.5	333,379	21,670	21,535	43,205	11,723	1,898	13,621	332,333	24.4	4.1	
2015	6.5	470,534	30,585	33,218	63,803	22,104	2,309	24,413	509,770	20.9	5.2	
2020	6.5	649,610	42,225	47,999	90,224	40,468	2,809	43,277	731,782	16.9	6.7	
2025	6.5	867,915	56,414	63,859	120,273	73,105	3,418	76,523	964,226	12.6	8.8	
2030	6.5	1.130.642	73.492	75.050	148.542	127.288	4.159	131,447	1.115.682	8.5	11.6	
2035	6.5	1,465,042	95.228	72.531	167.759	199.333	5.060	204.393	1.050.691	5.1	14.0	
2040	6.5	1,919,455	124,765	47.086	171,851	286.047	6,156	292,203	631,580	2.2	15.2	
2045	6.5	2 536 377	164 864	-14 768	150,096	401 000	7 490	408 490	-353 302	-0.9	16.1	
2050	6.5	3,344,371	217,384	-139,852	77,532	572,247	9,112	581,359	-2,327,288	-4.0	17.4	
First negative res	erve				=	2044						
General average	premium over	50 years (% of ins	urable earnings)		=	9.4						
PAYG cost rate in	n 2050 (% of in	surable earnings)	0,		=	17.4						

% o Year	f insurable earnings	earnings (US\$)	Contributions	Investment							
Year 2004	earnings	(US\$)	Contributions						(end of year)	Reserve	% of insurable
2004	0.5		Contributione	earnings	Total	Benefits	Admin.	Total	(US\$)	ratio	earnings
	n 5	217 901	14 164	9 910	24 074	3 506	1 500	5 006	178 991	35.8	23
2005	6.5	233 591	15 183	11 059	26 242	4,387	1,560	5 947	199 286	33.5	2.5
2006	6.5	250,635	16,291	12,281	28,572	5,336	1,622	6,958	220,900	31.7	2.8
2007	6.5	269,163	17,496	13,583	31.079	6,354	1,687	8,041	243,938	30.3	3.0
2008	6.5	289,178	18,797	14.972	33,769	7,445	1,755	9,200	268,507	29.2	3.2
2009	6.5	310,568	20.187	16.450	36.637	8.684	1.825	10.509	294.635	28.0	3.4
2010	6.5	333,379	21,670	18,019	39,689	10,137	1,898	12,035	322,289	26.8	3.6
2015	6.5	470,534	30,585	27,301	57,886	19,678	2,309	21,987	485,553	22.1	4.7
2020	6.5	649,610	42,225	38,770	80,995	36,318	2,809	39,127	685,132	17.5	6.0
2025	6.5	867.915	56.414	50.836	107.250	65.591	3.418	69.009	890.028	12.9	8.0
2030	6.5	1.130.642	73,492	59,168	132,660	114.118	4,159	118.277	1.020.532	8.6	10.5
2035	6.5	1,465,042	95.228	57.275	152,503	178,422	5.060	183,482	964.593	5.3	12.5
2040	6.5	1,919,455	124,765	39,108	163,873	256.418	6,156	262.574	617,976	2.4	13.7
2045	6.5	2 536 377	164 864	-4 016	160 848	360 647	7 490	368 137	-177 756	-0.5	14.5
2050	6.5	3,344,371	217,384	-89,575	127,809	515,657	9,112	524,769	-1,742,909	-3.3	15.7
First as set is a second						0045					
First negative reserv	-irst negative reserve					2045					
General average pr		ou years (% of Insi	urable earnings)		=	9.0					

Table A5.8 Financial projections - Long-term Benefit Branch, Sensitivity test – Rate of return of the funds reduced by 1 per cent, 2004-2050 (in thousand dollars)

Table A5.9	
Financial projections - Long-term Be	enefit Branch, Sensitivity test -
Higher migration, 2004-2050	-
(in thousand dollars)	

Revenue (US\$) Expenditure (US\$) PAYG cost rate Contribution rate Total insurable Reserve % of insurable earnings Investment (end of year) Reserve % of insurable Year earnings (US\$) Contributions earnings Total Benefits Admin. Total (US\$) ratio earnings 2004 6.5 217.968 14,168 25.729 3.506 1.500 5.006 180.642 36.1 11,561 2005 6.5 233,806 15,197 13,017 28,214 4,387 1.560 5,947 202,909 34.1 2006 6.5 251,095 16,321 14,582 30,903 5,336 1,622 6,958 226,854 32.6 2007 6.5 269,981 17,549 16,265 33,814 6,354 1,687 8,041 252,627 31.4 2008 18,882 18,078 36.960 7.444 1.755 9,199 280.388 30.5 6.5 290.485 2009 6.5 312,518 20,314 20,028 40,342 8,683 1,825 10,508 310,222 29.5 2010 6.5 336,142 21,849 22,119 43,968 10,136 1,898 12,034 342,156 28.4 2015 6.5 480,776 31,250 34,970 66,220 19,676 2,309 21,985 538,111 24.5 2020 6.5 675,704 43,921 52,157 96,078 36,313 2,809 39,122 798,319 20.4 2025 6.5 923,018 59,996 72,939 132,935 65,590 3,418 69,008 1,108,662 16.1 2030 6.5 1,234,999 80,275 93.792 174,067 4,159 118,353 1,412,273 11.9 114,194 2035 6.5 1,647,861 107,111 109.092 216.203 178.844 5.060 183,904 1,626,015 8.8 2040 2,221,996 144,430 258,626 264,325 1,681,576 6.4 6.5 114,196 258,169 6,156 2045 6.5 3,021,253 196,381 101,894 298,275 366,039 7,490 373,529 1,463,768 3.9 2050 6.5 4,105,336 266,847 54,902 321,749 531,281 9,112 540,393 695,649 1.3 First negative reserve After 2050 = General average premium over 50 years (% of insurable earnings) 7.9 = PAYG cost rate in 2050 (% of insurable earnings) 13.2 =

2.3

2.5

2.8

3.0

3.2

3.4

3.6

4.6

5.8

7.5

9.6

11.2

11.9

12.4

13.2

(in thousand dollars)

Table A5.10	
Financial projections - Long-term Benefit Branch, Sensitivity test –	
Larger number of inactive persons, 2004-2050	
(in thousand dollars)	

Table A5.10
Financial projections - Long-term Benefit Branch, Sensitivity test –
Larger number of inactive persons, 2004-2050
(in thousand dollars)

Con	tribution rate	Total insurable	Re	venue (US\$)		Expe	enditure (US\$)		Reserve		PAYG cost rate	
%	of insurable	earnings		Investment					(end of year)	Reserve	% of insurable	
Year	earnings	(US\$)	Contributions	earnings	Total	Benefits	Admin.	Total	(US\$)	Reserve ratio 36.1 34.1 32.6 31.4 30.5 29.5 28.4 24.3 20.1 15.6 10.5 7.0 4.1 1.2 -1.8	earnings	
2004	6 5	217 001	14 164	11 561	25 725	2 506	1 500	5 006	190 642	26.1	2.2	
2004	0.5	217,901	14,104	12.016	20,720	3,500	1,500	5,000	202 804	24.1	2.3	
2005	0.5	233,591	10,183	13,016	28,199	4,387	1,560	5,947	202,894	34.1	2.5	
2006	6.5	250,635	16,291	14,580	30,871	5,336	1,622	6,958	226,807	32.6	2.8	
2007	6.5	269,163	17,496	16,260	33,756	6,354	1,687	8,041	252,522	31.4	3.0	
2008	6.5	289,178	18,797	18,067	36,864	7,445	1,755	9,200	280,186	30.5	3.2	
2009	6.5	310,568	20,187	20,009	40,196	8,684	1,825	10,509	309,873	29.5	3.4	
2010	6.5	333,379	21,670	22,088	43,758	10,137	1,898	12,035	341,596	28.4	3.6	
2015	6.5	470,534	30,585	34,775	65,360	19,678	2,309	21,987	534,799	24.3	4.7	
2020	6.5	649,610	42,225	51,442	93,667	36,318	2,809	39,127	786,518	20.1	6.0	
2025	6.5	867,915	56,414	70,927	127,341	65,591	3,418	69,009	1,076,085	15.6	8.0	
2030	6.5	1,130,642	73,492	88,317	161,809	121,149	4,159	125,308	1,321,599	10.5	11.1	
2035	6.5	1,465,042	95,228	93,761	188,989	192,296	5,060	197,356	1,378,789	7.0	13.5	
2040	6.5	1,919,455	124,765	80,429	205,194	273,998	6,156	280,154	1,147,384	4.1	14.6	
2045	6.5	2,536,377	164,864	38,829	203,693	377,476	7,490	384,966	477,931	1.2	15.2	
2050	6.5	3,344,371	217,384	-51,779	165,605	527,443	9,112	536,555	-958,250	-1.8	16.0	
First negative res	erve					2048						
Conoral average	premium over	50 years (% of ins	urable earnings)		_	2040						
PAYG cost rate in	2050 (% of in	surable earnings)	and earnings)		=	0.0 16.0						

Table A5.11
Financial projections - Long-term Benefit Branch
Sensitivity test – Indexing of pensions based on a wage index
(instead of CPI), 2004-2050
(in thousand dollars)

	Contribution rate	Total insurable	Revenue (US\$)			Expe	nditure (US\$)		Reserve	PAYG cost rate	
	% of insurable	earnings		Investment					(end of year)	Reserve	% of insurable
Year	earnings	(US\$)	Contributions	earnings	Total	Benefits	Admin.	Total	(US\$)	Reserve ratio 36.1 33.8 32.0 30.5 29.3 28.1 26.8 22.0 17.3 12.6 8.3 4.8 1.7 -1.5 -4.7	earnings
2004	6.5	217 001	14 164	11 561	25 725	3 506	1 500	E 006	190 642	26.1	2.2
2004	0.0	217,901	14,104	12,015	25,725	3,506	1,500	5,006	100,042	30.1	2.3
2005	0.0	233,591	15,183	13,015	28,198	4,440	1,560	6,000	202,840	33.8	2.0
2006	6.5	250,635	16,291	14,571	30,862	5,460	1,622	7,082	226,620	32.0	2.8
2007	6.5	269,163	17,496	16,239	33,735	6,568	1,687	8,255	252,100	30.5	3.1
2008	6.5	289,178	18,797	18,026	36,823	7,773	1,755	9,528	279,395	29.3	3.3
2009	6.5	310,568	20,187	19,938	40,125	9,146	1,825	10,971	308,549	28.1	3.5
2010	6.5	333,379	21,670	21,974	43,644	10,756	1,898	12,654	339,539	26.8	3.8
2015	6.5	470,534	30,585	34,157	64,742	21,548	2,309	23,857	524,404	22.0	5.1
2020	6.5	649,610	42,225	49,396	91,621	40,779	2,809	43,588	752,981	17.3	6.7
2025	6.5	867,915	56,414	65,428	121,842	74,963	3,418	78,381	987,265	12.6	9.0
2030	6.5	1,130,642	73,492	76,002	149,494	132,041	4,159	136,200	1,127,825	8.3	12.0
2035	6.5	1,465,042	95,228	71,165	166,393	208,478	5,060	213,538	1,025,174	4.8	14.6
2040	6.5	1,919,455	124,765	40,323	165,088	302,026	6,156	308,182	520,080	1.7	16.1
2045	6.5	2,536,377	164,864	-32,884	131,980	430,047	7,490	437,537	-644,978	-1.5	17.3
2050	6.5	3,344,371	217,384	-181,066	36,318	625,015	9,112	634,127	-2,984,095	-4.7	19.0
First negativ	e reserve					2043					
General ave		50 years (% of inc	urable earnings)		_	9.7					
PAVG cost	rage premium over	surable earninge	arable carriings)		=	3.7 10 0					
	ate in 2030 (/8 01 li	isuiable earrings)				19.0					