

**Sierra Leone**

**Actuarial Valuation  
of the National Social Security  
and Insurance Trust  
as at 31 December 2007**

**Régie des rentes du Québec**

Direction de l'évaluation, de la statistique et de la révision

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# Table of contents

<b>1</b>	<b>EXPERIENCE OF THE SYSTEM SINCE THE LAST ACTUARIAL VALUATION.....</b>	<b>11</b>
1.1	LEGAL FRAMEWORK OF THE NASSIT.....	11
1.2	COVERED POPULATION .....	12
1.3	ANALYSIS OF INCOME AND EXPENDITURES .....	13
1.3.1	<i>Statement of account, general scheme</i> .....	13
1.4	ANALYSIS OF ADMINISTRATIVE COSTS.....	15
1.4.1	<i>The NASSIT situation</i> .....	15
1.4.2	<i>General principles</i> .....	17
1.5	STRUCTURE AND RATE OF RETURN ON THE INVESTMENT PORTFOLIO AND INVESTMENT POLICY ..	17
1.5.1	<i>Portfolio analysis</i> .....	18
1.5.2	<i>Description of the investment policy</i> .....	20
1.5.3	<i>Comments on investment policy</i> .....	22
1.6	FINANCIAL SYSTEM AND VALUATION OF THE RESERVE (FUND).....	22
1.7	COMPARISON WITH THE PREVIOUS VALUATION .....	24
<b>2</b>	<b>PROJECTION FRAMEWORK .....</b>	<b>27</b>
2.1	DATA GATHERING.....	27
2.2	INSURED POPULATION.....	29
2.2.1	<i>Active Insured population as at the valuation date</i> .....	29
2.2.1	<i>Inactive Insured population as at the valuation date</i> .....	30
2.2.2	<i>Projection of the insured population</i> .....	31
2.2.2.1	Growth of insured population .....	31
2.2.2.2	Distribution of new entrants.....	32
2.2.2.3	Mortality rates .....	33
2.2.2.4	Age at retirement.....	35
2.2.2.5	Disability incidence rates .....	35
2.2.2.6	Mortality rates among disabled persons .....	35
2.2.2.7	Structure of the insured population .....	36
2.3	ECONOMIC ASSUMPTIONS .....	37
2.3.1	<i>Inflation</i> .....	37
2.3.2	<i>Earnings increases and interest rates</i> .....	38
2.4	PARAMETRIC ASSUMPTIONS AND DATA .....	39
2.4.1	<i>Salary scale and contribution density</i> .....	39
2.4.2	<i>Past service</i> .....	40
2.4.3	<i>Pensioners as at the valuation date</i> .....	43
2.4.4	<i>Family structure</i> .....	43
2.4.5	<i>Adjustment of pensions in payment</i> .....	44
2.4.6	<i>Projection of administrative costs</i> .....	44
2.4.7	<i>Amount of reserve as at valuation date</i> .....	44
<b>3</b>	<b>DEMOGRAPHIC AND FINANCIAL PROJECTIONS .....</b>	<b>45</b>
3.1	RESULTS OF THE PROJECTION FOR THE BASIC SCENARIO.....	45
3.1.1	<i>Financial projections</i> .....	47
3.1.2	<i>Reconciliation with previous actuarial valuation</i> .....	54
3.2	SENSITIVITY TESTS .....	58
3.2.1	<i>Insured population growth</i> .....	58
3.2.1	<i>Higher return on assets</i> .....	60
3.2.2	<i>The cost of the validation of past services</i> .....	60
3.2.3	<i>Adjustment to pensions in payment</i> .....	61
<b>4</b>	<b>CONCLUSION .....</b>	<b>63</b>

## Tables and figures

TABLE 1 .....	12
DISTRIBUTION OF THE COVERED POPULATION AS AT 31 DECEMBER 2007.....	12
TABLE 2 .....	14
STATEMENT OF ACCOUNT, 2005-2006, IN MILLIONS OF LEONES.....	14
TABLE 3 .....	15
NATURE OF COSTS, 2004-2007, IN MILLIONS OF LEONES .....	15
TABLE 4 .....	16
TOP 10 ADMINISTRATIVE AND RELATED EXPENSES, 2007 .....	16
TABLE 5 .....	16
ADMINISTRATIVE COSTS EXPRESSED AS A PROPORTION OF SEVERAL INDICATORS, 2004-2007 .....	16
TABLE 6 .....	19
ASSET VALUE AS AT END OF FISCAL YEAR, 2005-2007, IN MILLIONS OF LEONES .....	19
TABLE 7 .....	20
RATE OF RETURN* ON ASSETS, FISCAL YEAR, SHORT TERM INVESTMENT, 2005 - 2007 .....	20
TABLE 8 .....	20
HISTORICAL ANNUAL RATE OF RETURN OF THE FUND, 2005-2007, IN MILLIONS OF LEONES.....	20
TABLE 9 .....	21
MID-TERM ASSET MIX, (%).....	21
TABLE 10 .....	24
COMPARISON OF THE INCREASE IN ASSETS, 2005-2007 .....	24
TABLE 11 .....	25
COMPARISON OF THE PAYG RATES, 2005-2007 .....	25
TABLE 12 .....	26
COMPARISON OF REAL EXPERIENCE AND EXPECTATION IN THE LAST ACTUARIAL VALUATION, SELECTED INDICATORS, 2004 TO 2007 .....	26
TABLE 13A .....	29
DISTRIBUTION OF CIVILIAN EMPLOYEES* BY AGE AND SEX, 2007 .....	29
TABLE 13B .....	29
DISTRIBUTION OF POLICE AND MILITARY PERSONNEL BY AGE AND SEX, 2007 .....	29
TABLE 13C .....	29
DISTRIBUTION OF TEACHERS BY AGE AND SEX, 2007 .....	30
TABLE 13D .....	30
DISTRIBUTION IN THE PRIVATE SECTOR EMPLOYEES* BY AGE AND SEX, 2007.....	30
TABLE 14 .....	31
DISTRIBUTION OF THE INACTIVE POPULATION BY AGE AND SEX, 2007 .....	31
TABLE 15 .....	32
POPULATION GROWTH ASSUMPTION BY INSURED SECTOR, SEX AND PERIOD .....	32
TABLE 16 .....	33
DISTRIBUTION OF NEW ENTRANTS FOR ALL SECTORS .....	33
TABLE 17 .....	33
LIFE EXPECTANCY AT BIRTH .....	33
TABLE 18 .....	34
LIFE EXPECTANCY AT DIFFERENT PERIODS OF TIME, BY AGE AND SEX.....	34
TABLE 19 .....	34
SAMPLE MORTALITY RATES, 2007 AND 2057 .....	34
TABLE 20 .....	35
DISABILITY RATES (RATES PER 10 000 PERSONS) .....	35
TABLE 21 .....	36
LOADING FACTOR FOR MORTALITY RATES AMONG DISABLED PERSONS .....	36
FIGURE 1 .....	36
DISTRIBUTION OF THE INSURED POPULATION BY AGE, SEX AND SECTOR, 2007 .....	36

FIGURE 2 .....	37
DISTRIBUTION OF THE INSURED POPULATION BY AGE, SEX AND SECTOR, 2057 .....	37
TABLE 22 .....	38
INFLATION RATE, 2002-2007.....	38
TABLE 23 .....	39
INFLATION RATES, EARNINGS GROWTH AND RETURN ON THE FUND, 2008-2057, AS A PERCENTAGE .....	39
TABLE 24 .....	40
DISTRIBUTION OF EARNINGS BY AGE AND SEX, BY GROUP, 2007, IN LEONES ('000) .....	40
TABLE 25 .....	40
DISTRIBUTION OF EARNINGS BY AGE AND SEX, BY GROUP, 2007, IN LEONES ('000) .....	40
TABLE 26 .....	41
AVERAGE PAST CONTRIBUTION YEARS FOR CIVIL SERVANTS, AS AT 31 DECEMBER 2007 .....	41
TABLE 27 .....	41
AVERAGE PAST CONTRIBUTION YEARS FOR TEACHERS, AS AT 31 DECEMBER 2007.....	41
TABLE 28 .....	42
AVERAGE PAST CONTRIBUTION YEARS FOR POLICE, AS AT 31 DECEMBER 2007 .....	42
TABLE 29 .....	42
AVERAGE PAST CONTRIBUTION YEARS FOR MILITARY, AS AT 31 DECEMBER 2007 .....	42
TABLE 30 .....	43
AVERAGE PAST CONTRIBUTION YEARS FOR PRIVATE SECTOR, AS AT 31 DECEMBER 2007.....	43
TABLE 31 .....	44
FAMILY STATISTICS* .....	44
TABLE 32 .....	46
DEMOGRAPHIC PROJECTION, PUBLIC SECTOR.....	46
FIGURE 3 .....	46
DEMOGRAPHIC RATIO, PUBLIC SECTOR .....	46
TABLE 33 .....	47
DEMOGRAPHIC PROJECTION, PRIVATE SECTOR.....	47
FIGURE 4 .....	47
DEMOGRAPHIC RATIO, PRIVATE SECTOR .....	47
TABLE 34 .....	48
REPLACEMENT RATIOS, PUBLIC SECTOR .....	48
TABLE 35 .....	49
REPLACEMENT RATIOS, PRIVATE SECTOR .....	49
TABLE 35 .....	50
GENERAL AVERAGE PREMIUM, PUBLIC SECTOR, PRIVATE SECTOR AND BOTH SECTORS .....	50
TABLE 36 .....	51
FINANCIAL PROJECTIONS, ALL SECTORS, IN MILLIONS OF LEONES .....	51
TABLE 37 .....	52
FINANCIAL PROJECTIONS, PUBLIC SECTOR, IN MILLIONS OF LEONES .....	52
TABLE 38 .....	53
FINANCIAL PROJECTIONS, PRIVATE SECTOR, IN MILLIONS OF LEONES .....	53
FIGURE 5 .....	54
PAY-AS-YOU-GO RATE, PUBLIC SECTOR, PRIVATE SECTOR AND BOTH SECTORS COMBINED.....	54
FIGURE 6 .....	54
DEVELOPMENT OF THE RESERVE, 2005-2054 (CONSTANT LEONES OF 2007) .....	54
TABLE 39 .....	56
RECONCILIATION OF THE GAP, 2004 AND 2007 ACTUARIAL VALUATIONS, PUBLIC SECTOR .....	56
TABLE 40 .....	57
RECONCILIATION OF THE GAP, 2004 AND 2007 ACTUARIAL VALUATIONS, PRIVATE SECTOR.....	57
TABLE 41 .....	57
RECONCILIATION OF THE GAP, 2004 AND 2007 ACTUARIAL VALUATIONS, BOTH SECTORS .....	57
TABLE 42 .....	58
POPULATION GROWTH ASSUMPTION FOR THE PRIVATE SECTOR, BASIC AND ALTERNATE SCENARIO.....	58

TABLE 43 .....	59
FINANCIAL PROJECTIONS, ALL SECTORS, IN MILLIONS OF LEONES	
LOW GROWTH SCENARIO FOR THE PRIVATE SECTOR .....	59
TABLE 44 .....	60
RETURN ON ASSETS ASSUMPTION, BASIC AND ALTERNATE SCENARIOS .....	60
TABLE 45 .....	60
COST OF THE VALIDATION OF PAST SERVICES, PUBLIC SECTOR.....	60
TABLE 46 .....	61
ADJUSTMENT TO PENSION IN PAYMENT .....	61

## Executive summary

The Sierra Leone long term benefits social security system covered about 138 000 workers in 2007. The system assures good protection to the work force concerning old-age, disability and death.

This is the second actuarial valuation since the inception of the NASSIT in 2002. It was carried out as at 31 December 2007. The scheme is relatively young. Because of the long term nature of its benefits, it will take time to reach a state of maturity and the cost of pensions expressed as a percentage of insurable earnings will continue to increase. The annual expenditure represents, in 2007, 7.5% of insurable earnings and projections indicate that it will gradually increase to 26.7% in 2057. If the scheme had to be financed by a constant contribution rate over the next 50 years with an objective of a reserve ratio of 3 at the end of this period, this rate would be 20.1%. This rate may be compared to the current contribution rate devoted to pensions, which is 15.0% of insurable earnings for the private sector and 17.5% for civil servants and teachers and 19.5% for military and police.

The reserve ratio (reserve expressed as a ratio of annual expenditures) is presently 9.5. It will be higher than 3.0 until 2031. The reserve will be exhausted in 2041, on the basis of the assumptions established for this valuation. Contribution rates are adequate to finance the scheme over a period of 20 years (defined as the equilibrium period). Therefore, there is no emergency for adjusting the contribution rate in the very short-term. It is, however, recommended that a regular and orderly mechanism for future contribution rate increases be adopted.

### Indicators of the financial condition of the scheme

	Year of reserve exhaustion	PAYG* cost in 2057	General average premium
basic scenario	2041	26.7%	20.1%

\* Pay-as-you-go

Despite this favourable situation, there are some elements that deserve more attention:

- The scheme is young and it is normal that the level of administrative costs is high. However if such a high level of administrative costs continues in the future, viability of the scheme could be jeopardized. We suggest that a target for the level of future administrative costs be established for the future.
- Currently, there are fewer participants that opt for pension than the number that can be expected when analyzing the data. People seem to prefer to continue working instead of taking their retirement. This can be due to the level of pension. But even if they are not claiming pensions, the NASSIT has liabilities for those people. So it is important to make sure that one day or another all people will get their money.
- We suggest that the NASSIT put in the regulations financial objectives of the scheme or establishes a written funding policy in collaboration with stakeholders of the fund. The funding policy should be well-thought-out and periodically reviewed. This is a useful tool to:

- formalize the long-term funding objectives of the schemes;
- better understand the risks and advantages of financing options;
- assure that sufficient plan assets are maintained to deliver the promised benefits in a defined benefit plan;
- improve the corporate governance of a scheme by increasing transparency.

This actuarial report highlights some issues that also deserve attention:

- The next valuation will be very important because more scheme experience should be available to increase precision in the analysis and the valuation.
- We encourage the NASSIT to put effort to input participant's data in the NAPOS system and to update continuously this information. This will increase the precision of the actuarial valuation and the analysis of experience.
- As an additional scenario, this report presents the cost of the scheme without the validation of the past services in the public sector.
- This report suggests a methodology to adjust pension in payment.

The methodology used is based on a model developed by the ILO for reviewing the long-term actuarial and financial status of national pension schemes. The model has been adjusted to fit the particular situation of the NASSIT. The data collection process was the responsibility of the NASSIT. We did some checks to be sure that the data are reasonable. Despite some incomplete information for doing an actuarial valuation, we can say that in general, the data used in this actuarial valuation are complete enough to obtain a good estimation of the financial soundness of the NASSIT. However, it is important to understand that if some data transmitted to the actuary are materially inaccurate, it could have a significant effect on the results.

An actuarial valuation requires many assumptions. These assumptions, although coherent as a whole, must not be considered individually and are selected to reflect long-term trends rather than giving undue weight to recent experience. The objective of pension projections is not to forecast the exact development of the scheme's income and expenditures, but to verify its financial viability. 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 will have to be undertaken on a regular basis to check the actual experience in the light of the assumptions made. It is also important to understand that the results of the projection cannot be interpreted as objectives that the NASSIT should attain in the future. For example, assumptions regarding the growth in the number of participants should not be used to gauge the performance of the management in attracting new participants. Objectives of the fund should be stated by the Board of trustees and not by an actuarial valuation. It could be very hazardous to interpret the results one by one. The actuarial valuation must be seen as a whole where the main objective is to analyze the financial soundness of the scheme.



# Introduction

Article 47 of the *National Social Security and Insurance Trust Act, 2001* requires that the scheme be evaluated every three years during the first ten years of the scheme by an actuary. After this period, the scheme must be evaluated every five years. This is the second actuarial valuation of the National Social Security and Insurance Trust (NASSIT) since the implementation of the pension scheme in 2002. The actuarial valuation date is 31 December 2007.

The actuarial valuation was carried out under the terms of an agreement concluded between the NASSIT and the Régie des rentes du Québec (RRQ). The RRQ assigned Mr. George Langis, F.S.A, F.I.C.A, of the Régie des rentes du Québec to carry out this valuation. Mr. Andrew Allieu from the Research and Actuarial Department, NASSIT, assisted Mr. Langis in carrying out this actuarial valuation. More specifically, from 11 October to 28 October 2008, Mr. Allieu came to Québec city to prepare and analyze the data for the actuarial valuation. The collection of the data necessary for the valuation was done in Freetown by Mr. Allieu in collaboration with the personnel of the NASSIT. Mr. Pierre Plamondon, F.S.A, F.I.C.A., chief actuary of the Régie des rentes du Québec, revised the results of this actuarial evaluation.

This report is divided into four chapters. The first chapter presents the scheme's experience since the last actuarial valuation. The second chapter concentrates on the data collected as well as on the economic assumptions, demographic assumptions and other projection assumptions particular to the NASSIT. The third chapter presents the results of demographic and financial projections according to legal provisions' as of the valuation date as well as several sensitivity analyses. The conclusions of the valuation are found in the fourth chapter.



# 1 Experience of the system since the last actuarial valuation

This chapter presents an analysis of the results of the NASSIT from 2005 to 2007. The study was carried out in seven stages:

- Description of the legal framework of the NASSIT;
- Description of the covered population;
- Analysis of income and expenditures;
- Analysis of administrative costs;
- Structure and return of the investment portfolio and the investment policy;
- Description of the financial system and the level of the reserve (fund);
- Analysis of the experience of the scheme since the last actuarial valuation and comparison.

## 1.1 Legal framework of the NASSIT

The legal framework in which evolves the NASSIT is constituted by:

- *The National Social Security and Insurance Trust Act, 2001;*
- *The National Social Security and Insurance Trust Regulations, 2004.*

The social security system of Sierra Leone offers a protection against risk related to old age, death, and disability as well as the risk related to occupational diseases and work-related injuries. The actuarial valuation covers only the scheme for long-term pensions (old-age, disability and survivor benefits)

Income into the pension scheme results from three sources:

- Contributions from employers and workers;
- Investment income;
- Penalties because of delays in the payment of contributions or in transmission of the statements (declarations) of salary

The NASSIT also receives a contribution from the State dedicated to paying pensions to former civil servants that were already in payment at the scheme's date of inception. The NASSIT is responsible only for administering the payment of these pensions. According to an agreement between the government and the NASSIT, the later is reimbursed for the cost of pensions plus the administrative costs related to this function.<sup>1</sup>

There are two types of expenditures:

- Benefits payments;
- Operating and investment costs.

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<sup>1</sup> Government pensions were a non-contributory scheme financed through the consolidated fund. In May 2004, the government asked NASSIT to take over the payment of these pensions.

Benefits are of three types: retirement, survivor and disability benefits. These benefits are long-term in nature but there are several grants which are also paid to participants. Appendix 1 presents a detailed description of the provision of the scheme administered by the NASSIT.

Costs related to the operations of the NASSIT are analyzed in section 1.4. They include salaries to employees, overhead, expenditures linked to auditing, etc.

Since the last actuarial valuation, there were two major changes to the provisions of the NASSIT:

- The contribution rate for the military personnel and police personnel has increased by 2% to take into account the elimination of early retirement reduction factors for these two groups;
- A grandfathering provision has been established to recognize, to some extent, past service of participants working in the private sector (see section 1.2).

## 1.2 Covered population

By law, all workers in Sierra Leone are covered by the NASSIT. Self-employed workers can join the scheme on a voluntary basis. Participation in the NASSIT dates from 1 January 2002. Before 2002, almost all the government employees were covered by a non-contributory pension scheme which guaranteed a retirement pension at 55 years-old. Some workers in the private sector were covered by a provident fund.

Table 1 illustrates the distribution of the covered population as of the 31 December 2007.

**Table 1**  
**Distribution of the covered population as at 31 December 2007**

<b>Covered population</b>	<b>Number</b>
Public sector	75 889
Teachers	33 107
Military personnel	10 188
Civilians in the army	797
Police	9 638
Civil servants	16 965
Subsidized institutions	5 194
Private sector	62 351
<b>Total</b>	<b>138 240</b>

Source: Facts and figure as at December 2007

Using the 2004 Population and Housing Census and the population projection of Statistics Sierra Leone, we can estimate that the 2007 employed population in Sierra Leone is about 1 800 000. That means that NASSIT is covering about 8% of the employed population in Sierra Leone.

The number of participants who contributed in 2007 is estimated at 124 814 (see section 2.2). This number can be compared to the population covered (138 240). The difference of 13 426 can be interpreted as people in the private sector who are covered but were not contributing to the

scheme in 2007. Using this information give us a compliance rate of about 80% for the private sector.

For the rest of this report, reference to the private sector also includes scheme participants in government assisted institutions. Civilians working for the army have been included with civil servants.

Participants in the public sector and those in the private sector are entitled to the same benefits. However, there is an important element that distinguishes these two categories of workers. Past service before the inception of the scheme is credited in the calculation of the benefits for workers in the public sector only. To recognize past service, the government agreed to pay an additional contribution rate of 2.5% for 20 years. For the private sector there are two provisions that recognize to some extent past service:

- employees in the private sector had the opportunity to purchase additional service to meet the eligibility conditions. As of December 2007, this opportunity no longer exists (it ended in December 2006).
- for employees in the private sector who joined the scheme from 2002 to 2006, additional service credit are granted according to the following terms:
  - To qualify:
    - At time of affiliation, age must be above 30 years and;
    - The participant must contribute to the scheme for at least 27 months of the first 36 months of his affiliation.
  - Additional service granted:
    - Half of the period between the age at the time of affiliation and age 30.

## **1.3 Analysis of income and expenditures**

### **1.3.1 Statement of account, general scheme**

Table 2 presents the statement of account for the three-year period from 2004 to 2007.

**Table 2**  
**Statement of account, 2005-2006, in millions of leones**

	<b>2 004</b>	<b>2 005</b>	<b>2 006</b>	<b>2 007</b>
<b>Total income</b>	<b>40 228</b>	<b>57 639</b>	<b>82 793</b>	<b>93 146</b>
Contributions received	28 891	40 666	49 591	58 202
Contributions receivable	-	-	14 701	14 000
Investment Income	11 328	16 945	18 473	20 847
Other income	9	28	28	97
<b>Total expenditures</b>	<b>6 718</b>	<b>15 309</b>	<b>30 379</b>	<b>32 347</b>
Benefits paid*	311	640	1 990	4 034
General and administrative expenses*	6 407	14 669	15 492	22 974
Provision for impairment of contributions receivable	-	-	12 897	5 339
<b>Surplus</b>	<b>33 510</b>	<b>42 330</b>	<b>52 414</b>	<b>60 799</b>

Source: Annual Reports 2005, 2006, 2007 and last actuarial valuation report

\* "Benefit payment expenses" of 2004, 2005, 2006, 2007 that appear in the financial statements have been removed from "Benefits paid" and included in "General and administrative expenses" for the analysis.

According to the statement, income increased by almost 130%, between 2004 and 2007 while expenses increased by 381%.

- Contributions received have almost doubled during the last three years. Together, increases in the average salary and in number of contributors were responsible of most of the total increase. In fact, average salary and number of contributors have increased by 61% and 22% respectively during this period.
- The increase in contributions receivable is due to the new accounting rules adopted in 2006. Financial statements are now on an accrual basis instead of a cash basis. The same comment applies to the provision for impairment of contributions receivable.
- Investment income has almost doubled; this is mainly due to the increase in the fund.
- The highest increase during the last 3 years is related to the benefits paid. In fact the amount of benefits paid has increased by 1 197%. This situation is normal since the scheme is young. Such increases can be expected to continue in the near future.
- General and administrative expenses increased by 258% from 2004 to 2007. An in-depth analysis of administrative fees is presented in the section 1.4.

Figures in Table 2 exclude amounts related to the payment of pensions and administrative costs for former civil servant pensioners at the inception of the scheme. The reason for this exclusion in our analysis is that the nature of the agreement between the NASSIT and the government is a contract for service only. The NASSIT assumes no risk by taking charge of these payments. According to an agreement between the government and the NASSIT, the later is reimbursed for the cost of pensions plus the related administrative costs. In 2007, the NASSIT received, from the government, 11 311 million leones for the cost of pensions and administrative costs. On the

expenditure side, in 2007, the NASSIT paid 11 579 million leones in pension benefits to former civil servants.

## 1.4 Analysis of administrative costs

### 1.4.1 The NASSIT situation

Table 3 shows the evolution of administrative costs for the last four years. There are two steps in the increases of these expenses over this period, one from 2004 to 2005 and the other from 2006 to 2007. From 2004 to 2005, administrative and related expenses increased by 112% while the increase was 37% from 2006 to 2007. These increases are not matched by inflation or by depreciation of the currency. During the last three years, yearly inflation was 12% on average and currency has decreased by about 10%.

**Table 3**  
Nature of costs, 2004-2007, in millions of leones

Nature of costs	2004	2005	2006	2007
Director fees and allowances	188	334	154	119
Depreciation	549	1 078	1 611	1 967
Staff costs	3997	5 111	8 281	13 053
Provision for audit fees	33	40	50	60
General costs	2159	8 106	5 396	7 775
<b>Total</b>	<b>6 926</b>	<b>14 669</b>	<b>15 492</b>	<b>22 974</b>

\* “Benefit payment expenses” of 2005, 2006, 2007 that appear in financial statement have been removed from “Benefits paid” and included in “General costs” for the analysis.

The most important item is staff costs, which represent more than 57% of total expenditures in 2007. A second item, general costs, represents 34% of total expenditures. These proportions remain more or less constant over the three-year period 2004-2007. For example, the proportion general cost has increased to 44% in 2005. For general expenses, the high costs are related to the cost of doing business in Sierra Leone – water, electricity, poor infrastructure, etc. Additionally there were expenses to promote the image of the Trust – adverts, billboards, etc. These expenses are targeted to decline in the coming years. Looking more in-depth we can find that “Training and Staff Development” expenses was higher in 2005 than in 2004 by Le 1 billion. The NASSIT undertook training for key processes through study tours and attachments to SSNIT, Ghana and NSSF, Tanzania – the staff were trained in core processes, including inspectorate work and customer services. It is important to note that the overall increase in administrative costs seems not related to a single post. Each budget item contributed to this increase. Table 4 shows the top 10 expenses in 2007 and their proportion to the total administrative and related expenditure.

**Table 4**  
**Top 10 administrative and related expenses, 2007**

Salaries	28.5%
Terminal Benefit	14.2%
Rent, Leave & Transport Allowances	11.1%
Depreciation	9.2%
Motor Vehicle Expenses	3.9%
Social Security Contributions	3.0%
Training and Staff Development	2.6%
Bonus/Exgretia	2.4%
Medical	2.2%
General maintenance	2.0%

Source: NASSIT

The expenses for the terminal benefit were lower than 1% of all expenditures before 2007. International Financial Reporting Standards (IFRS) requires recognition of the total liabilities in financial statements. This was done for the first time in 2007 and explains why for that year, the terminal benefit represents a high proportion of all expenditures. This is a non recurrent item.

When compared to insurable earnings, administrative costs of the NASSIT are relatively high. The ratio increased from 3.1% in 2004 to 5.9% in 2007 (see Table 5). For 2007, even if we forget terminal benefits in this ratio, the level is still around 5%.

**Table 5**  
**Administrative costs expressed as a proportion of several indicators, 2004-2007**

	2004	2005	2006	2007
As a% of contribution income	24.0%	36.1%	31.2%	36.5%
As a% of total expenditures	95.4%	95.8%	51.0%	60.2%
As a% of insurable earnings*	3.1%	5.7%	5.1%	5.9%

\* Estimations for year 2005 and 2006  
Calculations by the author

As was pointed out in the previous actuarial valuation, it is important for the NASSIT to control the level of its administrative costs to prevent them from affecting the viability of the scheme thereafter. The NASSIT being a young scheme, it is normal that the administrative costs at the beginning are higher than those of a mature scheme. Comparisons regarding administrative costs between countries are difficult due to factors like scheme development, coverage level, and level of insured earnings. Some countries in Africa have administrative fees around 2% of their insurable earnings.

In an organization like the NASSIT, it is necessary to put in place controls on the administration process. We suggest that the NASSIT put in place a target on administrative costs to be attained



in a given number of years. This target should be considered as a warning to the Board that scheme administration is inefficient or nearly so. Whilst there are no particular rules on this target, at an Inter-African Conference on Social Security, targets were recommended for a number of indicators, including the ratio of administrative expenses to contributions, and this was to be less than 15 per cent<sup>2</sup>. For the NASSIT, this ratio for the year 2007 is estimated at 28%<sup>3</sup>.

## 1.4.2 General principles

For a mature scheme, administrative costs usually represent a rather low proportion of the overall insurable earnings. In a starting scheme, obviously, several costs are incurred that are linked to the initiation of the scheme: staff training, building the IT structure, implementation of a mechanism to collect contributions and pay benefits. Therefore, there is no ready mechanism available to assess the appropriateness of administrative costs at the inception of a scheme.

However, several useful tools can be considered in order to assess benchmarks that help fully appreciate the size of these expenditures. Ratios are used in many countries as limits that cannot be exceeded. These ratios are:

- Administrative costs / contribution income: this ratio is sensitive to the contribution rate. As the contribution rate will probably evolve during the scheme's lifetime, it has to be used carefully. It is also sensitive to the size of the covered population, or limits to insurable earnings.
- Administrative costs / insurable earnings: more robust than the previous ratio, this one was proposed as a benchmark in the report from the ILO. However, as insurable earnings are usually increasing at a higher pace than inflation, this may lead to relatively high administrative costs in relative and absolute value over the long term. It is sensitive to the inclusion/exclusion of new groups of covered persons (for example, teachers, civil servants, or military personnel). It can also be influenced by an eventual limit on insurable earnings.
- Administrative costs / benefits expenditures: For a scheme that is not mature, this ratio is not recommended, as benefit payments are very low at the inception of the scheme, unless very sizeable transitory measures are put in place. This ratio will naturally decrease steeply as benefits grow, but will by no mean signify that a more efficient administration exists. This ratio is also affected by adjustments to benefits following, for example, a reform in the pension system.
- Annual increase limited to inflation: this option may be interesting several years after inception of the scheme. Before this benchmark is considered, any costs related to the inception of the scheme should be reduced to their minimum, and a careful analysis of relevant expenditures should also be made.

## 1.5 Structure and rate of return on the investment portfolio and investment policy

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<sup>2</sup> Conférence Interafricaine de la Prévoyance Sociale [www.lacipres.org](http://www.lacipres.org)

<sup>3</sup> For the estimate, we have subtracted depreciation and the terminal benefit from the total administrative and related expenses.

### 1.5.1 Portfolio analysis

As of 31 December 2007, the total assets of the NASSIT on the balance sheet represent an amount of 243 billion leones, after amortization. Three important components constitute the assets of the NASSIT:

- Long-term investments, which represent 14,0% of the total assets and are composed principally of private equity investment an investment. The highest investment is in Sierra Leone Blocks Concrete Products Limited (8,8 billion leones);
- Property, plant and equipment represent 13,6% of the total assets. Headquarters and pension tower represent 45% and land 42% of all property, plant and equipment investments.
- Short-term investments which represent 59,9% of the total assets and are composed principally of treasury bills and treasury bonds (122,7 billion leones);

As at 31 December 2007, the balance sheet shows a total liability of 11.9 billion leones, of which 37% is interest on treasury bills/bonds and 25% is related to staff terminal benefits.

**Table 6**  
**Asset value as at end of fiscal year, 2005-2007, in millions of leones**

	2005	2006	2007	(2007) %
A) Long-term Investment	19 693	39 580	34 053	14.0%
B) Property, plant and equipment	5 831	11 050	33 166	13.6%
C) Current assets				
Short-term investments	94 741	112 264	145 577	59.9%
Inventories	41	93	75	0.0%
Assets transit account	211	6 079	5 406	2.2%
Collectibles	3 430	4 855	9 779	4.0%
Prepayments	379	2 043	10 617	4.4%
Cash and cash equivalents	1 848	1 493	4 494	1.8%
Total (currents assets)	100 648	126 828	175 947	72.4%
D) Total assets (A+B+C)	126 172	177 458	243 166	100.0%
E) Accounts payable				
falling due within one year	-7 819	-6 705	-11 883	100.0%
falling due after one year				
Total (creditors)	-7 819	-6 705	-11 883	100.0%
Net Assets or Accumulated Fund (D+E)	118 353	170 753	231 283	

Source: 2007 and 2006 Annual reports

Total return on the invested portfolio is difficult to evaluate because fair values of some investments are not reliably determined as they are not quoted in an active market. This is the case for equity investments. We have evaluated the return for short term investments where all the information was available to do so. As at December 2007, short-term investments represented 60% of total assets. Table 7 shows that for the last three years, the average yearly return on short term investment has been 19.0%. Taking into account the impact of inflation during this period, the real return was 6.5%.

**Table 7**  
**Rate of return\* on assets, fiscal year, short term investment, 2005 - 2007**

	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>Average</b>
Nominal return	23.4%	17.4%	16.2%	19.0%
Real return	9.2%	8.4%	2.2%	6.5%

\* Calculated according to the following formula:  

$$\text{Interest rate} = \frac{2 * \text{investment income}}{(\text{investment at beginning} + \text{investment at end} - \text{investment income})}$$

**Table 8**  
**Historical annual rate of return of the fund, 2005-2007, in millions of leones**

	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>Average</b>
Initial reserve	76 627	118 353	170 753	
Final reserve	118 353	170 753	231 283	
Investment income	16 945	18 473	20 847	
Nominal return on assets	19.0%	13.7%	10.9%	14.5%
Real return on assets	5.2%	5.0%	-2.5%	2.5%

\* Estimated with the following formula:  

$$\text{Interest rate} = \frac{2 * (\text{interest income})}{(\text{initial reserve} + \text{final reserve} - \text{interest income})}$$
This formula assumes that all cash flows are uniformly distributed during the year. If income is cashed in later in the year, the formula may generate a lower annual interest rate than the real one.

Table 8 shows that for the last three years, the overall return of the fund was 14.5%. In fact, for this period, the fund obtained an average real return of around 2.5%. The reader must be careful when using such returns because as said previously, some assets are not evaluated at market value each year and this could significantly affect the overall picture.

### 1.5.2 Description of the investment policy

According to the investment policy, the purpose of the investment of the fund is to:

- Maximize real value of the trust's assets and provide current income consistent with capital preservation and appreciation, as well as maintenance of liquidity;
- Minimize costs and risks associated with investments;
- Contribute to economic and social development of the country.

Responsibilities for investment decisions are distributed among three different entities:

- The Board of Trustees, which makes the ultimate decision regarding investment.
- Management, which carries out analyses of proposals for the Trustee's decision.
- The Investment Committee, which advises the Board of Trustees on risk-return relationships for all proposals received by Management.

The investment policy recognizes that the most important element affecting future portfolio is the asset mix. To achieve its objectives of risk, return and liquidity the following asset allocation has been decided:

**Table 9**  
**Mid-term asset mix, (%)**

Asset type	2007	2008	2009	Margin (+/-), in %
Fixed Income*	60	40	25	2
Equities	30	40	40	5
Real estate,	10	25	35	5
Property	100	100	100	5
Total				

\* Fixed income securities include T-bills, T-bonds, corporate and other government bonds, of several maturities.

Fixed income securities include T-bills, T-bonds, corporate and other government bonds, of several maturities.

Equity participation is essentially private in nature, as there is currently no stock exchange in Sierra Leone. The limit for a single stock is 60% of the total share value of that stock and 10% of the NASSIT's total assets. These two limits are not mentioned in the investment policy but in a document called "Criteria for the NASSIT's Equity Participation in Corporate Investments". For investment in existing companies, several requirements must be met, for example, profits and dividends must exist for the last three years. Requirements exist for new companies, but are different in their scope.

Property investment (or real estate) focuses primarily on real return assets. Direct investment is made in the Office Tower Block, shopping centers and parking lots.

The benchmark rate of return described in the investment policy is 2% above wage inflation.

The investment policy specifies that the Trust may hold between 15 to 20 percent of its investment funds in offshore fixed income securities.

The investment policy contains a qualitative analysis of seven types of risks for each asset category: liquidity, currency, interest rate, business, financial, agency and operational.

Asset selection by the Board is guided by three principles: safety of the investment, yield required, and harmony with public interest. Furthermore, before investing in a specific equity, the potential growth of the investment, its contribution to economic growth and development and its potential tradability / liquidity are analyzed.

The frequency of revision of the investment process is:

- Investment performance: quarterly/annually
- Investment policy/strategy: Annually
- Global asset Allocation: Every three years

### 1.5.3 Comments on investment policy

There are two general comments on the investment policy.

- A) The assumptions related to return on investment in an actuarial valuation must not be considered as a recommendation for a benchmark in an investment policy. However, the actuary must take into account information on the investment to establish an assumption. The Board can use the assumption as a target for the investment policy, but this must not be interpreted as a recommendation of the actuary. It is also important to keep in mind that assumptions used in an actuarial valuation are established with a long term perspective and may not be suitable for short term benchmarking.
- B) The proportion of equities, real estate and property in the target assets allocation will increase considerably until 2009. We understand that the investment context in Sierra Leone is different than the one in developed countries where holding a high proportion of such securities could be seen as very risky. Economic development through funds that come from a social security scheme is a praiseworthy objective, but security of money invested is also important. It is thus very important that the investments made be re-evaluated frequently to be aware of risks and to follow the real market value. It is important to avoid situations where investments in a stock or real estate holding do not generate cash flows for a long time and their book value does not change in the financial statements.

## 1.6 Financial system and valuation of the reserve (fund)

The social security code provides that contribution rates must be fixed so that the total income makes it possible to cover the technical expenses as well as the part of the administrative costs. Also, a specified amount of reserve should be constituted. However there are different factors that will affect the achievement of this goal:

- The natural increase in the level of expenditures over a long period (especially for a young scheme like the NASSIT).
- The desire to have a stable contribution rate (making it more likely that employees and employers will remain confident in the scheme) and to have a contribution rate that will not become a burden on the people who contribute to the scheme.
- The duration of the equilibrium period and the amount (level) of reserve that must be attained throughout this period.

A partial funding system has been retained for the financing of the NASSIT, as is generally the case for a new scheme. It was suggested in the inception report that a period exceeding 20 years should be chosen as the equilibrium period which guarantees the stability of the contribution rate. Over this period there must be enough contributions to pay all benefits and costs and constitute a reserve at least equal to three times the total expenditure of the previous year.

What is important to understand with this type of financing is that, at the end of the equilibrium period, if the contribution rate has not been increased throughout this period, the increase in the

contribution rate to meet the objectives in the second equilibrium period could be very high. To avoid this situation, it is often proposed to gradually raise the rates during the equilibrium period.

We also suggest that the objectives regarding the equilibrium period and the minimum level of reserve that have to be maintained be included in the regulations concerning the NASSIT. This will help establish a common and stable objective for everyone and avoid situations where these objectives could change from one actuarial valuation to another. Another way to process is to put in place a funding policy.

In the pension plan area, there is a growing interest towards funding policies. Many major pension plans already have a funding policy. This is a useful tool to:

- formalize the long-term funding objectives of schemes;
- better understand the risks and advantages of financing options;
- assure that sufficient plan assets are maintained to deliver the promised benefits in a defined benefit plan;
- improve corporate governance by increasing transparency.

Funding rules must address the interests of stakeholders:

- plan participants and former participants, as beneficiaries of the system and often as contributors to the financing of the system;
- plan sponsors, as the parties bearing responsibility for financing the pension system;
- the general public.

The funding policy would specify:

- contribution rates;
- risks faced by the scheme and how these risks can be managed;
- risk tolerance;
- allocation of risks among participants and employers;
- funding objectives (like contribution stability or improving the funding ratios);
- frequency of actuarial valuation, method of actuarial projection and the level of margins to be included in the assumptions;
- funding method;
- goal related to intergenerational equity;
- all other funding issues.

We recommend that the NASSIT have a written funding policy. The funding policy should be well-thought-out and periodically reviewed.

For this actuarial valuation we have used an equilibrium period of 20 years, as in the inception report, and an ultimate reserve that will be equal to three times the total expenditures in the previous year.

## 1.7 Comparison with the previous valuation

To understand the direction the scheme could take in the future, it is important to understand the past experience. To do this, we compare the real experience of the scheme with what was expected in the last actuarial valuation report. Such an exercise is very important, but it is essential to keep in mind some elements that could affect such comparisons.

- First, relative figures, like the PAYG rate, are more important than the absolute amounts.
- Second, actuarial valuations are done to measure the long term ability of a pension plan to meet its liabilities and this can be measured by calculating a rate of contribution or a funding ratio. Assumptions used are usually established with a long term perspective. In an actuarial valuation like the one made for the NASSIT, a long term view of the plan is more important than a short term view. This does not mean that short term fluctuations are irrelevant. These fluctuations must be analysed to measure the financial consequences for the plan. But it must be kept in mind that it is very probable that emerging short term experience should be different with the one expected with a long term vision.
- Third, comparison of experience with what was anticipated is conditional on having good data to carry out such an exercise. Lack of complete data does not permit such a comparison or decreases considerably its meaning.

The following tables summarize the expected experience and the real experience for the years 2005, 2006 and 2007. Table 10 shows the sources of the increase in assets, while Table 11 presents the pay-as-you-go (PAYG) rates.

**Table 10**  
**Comparison of the increase in assets, 2005-2007**

	Last actuarial valuation A)	Experience B)	ratio B / A
a) Assets on 2004-12-31	76 460	76 627	100.2%
b) Contributions received (2005-2007)	122 022	148 459	121.7%
c) Return on assets (2005-2007)	63 391	56 265	88.8%
d) Other income (2005-2007)	8 148	30 967	380.0%
e) Benefis paid (2005-2007)	23 746	6 664	28.1%
f) Administrative expenditures (2005-2007)	24 981	53 135	212.7%
g) Other expenses	-	21 236	
<b>A) Assets on 2007-12-31 (a+b+c+d-e-f-g)</b>	<b>221 295</b>	<b>231 283</b>	<b>104.5%</b>



**Table 11**  
**Comparison of PAYG rates, 2005-2007**

Year	Actuarial valuation			Experience		
	Benefits PAYG	Adm. PAYG	Total PAYG	Benefits PAYG	Adm. PAYG	Total PAYG
2005	2.5%	3.5%	6.0%	0.2%	5.7%	6.0%
2006	3.1%	3.3%	6.3%	0.7%	5.1%	5.8%
2007	3.5%	3.0%	6.6%	1.1%	6.4%	7.5%
Average	3.0%	3.3%	6.3%	0.7%	5.7%	6.4%

Our comparison tells us that globally, the projection was not too far from the reality. The expected average total PAYG rate in the last actuarial valuation was 6.3% compared with 6.4%. Assets as at December 2007 were only 4.5% higher than the level expected in the actuarial analysis. However the picture is quite different when looking more deeply at the situation.

- Contribution income was higher by 22% than expected in the last actuarial valuation. Higher growth in the insured population and the average salary explains the difference (see Table 12).
- Other income and other expenses are different mainly because of the application of new IFRS.
- Benefits paid were only 28% of the expectation. One of the reasons is that there are a lot of people, who, when they attain age 60, prefer to continue working instead of claiming their retirement pension. Even if people do not ask for their pension, there is still a liability for the NASSIT which means that eventually, those pensions will have to be paid.
- In the last actuarial valuation, we expected a decrease in the administrative expenses. The opposite occurred. Administrative and related expenditures were expected to be 3.3% of total insurable earnings for the years 2005 to 2007. In fact they were 5.7%.
- The return on assets was lower than the level expected in the last actuarial valuation. One should be prudent when comparing these two elements since a large part of the portfolio is not re-evaluated each year to take into account variations in the market value.

Changes in the amount of contributions are affected by two elements: growth of the insured population and growth in the average earnings. Table 12 shows that in the previous actuarial valuation we underestimated the growth in the insured population for both the public and the private sector. For all sectors, the expected annual growth in the insured population was 1.8%. During the last three years, the annual growth was 7.1%. Having a higher growth in the number of contributors has the effect of decreasing the cost of the scheme in the short term.

**Table 12**  
**Comparison of real experience and expectation in the last actuarial valuation, selected indicators, 2004 to 2007**

	<b>Private sector</b>	<b>Public sector</b>	<b>All sectors</b>
<b>Annual growth in the insured population</b>			
<b>Last actuarial valuation</b>	6.5%	-1.2%	1.8%
<b>Real</b>	12.7%	3.5%	7.1%
<b>Annual increase in salary</b>			
<b>Last actuarial valuation</b>	19.4%	8.1%	10.6%
<b>Real</b>	19.4%	9.0%	16.9%
<b>Annual average inflation rate</b>			
<b>Last actuarial valuation</b>			8.8%
<b>Real</b>			11.7%

## 2 Projection framework

The projection of the financial results of the NASSIT requires statistical information on the initial insured population and on pensions being paid as at the valuation date, and a set of actuarial assumptions. The initial covered population is broken down into nine different groups, each being under a different set of demographic and parametric assumptions, but with similar economic scenarios. The selection of the assumptions takes into account the recent experience of Sierra Leone (where information is available). However, these assumptions are also selected to reflect long-term trends rather than to put too much emphasis on recent results.

The nine groups are defined as follow: civil servants, teachers, police, and employees from the private sector. Participants are broken down by sex. For military personnel, all participants are considered to be males.

The actuarial valuation also requires reproducing in the projection model the legal provisions of the scheme. An overview of the legal provisions of the scheme administered by the NASSIT is presented in Appendix 1.

### 2.1 Data gathering

The data needed for the actuarial valuation regarding participants normally originate from the regional offices. The head office periodically updates the data gathered by the regional offices. Furthermore, after consolidation, the head office provides regional offices with consolidated data, allowing each of them to get a complete picture of the overall scheme.

Regional offices are responsible for the following:

- Payments;
- Collection of contributions;
- Inspections;
- Participant registration;
- Initiate benefit processing.

Head office is responsible for the following:

- Benefits calculations;
- Consolidation of all data received from area offices.

There are essentially two systems for administering the pensions at the NASSIT. The first is for the administration of former civil servants whose benefits were already being paid as at the date of inception of the plan and the other for the actual participants. The second system is named NAPOS. NAPOS is used to make pension calculations.

Collection of the data required to perform the actuarial valuation was the responsibility of the NASSIT. The actuary did some tests to relieve on the data transmitted, to bring out some adjustments or to make assumptions for missing data. The sources of data are the following:

- The payroll entity of the government transmitted Excel files containing the monthly salaries of participants, their sex and date of birth. SAS software was used to merge all

- For the private sector, the NASSIT transmitted to the actuary an Excel file containing the necessary data on the participants for the last three years (registration number, registration date, sex, date of birth, number of months of contribution and salary). The file was not complete. That means that all the information for all the participants was not included. We used the distribution in this file to obtain the average salary by age. The number of contributors was consequently set as the one that, with the distribution of salary, reproduces the level of contributions paid in the financial statement. We used information on 37 628 participants to estimate the profile of the 54 458 contributors in 2007.
- Complete data concerning the length of the credited past service of participants from the public sector were not available. In 2005, the NASSIT undertook an exercise to validate past service for all participants working in the public sector. We have used for the actuarial valuation all the available information concerning past service in the public sector. The following table summarizes the sample used to establish the average length of service for the employees of the public sector.

Civil servants	3 689
Teachers	2 004
Military	2 365
Police	399

- Absence of information such as the complete population in the private sector and the complete distribution in length of service of employees in the public sector could have a significant effect on the results. This could affect considerably the precision of the actuarial valuation. We don't have a complete picture of all the participants to perform the actuarial valuation. However, we believe that the information we have constitutes the best we can do to obtain a sample that will give us a good approximation of reality. Also, we have done cross checking with financial statements to be sure that the data used for the actuarial valuation are coherent. We encourage the NASSIT to continue its effort to input all information needed for an actuarial valuation on the NAPOS system for all active participants in private and public sectors and all beneficiaries.
- We also made minor adjustments to data:
  - We redistributed the population of participants where the age was missing or was over age 65;
  - We used the distribution of civil servants by sex to approximate the distribution by sex of civilians working for the military.

## 2.2 Insured population

The projection of the insured population requires a certain amount of information and a number of assumptions. Projections start with an estimate of the insured population as at the date of analysis. The growth of this population is then estimated using the assumptions described in section 2.2.2. Several other decrement assumptions are required, namely, retirement rates by age and sex, prevalence rate of disability and mortality rates among disabled persons. Finally, a distribution assumption is required for new entrants in the covered population.

### 2.2.1 Active Insured population as at the valuation date

Data on the insured population were obtained from the NASSIT. Table 13a through Table 13d show the active insured population as at the valuation date, by age and sex, and by covered group.

**Table 13a**  
Distribution of civilian employees\* by age and sex, 2007

Age	Males	Females	Total
15 - 19	5	4	9
20 - 24	54	40	94
25 - 29	255	193	448
30 - 34	631	345	976
35 - 39	1 159	509	1 668
40 - 44	1 848	724	2 572
45 - 49	3 060	731	3 791
50 - 54	2 985	578	3 562
55 - 59	3 038	212	3 250
60 - 64	1 057	80	1 136
<b>Total</b>	<b>14 092</b>	<b>3 415</b>	<b>17 507</b>

\* Civilians working for militaries are included in this population for the actuarial valuation.

**Table 13b**  
Distribution of police and military personnel by age and sex, 2007

Age	Males Police	Females Police	Total Police	Total Military personnel*
15 - 19	12	2	14	3
20 - 24	273	71	344	155
25 - 29	1 355	385	1 740	1 921
30 - 34	1 825	222	2 047	3 010
35 - 39	1 102	117	1 218	2 569
40 - 44	1 300	154	1 454	1 333
45 - 49	1 061	102	1 163	696
50 - 54	652	41	694	436
55 - 59	577	32	609	131
60 - 64	54	-	54	-
<b>Total</b>	<b>8 209</b>	<b>1 127</b>	<b>9 337</b>	<b>10 253</b>

\* Males and females are combined together for simplicity for military personnel because there are few females.

**Table 13c**  
**Distribution of teachers by age and sex, 2007**

Age	Males	Females	Total
15 - 19	31	-	31
20 - 24	159	51	211
25 - 29	1 541	766	2 307
30 - 34	3 556	1 704	5 261
35 - 39	4 699	1 851	6 550
40 - 44	4 441	1 526	5 967
45 - 49	4 342	1 411	5 753
50 - 54	2 772	706	3 478
55 - 59	2 230	453	2 683
60 - 64	807	211	1 018
<b>Total</b>	<b>24 579</b>	<b>8 680</b>	<b>33 259</b>

**Table 13d**  
**Distribution of private sector employees\* by age and sex, 2007**

Age	Males	Females	Total
15 - 19	35	6	41
20 - 24	967	326	1 293
25 - 29	5 017	1 806	6 823
30 - 34	7 982	2 176	10 159
35 - 39	8 027	1 995	10 023
40 - 44	6 924	1 600	8 524
45 - 49	6 453	1 163	7 616
50 - 54	4 358	802	5 160
55 - 59	3 335	468	3 802
60 - 64	889	129	1 018
<b>Total</b>	<b>43 988</b>	<b>10 470</b>	<b>54 458</b>

\* Include people working in government assisted institutions

### 2.2.1 Inactive Insured population as at the valuation date

Compared to the previous actuarial valuation, this actuarial valuation takes into account explicitly the inactive population as at December 2007. An inactive participant is someone who has contributed to the scheme, but not in the last 12 months. This participant has accrued rights that one day or another are supposed to be paid in benefits. The following table shows the inactive population used in this actuarial valuation. As shown in the 3.1.2 the impact of including the inactive population does not modify the conclusion of the actuarial valuation. It gives however more precision to the estimates.

**Table 14**  
**Distribution of the inactive population by age and sex, 2007**

Age	Males	Females	Total
15 - 19	-	-	-
20 - 24	542	80	622
25 - 29	1 026	245	1 271
30 - 34	3 142	1 030	4 173
35 - 39	2 761	463	3 224
40 - 44	2 327	325	2 652
45 - 49	540	366	906
50 - 54	2 056	582	2 638
55 - 59	606	408	1 014
60 - 64	-	-	-
<b>Total</b>	<b>13 000</b>	<b>3 500</b>	<b>16 500</b>

## 2.2.2 Projection of the insured population

The projection of the insured population constitutes the basis for projections of the scheme's costs. Generally, these projections require the use of assumptions pertaining specifically to the population, such as retirement rates by age and sex.

The insured population was projected by applying an annual growth rate to the initial insured population by group.<sup>4</sup> Once total growth is established, the number of new entrants in the covered population is calculated by adding to this growth the number of people who become disabled or who retired. Retirement rates, disability rates and distribution of new entrants are all estimated by age, sex and group.

### 2.2.2.1 Growth of insured population

In order to produce the projections of the NASSIT social security system costs, the initial insured population has to be projected over the long term. In order to do so, an annual growth rate has been used, which is different for each subgroup of the insured population. The following table presents these annual growth rates. The growth of the insured population reflects long-term trends and also includes a provision for improvement in coverage and compliance. Over the short term, the growth of the insured population has been chosen to match recent experience and to recognize, to some extent, the growth that is anticipated in the 2008-2009 budget. In the long term, it is assumed that the population of females will increase at a rate of 0.5% higher than the growth rate for males.

<sup>4</sup> See section 2.2.2.1.

**Table 15**  
**Population growth assumption by insured sector, sex and period**

	2008	2009	2010	2011	2012	2013 +
<b>Civil servants</b>						
Males	0.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Females	0.0%	1.5%	1.5%	1.5%	1.5%	1.5%
<b>Teachers</b>						
Males	5.0%	3.0%	1.0%	1.0%	1.0%	1.0%
Females	5.5%	3.5%	1.5%	1.5%	1.5%	1.5%
<b>Police</b>	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
<b>Military personnel</b>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<b>Private</b>	2008	2018	2028	2038	2048	2058
Males	3.5%	3.0%	2.5%	2.0%	1.5%	1.0%
Females	4.0%	3.5%	3.0%	2.5%	2.0%	1.5%

Over the 50 years projection period, the insured population is increasing at an average annual rate of 1.7%.

### 2.2.2.2 Distribution of new entrants

This distribution is established from the experience of the scheme. The same distribution of new entrants is applied to each group, regardless of sex. According to the model used, the number of new entrants is the difference between the population at the beginning of the year, to which an overall growth rate is applied, and the same population at beginning of the year to which mortality and retirement rates are applied. Table 16 presents the assumption for the distribution of new entrants.



**Table 16**  
**Distribution of new entrants for all sectors**

Age	
15-19	5%
20-24	20%
25-29	50%
30-34	20%
35-39	5%
40-44	0%
45-49	0%
50-54	0%
55 et +	0%
<b>Total</b>	<b>100%</b>

### 2.2.2.3 Mortality rates

Mortality rates are an important assumption for an actuarial valuation. The NASSIT is a young scheme so it is difficult to establish a credible mortality table using its own mortality experience. The following table gives us some information concerning life expectancy in Sierra Leone.

**Table 17**  
**Life expectancy at birth**

<b>Sources:</b>	
United Nations (2005-2010)	41 (male) and 44 (female)
World Bank (2006)	42.2
2004 population and housing survey (Sierra Leone (2006))	48.4
2004 population and housing survey (S.L. Western area (2006))	53.5

There is significant difference between the information coming from the United Nation, the World Bank and the Population and Housing survey. One can also observe that the life expectancy in the western area of the Sierra Leone is also higher than the one for the country. The largest majority of participants come from the western part of the country.

For the present actuarial valuation, death rates per age used for projections were derived from life surviving tables of the United Nations. The assumption of additional mortality due to AIDS is included implicitly in these projections. However the mortality rates were reduced to consider that the vast majority of participants come from the western part of the country and that it is very plausible that participants have a higher life expectancy than the general population in Sierra Leone. Table 18 shows life expectancy at various ages for men and women. Life expectancy at age 20 in 2007 was established at 45.3 years for men and 47.2 years for women. This life expectancy is expected to increase during the period of projection and reach 52.7 years for men in 2057 and 56.0 years for women in the same year.

**Table 18**  
**Life expectancy at different periods of time, by age and sex**

Year	Women			Men		
	At 20	At 40	At 60	At 20	At 40	At 60
2007	47.2	32.2	16.9	45.3	30.2	15.7
2032	51.1	34.7	18.4	48.6	32.2	16.8
2057	56.0	37.9	20.5	52.7	34.8	18.3

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 a participant's death.

**Table 19**  
**Sample mortality rates, 2007 and 2057**

Age	Males		Females	
	2007	2057	2007	2057
15	0.00285	0.00106	0.00300	0.00093
20	0.00362	0.00126	0.00387	0.00112
25	0.00536	0.00185	0.00550	0.00162
30	0.00707	0.00261	0.00688	0.00212
35	0.00839	0.00333	0.00774	0.00262
40	0.00939	0.00418	0.00815	0.00319
45	0.01027	0.00527	0.00828	0.00377
50	0.01168	0.00683	0.00887	0.00449
55	0.01474	0.00940	0.01101	0.00587
60	0.02094	0.01384	0.01620	0.00884
65	0.03217	0.02188	0.02637	0.01495
70	0.05068	0.03578	0.04378	0.02637
75	0.07917	0.05990	0.07120	0.04759
80	0.12078	0.09949	0.11176	0.08383
85	0.17872	0.14721	0.16861	0.12648
90	0.25694	0.21164	0.24577	0.18435
95	0.35968	0.29626	0.34746	0.26064
100	1.00000	1.00000	1.00000	1.00000

#### 2.2.2.4 Age at retirement

The actuarial model used for the present actuarial review considers retirement as the residual element of a series of factors. The growth factor described in section 2.2.2.1 provides the number of people employed each year. For a given age (at which retirement is possible under the social security scheme), and once deaths are considered, the difference between the number of persons in two consecutive years is the number of new retirees. Consistency checks are performed to reproduce the retirement pattern observed under the scheme. For this analysis, the assumptions about age at retirement are:

- For civil servants and teachers, it is assumed that most people retire between age 55 and 65 with an average age at retirement of 60;
- For police and military personnel, people retire respectively at age 57 and 55;
- For participants in the private sector (including subsidized institutions) it is expected that everyone retires around age 60.

When a participant retires before age 60, except for participants in the armed force and the police, his pension is reduced by a factor equal to 4% for each year preceding the participant's 60th birthday.

#### 2.2.2.5 Disability incidence rates

The assumption concerning disability incidence rates used for this actuarial valuation is the same that the one used in the inception actuarial analysis. As the scheme will mature, more experience will emerge permitting adjustments in this assumption to reflect the real experience.

**Table 20**  
**Disability rates (Rates per 10 000 persons)**

<b>Age</b>	<b>Females</b>	<b>Males</b>
15	0.3	0.1
20	1.6	0.8
25	4.1	2.6
30	7.8	5.4
35	12.4	9.1
40	16.0	12.4
45	20.9	16.6
50	33.8	27.1
55	66.7	49.1

#### 2.2.2.6 Mortality rates among disabled persons

Disabled persons generally experience higher mortality than active participants. It was assumed that the mortality of disabled persons is five times that of active participants at age 15 and decreases linearly to equal that of the active participants at age 55. The multiplication factors used are shown in Table 21.

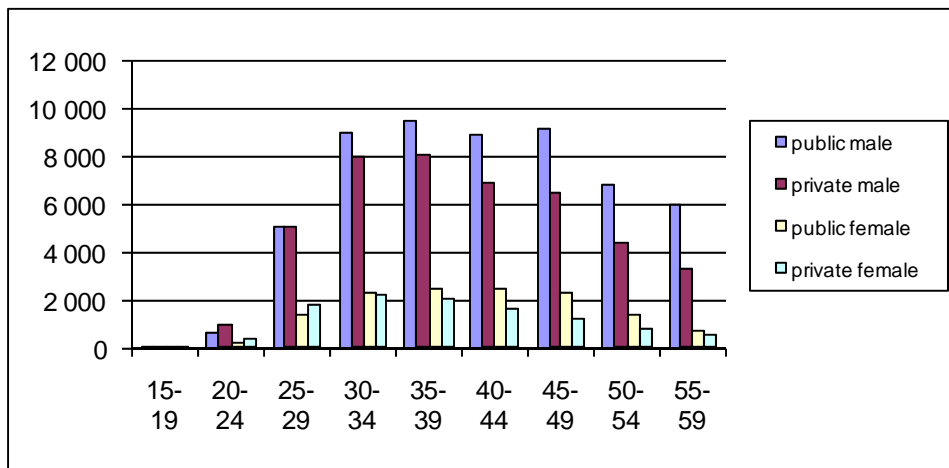
**Table 21**  
**Loading factor for mortality rates among disabled persons**

Age	Factor
15 or less	5.0
20	4.5
25	4.0
30	3.5
35	3.0
40	2.5
45	2.0
50	1.5
55 and over	1.0

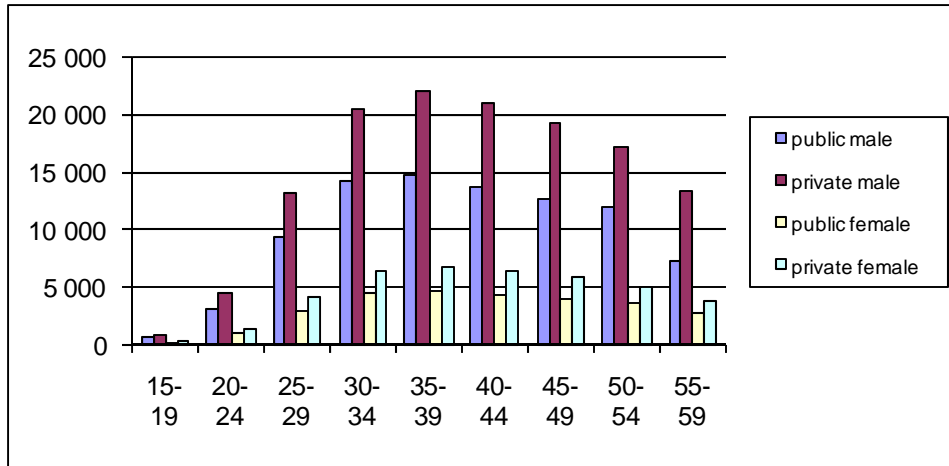
### 2.2.2.7 Structure of the insured population

The following figures show the age structure of the initial insured population by sex and the one that would prevail at the end of the projection period for both the private and the public sectors. At the beginning of the projection period, the number of active insured people is 124 814 while at the end of the projection period there are 294 767 people insured. Comparison of the two figures also shows the importance of the private sector in the future in terms of number of participants.

**Figure 1**  
**Distribution of the insured population by age, sex and sector, 2007**



**Figure 2**  
**Distribution of the insured population by age, sex and sector, 2057**



## 2.3 Economic assumptions

The financial changes in the NASSIT pension scheme will be directly influenced by the economic development of Sierra Leone and by changes in the labour market. However, the NASSIT covers only a small part of the working population, and the country is subjected to numerous financial and economic constraints. For these reasons, the analysis of the macro-economic framework is simplified. Inflation was directly established from the macroeconomic data of Sierra Leone. Rate of increase of salaries and interest rates were established as exogenous variables in this analysis.

### 2.3.1 Inflation

Table 22 shows the inflation rate in Sierra Leone since 2002. This information comes from data transmitted by the NASSIT. In the future, inflation is assumed to be 15% in 2008, declining to 4% in year 2018. Inflation remains constant thereafter.

**Table 22**  
**Inflation rate, 2002-2007**

---

Year	Inflation rate (%)
2002	-3.1
2003	11.3
2004	14.4
2005	13.1
2006	8.3
2007	13.8

---

Source: Bank of Sierra Leone

### **2.3.2 Earnings increases and interest rates**

The assumptions for salary growth and interest rates were established in an exogenous way. These assumptions represent the outcome of an economic framework observed frequently in other African countries. For the purposes of projection, in the long run, the real growth of salaries (increase of salary over inflation) was established at 1% annually for each sector of the economy (private and public) and corresponds to a realistic long-term assumption. Because the number insured in the private sector, where salaries are higher, is expected to increase at a higher rate than the number insured in the public sector, that means that the effective real growth of average salary for the entire insured population will be higher than 1%. The salary increase for the first year of the projection was chosen to match the expected revenue from contributions for the year 2008. The salary growth for the year 2009 takes into account the announced 20% increase for the public sector. The global real salary growth will reach the ultimate level in 2010.

The returns on assets for the entire projection period were established at 3% above than inflation. This is close to the average return on assets for the last 3 years. Over the long term, this assumption is in line with the investment policy, which specifies the target for measuring the investment performance of the fund. In fact, in the investment policy, the return of the fund must exceed by 2% the increase in salaries.

Table 23 summarizes the economic assumptions used in the basic scenario.

**Table 23**  
**Inflation rates, earnings growth and return on the fund, 2008-2057, as a percentage**

Period	Inflation rates	Average rate of growth on earnings		Return on assets	
		Real	Nominal	Real*	Nominal
2008	0.150	-0.028	0.117	0.030	0.185
2009	0.139	0.029	0.172	0.030	0.173
2010	0.128	0.015	0.145	0.030	0.162
2011	0.117	0.015	0.134	0.030	0.151
2012	0.106	0.015	0.122	0.030	0.139
2013	0.095	0.015	0.111	0.030	0.128
Ultimate (2018)	0.040	0.012	0.050	0.030	0.071

\* The real rate of interest for the table 23 is the difference between nominal rate of interest and nominal average rate of inflation.

## 2.4 Parametric assumptions and data

Social security schemes and the insured population present other characteristics which must be reflected in the valuation. These parameters are neither considered economic (like inflation or interest rates) nor demographic (like mortality rates). They are grouped in a class of assumptions and data called “parametric”.

### 2.4.1 Salary scale and contribution density

The data on the average salary of participants (according to age and sex) were obtained from a retrieval from the NASSIT database for the private sector and from data transmitted by the government’s payroll entity for the public sector. The following tables show the salary scale used at the beginning of the projection period. Earnings are projected using assumptions presented in the previous section.

For the purpose of projections, the actuarial model distributes average wages in three sections (low, medium, high) with an aim of measuring the effect of the minimum pension and the ceiling if applicable. Moreover, it is estimated that the dispersion observed in the distribution of the earnings will remain constant during the period of projection.

For the public sector, the earnings were established by considering that one year of the total earnings for an employee were paid out uniformly during the year. This means that the participants will accumulate pension benefits quickly and that the proportion of those who will be entitled to a pension will increase, to the detriment of those entitled only to a grant benefit. Furthermore, by doing so, the contribution density, which represents the proportion of the year during which the participants pay contributions to the scheme, is automatically equal to 100 percent. However, for the private sector, we assumed a contribution density equal to 77 percent, reflecting less stability in employment.

**Table 24****Distribution of earnings by age and sex, by group, 2007, in leones ('000)**

Age	Civil servants		Military personnel	Private sector	
	Males	Females		Males	Females
15-19	982	829	1 839	1 408	1 325
20-24	972	829	1 839	1 902	3 007
25-29	1 117	947	1 839	3 122	4 038
30-34	1 220	1 040	1 839	3 797	4 543
35-39	1 409	1 198	1 971	4 042	4 444
40-44	1 408	1 197	2 092	4 290	4 806
45-49	1 421	1 206	2 435	4 581	4 966
50-54	1 434	1 214	2 865	5 226	6 407
55-59	1 601	1 356	2 865	5 887	8 002
60-64	2 113	1 788	2 865	5 887	8 002
<b>Average</b>	1 495	1 191	2 002	4 256	4 815

**Table 25****Distribution of earnings by age and sex, by group, 2007, in leones ('000)**

Age	Teachers		Police	
	Males	Females	Males	Females
15-19	951	951	872	786
20-24	1 049	1 049	879	793
25-29	1 323	1 323	972	877
30-34	1 528	1 528	1 067	962
35-39	1 626	1 626	1 252	1 129
40-44	1 791	1 791	1 389	1 252
45-49	2 138	2 138	1 603	1 445
50-54	2 744	2 744	1 766	1 592
55-59	3 174	3 174	1 909	1 721
60-64	3 282	3 282	1 995	1 799
<b>Average</b>	2 030	1 901	1 311	1 067

**2.4.2 Past service**

Credited service for the active and inactive insured populations was obtained from a survey of the validation forms sent to the NASSIT. Average data are presented in the following tables. 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.

For the public sector, past contribution years are presented in two ways:

- The column “without validation of pas services”, refers to the number of year of service accumulated since the beginning the of scheme;



- The column “with validation of pas services”, refers to the total number of years of service. That means those years accumulated since the beginning of the scheme plus those recognized as past service at the inception of the scheme.

For the private sector, past contribution years are presented in two ways:

- The column “without grandfathering provision”, refers to the number of year of service accumulated since the beginning the of scheme;
- The column “with grandfathering provision”, refers to the total number of years of service. That means those years accumulated since the beginning of the scheme plus those recognized in application of the grandfathering provision described in section 3.1.2.

**Table 26**  
Average past contribution years for civil servants, as at 31 December 2007

Age	Males without validation of past service	Females without validation of past service	Males with validation of past service	Females with validation of past service
20	2.2	2.2	2.1	2.1
25	3.1	3.1	3.5	3.5
30	4.5	4.5	7.0	7.0
35	5.5	5.5	13.2	13.2
40	5.8	5.8	17.7	17.7
45	5.9	5.9	21.8	21.8
50	5.9	5.9	25.9	25.9
55	5.9	5.9	29.2	29.2
60	6.0	6.0	32.0	32.0

Note: Same assumptions for males and females are used because it is based on a survey.

**Table 27**  
Average past contribution years for teachers, as at 31 December 2007

Age	Males without validation of past service	Females without validation of past service	Males with validation of past service	Females with validation of past service
20	1.4	1.4	1.3	1.3
25	3.2	3.2	3.7	3.7
30	4.3	4.3	6.0	6.0
35	4.9	4.9	8.2	8.2
40	5.2	5.2	12.3	12.3
45	5.5	5.5	17.9	17.9
50	5.7	5.7	23.6	23.6
55	5.8	5.8	29.0	29.0
60	5.9	5.9	35.2	35.2

Note: Same assumptions for males and females are used because it is based on a survey.

**Table 28**  
**Average past contribution years for police personnel, as at 31 December 2007**

<b>Age</b>	<b>Males without validation of past service</b>	<b>Females without validation of past service</b>	<b>Males with validation of past service</b>	<b>Females with validation of past service</b>
20	2.0	2.0	2.0	2.0
25	3.3	3.3	3.4	3.4
30	4.2	4.2	6.3	6.3
35	5.7	5.7	13.6	13.6
40	5.9	5.9	16.5	16.5
45	5.9	5.9	19.8	19.8
50	6.0	6.0	25.2	25.2
55	6.0	6.0	29.9	29.9
60	6.0	6.0	32.6	32.6

Note: Same assumptions for males and females are used because it is based on a survey.

**Table 29**  
**Average past contribution years for military personnel, as at 31 December 2007**

<b>Age</b>	<b>Without validation of past service</b>	<b>With validation of past service</b>
20	1.8	1.3
25	5.2	5.4
30	5.9	10.7
35	6.0	14.4
40	6.0	16.5
45	6.0	19.9
50	5.9	24.7
55	5.9	29.5
60	6.0	35.6

**Table 30**  
**Average past contribution years for private sector, as at 31 December 2007**

<b>Age</b>	<b>Males without grandfathering provision</b>	<b>Females without grandfathering provision</b>	<b>Males with grandfathering provision</b>	<b>Females with grandfathering provision</b>
20	1.5	1.5	1.5	1.5
25	2.0	2.0	2.0	2.0
30	2.7	2.8	2.7	2.9
35	3.1	3.4	3.8	4.1
40	3.4	3.7	5.7	6.1
45	3.6	4.0	8.1	8.6
50	3.9	4.2	10.6	11.2
55	4.0	4.4	13.0	13.8
60	4.1	4.5	14.0	14.9

### **2.4.3 Pensioners as at the valuation date**

Appendix 3 shows the distribution of pensioners for old-age, invalidity and survivors benefits as at the actuarial valuation date.

### **2.4.4 Family structure**

Information on the family structure of the insured population 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 spouses, the average age of orphans and the probability of having a living parent. The same assumptions as those made for the previous actuarial valuation are used in this actuarial valuation. Examples of the assumptions appear in Table 31.

**Table 31**  
**Family statistics\***

Age	Probability of being married		Average age spouse		Probability of having a living parent		Age of the youngest orphan	
	Males	Females	Males	Females	Males	Females	Males	Females
15-19	5.0%	30.0%	18	22	0.9852	0.9852	0	1
20-24	20.0%	65.0%	21	27	0.9676	0.9676	1	1
25-29	50.0%	80.0%	24	32	0.9341	0.9341	1	2
30-34	70.0%	85.0%	28	37	0.8738	0.8738	1	3
35-39	80.0%	85.0%	31	42	0.7739	0.7739	1	5
40-44	85.0%	80.0%	34	47	0.6267	0.6267	2	7
45-49	85.0%	75.0%	38	52	0.4421	0.4421	3	9
50-54	85.0%	70.0%	43	57	0.2553	0.2553	5	11
55-59	90.0%	60.0%	48	62	0.1119	0.1119	7	13
60-64	85.0%	55.0%	53	67	0.0339	0.0339	9	15
65-69	85.0%	45.0%	58	72	0.0062	0.0062	11	17
70-74	85.0%	40.0%	63	77	0.0005	0.0005	13	19
75-79	85.0%	35.0%	68	82	0.0000	0.0000	15	21
80-84	80.0%	30.0%	73	87	0.0000	0.0000	17	21
85-89	80.0%	30.0%	78	92	0.0000	0.0000	19	21
90-94	75.0%	30.0%	83	97	0.0000	0.0000	21	21
+ de 94	75.0%	30.0%	88	97	0.0000	0.0000	21	21

\* These statistics come from Statistics Sierra Leone and the NASSIT. Calculations are by the author.

#### 2.4.5 Adjustment of pensions in payment

Under the basic scenario, pensions in payment are assumed to be indexed in the future at a rate equal to the inflation.

#### 2.4.6 Projection of administrative costs

The initial administrative costs are assumed to be 5.3% of total insurable earnings. The portion of the total administrative costs related to salaries is expected to increase according to the increase in average salary while other elements are assumed to increase according to inflation. Over the projection period, the average administrative costs as a percentage of total earnings will decrease from 5.3% during the first year to 3.3%, 20 years later. In 2057, the percentage is 1.8%. Two factors are responsible of this decrease: the growth of the insured population and a part of the total fees that is linked to inflation increase (which is assumed to be lower than the salary increase).

#### 2.4.7 Amount of reserve as at valuation date

At the beginning of the projection period, the amount of reserve is 231 283 million of Leones. There is no separate accounting at the NASSIT for the private sector and the public sector. For this actuarial valuation, we assumed that 55% of the reserve, that is 127 206 million Leones, belongs to the private sector. The remaining 104 077 million Leones is the amount of initial reserve for the public sector.

## **3 Demographic and financial projections**

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 workers will continue to be insured with the NASSIT indefinitely, thus paying contributions and accruing benefit entitlements, and later receive benefits in accordance with the legal provisions of the scheme. Future contributions and benefits are calculated according to the demographic and economic assumptions presented in Chapter 2 and on the basis of the database and scheme-specific assumptions presented in section 2.4.

The main purpose of the valuation is to find out whether the financing of the NASSIT 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 will have to be undertaken on a regular basis to check the actual experience in the light of the assumptions made. It is also important to understand that the results of the projection cannot be interpreted as objectives that the NASSIT should attain in the future. For example, assumptions regarding the growth in the number of participants should not be used to compare the performance of the management in attracting new participants. Objectives of the fund should be stated by the Board of trustees and not by an actuarial valuation. It could be very hazardous to interpret the results one by one. Actuarial valuation must be seen as a whole where the main objective of the actuarial valuation is to analyze the financial soundness of the scheme.

This review deals with expenditures and income. Long-term benefits will attain a mature state only after the youngest persons of the first generation of contributors have become pensioners, have died and all survivors' pensions paid on their behalf have ceased. This requires that the situation of the scheme be analyzed over the next 50 years.

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

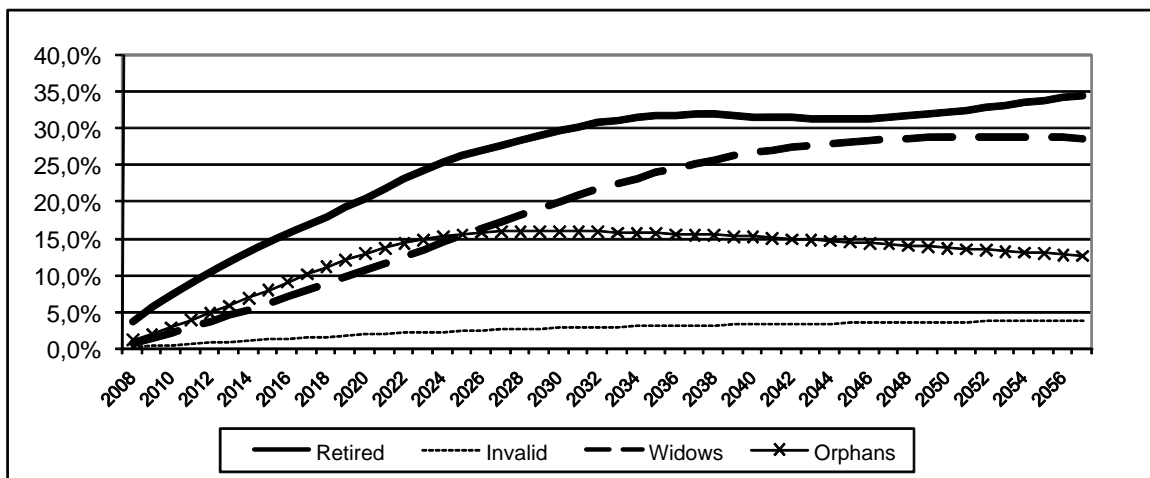
### **3.1 Results of the projection for the basic scenario**

Demographic projections are listed in Table 32 and Table 33. The information that appears in these two tables is reproduced in Figure 3 and Figure 4 respectively to better see the trends in the evolution of the demographic ratio (ratio of pensioners to active participants). We present these results separately for the public sector and the private sector because the pattern of the growth for pensioners is different for these two groups. In fact, in the public sector, because full length of service is recognized as at the actuarial valuation date there are more participants who are eligible to receive a pension. The total number of contributors follows the rate of growth of the population as described in the preceding chapter. For the two groups, the number of pensioners grows faster than the number of contributors because of the increasing entitlement to benefits of the successive generations. At the end of the projection period, there is more stability in the demographic ratio for the public sector than that for the private sector. This is due to the fact that the private sector is less mature than the public sector. The ratio of pensioners to contributors is a good indicator of the increasing cost of the scheme. This directly affects the pay-as-you-go cost of the scheme, as presented in the next section.

**Table 32**  
**Demographic projection, Public sector**

Years	Numbers of active participants and pensioners					Demographic ratio			
	Active	Retired	Invalid	Widows	Orphans	Ret.	Inv.	Wid.	Orph.
2008	70 356	2 572	120	562	805	3.7%	0.2%	0.8%	1.1%
2012	74 963	7 866	580	2 817	3 645	10.5%	0.8%	3.8%	4.9%
2017	78 646	13 204	1 176	6 289	7 986	16.8%	1.5%	8.0%	10.2%
2022	82 546	19 152	1 733	10 431	11 888	23.2%	2.1%	12.6%	14.4%
2027	86 676	24 175	2 220	15 096	13 857	27.9%	2.6%	17.4%	16.0%
2032	91 052	28 118	2 648	19 889	14 559	30.9%	2.9%	21.8%	16.0%
2037	95 688	30 704	3 016	24 236	14 931	32.1%	3.2%	25.3%	15.6%
2042	100 600	31 770	3 363	27 729	15 104	31.6%	3.3%	27.6%	15.0%
2047	105 805	33 526	3 719	30 331	15 101	31.7%	3.5%	28.7%	14.3%
2052	111 322	36 712	4 076	32 246	15 013	33.0%	3.7%	29.0%	13.5%
2057	117 170	40 609	4 422	33 745	14 892	34.7%	3.8%	28.8%	12.7%

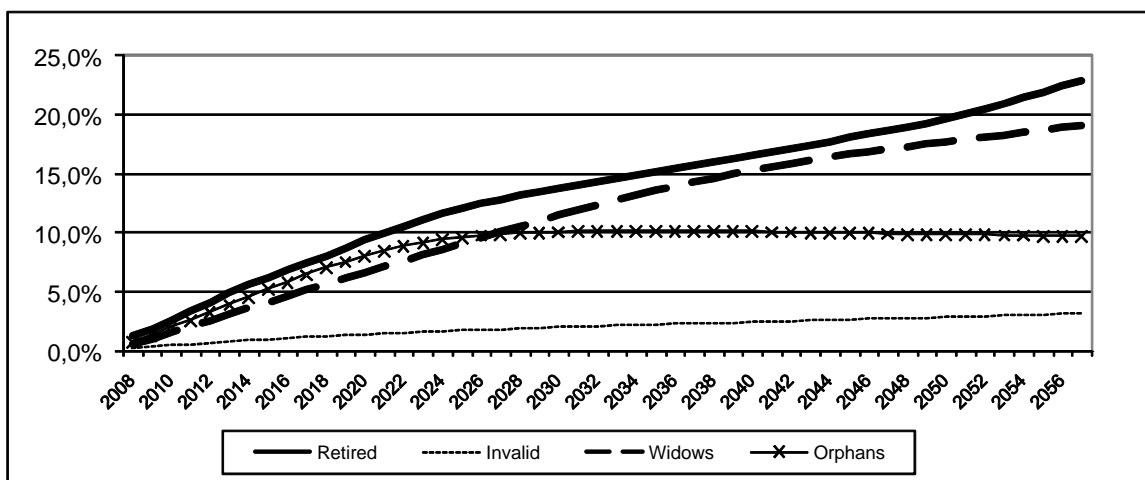
**Figure 3**  
**Demographic ratio, Public sector**



**Table 33**  
**Demographic projection, Private sector**

Years	Numbers of active participants and pensioners					Demographic ratio			
	Actives	Retired	Invalid	Widows	Orphans	Ret.	Inv.	Wid.	Orph.
2008	56 416	679	82	299	412	1.2%	0.1%	0.5%	0.7%
2012	64 669	2 649	392	1 643	2 099	4.1%	0.6%	2.5%	3.2%
2017	75 879	5 624	844	3 872	4 869	7.4%	1.1%	5.1%	6.4%
2022	87 968	9 307	1 331	6 684	7 748	10.6%	1.5%	7.6%	8.8%
2027	100 760	12 881	1 842	10 108	9 928	12.8%	1.8%	10.0%	9.9%
2032	114 027	16 371	2 388	14 030	11 507	14.4%	2.1%	12.3%	10.1%
2037	127 487	20 038	2 968	18 187	12 895	15.7%	2.3%	14.3%	10.1%
2042	140 816	24 130	3 581	22 299	14 112	17.1%	2.5%	15.8%	10.0%
2047	153 658	28 649	4 237	26 220	15 193	18.6%	2.8%	17.1%	9.9%
2052	165 639	34 054	4 948	29 953	16 190	20.6%	3.0%	18.1%	9.8%
2057	176 386	40 444	5 686	33 602	17 122	22.9%	3.2%	19.1%	9.7%

**Figure 4**  
**Demographic ratio, Private sector**



### 3.1.1 Financial projections

Another indicator of the maturing process of the system is the replacement ratio. This ratio is the ratio of the average pension to the average insurable earnings (see Table 34 and Table 35). It indicates the evolution of average pensions compared with the average earnings during the projection period (what proportion of earnings is paid to pensioners). In the public sector, the replacement ratio is more stable than in the private sector. This is explained by the different maturities in the two sectors. Replacement ratios for retirement benefits are higher at the beginning of the projection period for both the public and the private sectors. This can be explained by the fact that, at the beginning of the projection period, there are few pensioners which means that variation in the average pension could be important from year to year. It is also important to remember that the scheme is young. This situation could be also amplified by the

fact that some participants are reluctant to ask for retirement benefits because the amount of pension is low. Those having very low pensions seem to prefer to continue to work. During the projection period, replacement ratios for old age benefits are quite stable for public sector and increasing for private sector. This is due to the fact that there is the average length of service recognized in the pension for the private sector is lower than for the public one.

For disability pensioners, replacement ratios are lower than those projected for the old age pension because people become invalids at a lower age. The replacement ratios for surviving spouses represent, in the long term, about 40% of the disability pension replacement rate, because the pension formula provides 40% of the old age pension to a surviving spouse, whereas the disability pension formula provides 100% of the old age pension (with half of the difference between age 60 and the date of incidence is credited to pensioners).

**Table 34**  
**Replacement ratios, Public sector**

Years	Average insurable earnings (000)	Average annual pensions (000)				Replacement ratio			
	Active	Ret.	Inv.	Wid.	Orph.	Ret.	Inv.	Wid.	Orph.
2008	2 016	1 340	1 002	407	865	66%	50%	20%	43%
2012	3 468	1 742	1 486	611	952	50%	43%	18%	27%
2017	5 168	2 591	2 324	936	1 369	50%	45%	18%	26%
2022	6 591	3 364	3 136	1 228	1 760	51%	48%	19%	27%
2027	8 406	4 400	4 095	1 570	2 317	52%	49%	19%	28%
2032	10 722	5 771	5 233	1 986	3 033	54%	49%	19%	28%
2037	13 678	7 424	6 579	2 512	3 899	54%	48%	18%	29%
2042	17 450	9 337	8 260	3 192	4 979	54%	47%	18%	29%
2047	22 264	11 700	10 465	4 074	6 371	53%	47%	18%	29%
2052	28 407	14 744	13 344	5 203	8 164	52%	47%	18%	29%
2057	36 249	18 766	17 051	6 630	10 443	52%	47%	18%	29%



**Table 35**  
**Replacement ratios, Private sector**

Years	Average insurable earnings (000)	Average annual pensions (000)				Replacement ratio			
	Active	Ret.	Inv.	Wid.	Orph.	Ret.	Inv.	Wid.	Orph.
2008	4 801	2 653	1 639	690	1 352	55%	34%	14%	28%
2012	7 932	3 580	2 722	1 092	1 700	45%	34%	14%	21%
2017	11 857	5 702	4 437	1 760	2 619	48%	37%	15%	22%
2022	15 170	7 898	6 296	2 449	3 650	52%	42%	16%	24%
2027	19 407	10 813	8 638	3 301	5 112	56%	45%	17%	26%
2032	24 829	14 539	11 651	4 376	7 055	59%	47%	18%	28%
2037	31 766	19 435	15 529	5 764	9 475	61%	49%	18%	30%
2042	40 642	25 223	20 410	7 565	12 503	62%	50%	19%	31%
2047	51 997	32 044	26 528	9 883	16 275	62%	51%	19%	31%
2052	66 526	40 274	34 308	12 841	20 986	61%	52%	19%	32%
2057	85 115	50 797	44 097	16 575	26 903	60%	52%	19%	32%

The following tables (Table 36, Table 37 and Table 38) show the result of the financial projections in terms of cash-flows, pay-as-you-go (PAYG) rate, reserve, and equilibrium period (20 years). The contribution rates used in these projections are the following:

- 15.0% for the private sector;
- 15.0% for civil servants and teachers plus an additional 2.5% until 2021;
- 17.0% for military and the police plus an additional 2.5% until 2021;

The PAYG rate represents the contribution rate that would be required just to meet the expenditures of the scheme, year after year, in the absence of a reserve. In 2008, the scheme's PAYG rate (Table 36) is 8.6%, thus significantly lower than the current contribution rate devoted to pensions. However, the PAYG rate is expected to increase in the future and reach 19.9% in 2027 and 26.7% in 2057.

Table 36 also shows that over the equilibrium period, the current contribution rate is sufficient to pay all the expenditures of the scheme (benefits and administrative costs) and helps accumulate a reserve that is higher than three times the benefit expenditure in the previous year (reserve ratio). In fact, at the end of the equilibrium period, in 2027, this ratio is 4.8. When looking at the private sector and the public sector separately, the picture is quite different. For the public sector, at the end of the equilibrium period the ratio of reserve is 1.0, while for the private sector it is 7.5.

The following Table 35 shows the General Average Premium for the equilibrium period of 20 years and for 50 years. For the present actuarial valuation the GAP is defined as the contribution rate that is necessary to paid all the benefits and expenditure over a given period and to accumulate at the end of the period a reserve ratio of 3. As mentioned in section 1.6, it is important that the NASSIT formulates, in relation with its stakeholders, clear objectives for the minimum financing of the scheme. This can be done by including in the regulation financial objectives of the schemes over a period or adopting an investment policy. For this actuarial valuation we choose two periods to calculate the GAP. The 20 year period corresponds to the one

that has been chosen in the inception report while the 50 year period is the maximum period used for the projection.

**Table 35**  
**General Average Premium, Public sector, Private sector and both sectors**

	<b>Period of 20 years</b>	<b>Period of 50 years</b>
<b>Public sector</b>	19.7%	26.1%
<b>Private sector</b>	11.0%	17.9%
<b>All sectors</b>	13.7%	20.1%

According to the table 35, for the 20 year contribution period, the contribution rate for the public sector should be increased to 19.7% while the one of the private sector should be decreased to 11.0%. For both schemes combined, the current contribution rates are enough to pay all expenditures of the scheme over the next 20 years because the GAP is 13.7%. Given that, we recommend no contribution increase. By the next actuarial valuation and if financial objectives are clearly defined, contribution rates could be revised for both sectors.

If the scheme had to be funded by a constant contribution rate over the next 50 years, this rate would be 20.1% (26.1% for public sector and 17.9% for private sector).

Figure 5 and Figure 6 show the evolution of the PAYG rate for the private and the public sector, and the evolution of the reserve throughout the projection period.

**Table 36**  
**Financial projections, all sectors, in millions of leones**

Years	Contributions	Investment Earnings	Other Income	Benefits	Administrative Expenses	Surplus (Deficit)	Reserve (end of the year)	Pay-as-you-go rate	Reserve Ratio
<b>2008</b>	66 901	47 361	4 500	13 825	22 000	82 937	314 220	8.6%	8.8
<b>2009</b>	80 527	59 585	5 500	18 318	25 012	102 282	416 502	8.7%	9.6
<b>2010</b>	94 000	72 798	0	24 784	28 810	113 204	529 706	9.2%	9.9
<b>2011</b>	108 642	85 188	0	33 424	32 692	127 714	657 420	9.8%	9.9
<b>2012</b>	124 312	96 894	0	44 185	36 735	140 286	797 706	10.4%	9.9
<b>2013</b>	140 807	107 188	0	56 915	40 873	150 208	947 914	11.1%	9.7
<b>2014</b>	157 863	115 325	0	71 824	45 024	156 340	1 104 254	11.8%	9.5
<b>2015</b>	175 160	120 603	0	88 448	49 099	158 216	1 262 470	12.5%	9.2
<b>2016</b>	192 326	122 437	0	106 419	53 000	155 344	1 417 814	13.2%	8.9
<b>2017</b>	208 949	120 383	0	125 618	56 625	147 088	1 564 902	13.9%	8.6
<b>2018</b>	224 589	114 168	0	146 087	59 872	132 798	1 697 700	14.6%	8.2
<b>2019</b>	241 351	123 420	0	168 645	62 642	133 484	1 831 184	15.3%	7.9
<b>2020</b>	259 310	132 665	0	194 024	65 540	132 410	1 963 594	15.9%	7.6
<b>2021</b>	278 544	141 763	0	222 656	68 572	129 080	2 092 674	16.6%	7.2
<b>2022</b>	285 405	150 094	0	254 099	71 745	109 655	2 202 329	17.3%	6.8
<b>2023</b>	306 622	157 466	0	287 749	75 064	101 274	2 303 603	17.9%	6.3
<b>2024</b>	329 330	164 213	0	323 712	78 537	91 294	2 394 897	18.5%	6.0
<b>2025</b>	353 626	170 225	0	361 972	82 170	79 708	2 474 605	19.0%	5.6
<b>2026</b>	379 611	175 386	0	402 658	85 971	66 368	2 540 973	19.5%	5.2
<b>2027</b>	407 392	179 555	0	446 327	89 947	50 673	2 591 646	19.9%	4.8
<b>2032</b>	577 406	178 241	0	721 449	112 752	-78 555	2 495 608	21.9%	3.0
<b>2037</b>	812 056	114 518	0	1 101 243	141 310	-315 979	1 434 528	23.1%	1.2
<b>2042</b>	1 132 653	-53 142	0	1 607 480	177 051	-705 020	-1 218 067	23.8%	-0.7
<b>2047</b>	1 566 155	-399 536	0	2 314 583	221 754	-1 369 718	-6 613 405	24.5%	-2.6
<b>2052</b>	2 146 178	-1 049 178	0	3 342 641	277 630	-2 523 270	-16 670 965	25.5%	-4.6
<b>2057</b>	2 914 047	-2 221 242	0	4 811 604	347 415	-4 466 215	-34 730 970	26.7%	-6.7

The amount in the column "other revenues" represents the indebtedness

**Table 37**  
**Financial projections, public sector, in millions of leones**

Years	Contributions	Investment Earnings	Other Income	Benefits	Administrative Expenses	Surplus (Deficit)	Reserve (end of the year)	Pay-as-you-go rate	Reserve Ratio
2008	26 276	20 923	2 000	6 804	10 660	31 734	135 812	12.0%	7.8
2009	32 130	25 381	2 500	9 722	12 618	37 671	173 483	12.6%	7.8
2010	36 928	29 912	0	13 358	14 564	38 919	212 402	13.6%	7.6
2011	42 030	33 726	0	17 827	16 335	41 594	253 996	14.7%	7.4
2012	47 367	36 986	0	23 082	18 047	43 225	297 221	15.7%	7.2
2013	52 851	39 471	0	29 119	19 742	43 462	340 683	16.7%	7.0
2014	58 380	40 972	0	35 866	21 344	42 141	382 824	17.7%	6.7
2015	63 834	41 319	0	43 361	22 918	38 873	421 698	18.7%	6.4
2016	69 083	40 389	0	51 452	24 418	33 602	455 300	19.8%	6.0
2017	73 991	38 140	0	60 035	25 783	26 313	481 613	20.9%	5.6
2018	78 420	34 630	0	68 723	26 885	17 442	499 055	22.0%	5.2
2019	83 116	35 708	0	78 099	27 744	12 981	512 037	23.0%	4.8
2020	88 096	36 444	0	88 475	28 638	7 426	519 463	24.0%	4.4
2021	93 375	36 759	0	99 867	29 546	720	520 183	25.0%	4.0
2022	85 240	36 099	0	112 057	29 903	-20 621	499 562	25.8%	3.5
2023	90 350	34 362	0	124 850	30 858	-30 996	468 565	26.7%	3.0
2024	95 768	31 876	0	138 224	31 852	-42 431	426 134	27.5%	2.5
2025	101 514	28 565	0	152 266	32 899	-55 086	371 048	28.3%	2.0
2026	107 607	24 340	0	167 011	34 001	-69 065	301 983	29.0%	1.5
2027	114 067	19 103	0	182 610	35 150	-84 590	217 393	29.6%	1.0
2032	152 725	-26 647	0	275 239	41 548	-190 709	-504 758	32.1%	-1.6
2037	204 589	-117 161	0	384 820	48 824	-346 216	-1 903 174	32.8%	-4.4
2042	274 203	-270 690	0	510 524	57 383	-564 395	-4 250 095	32.0%	-7.5
2047	367 687	-518 052	0	683 800	68 515	-902 681	-8 023 358	31.6%	-10.7
2052	493 278	-912 992	0	933 852	82 802	-1 436 368	-14 042 785	31.8%	-13.8
2057	662 078	-1 538 018	0	1 282 375	100 911	-2 259 225	-23 555 784	32.2%	-17.0

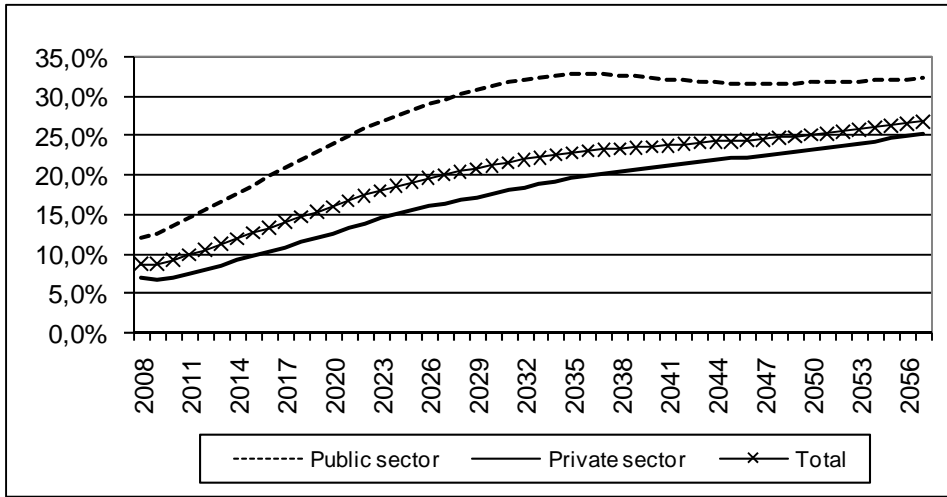
The amount in the column "other revenues" represents the indebtedness

**Table 38**  
**Financial projections, private sector, in millions of leones**

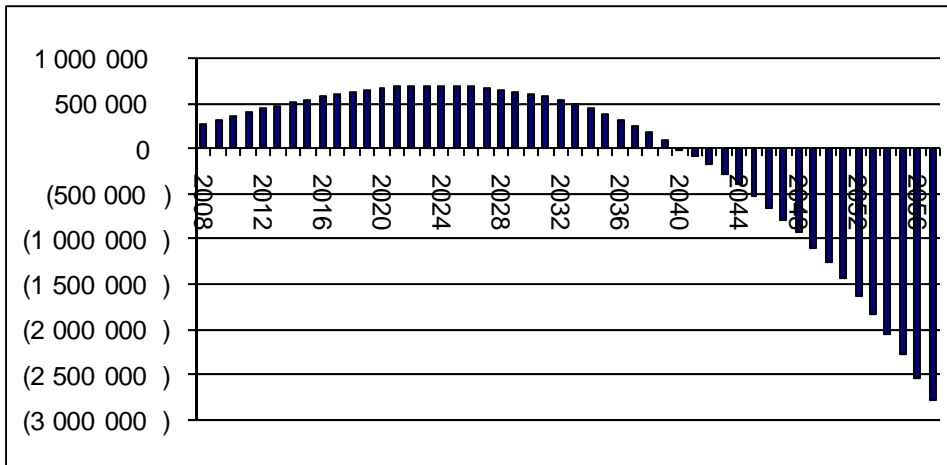
Years	Contributions	Investment Earnings	Other Income	Benefits	Administrative Expenses	Surplus (Deficit)	Reserve (end of the year)	Pay-as-you-go rate	Reserve Ratio
2008	40 625	26 438	2 500	7 021	11 340	51 203	178 408	6.8%	9.7
2009	48 397	34 204	3 000	8 596	12 395	64 610	243 019	6.5%	11.6
2010	57 071	42 885	0	11 426	14 246	74 285	317 304	6.7%	12.4
2011	66 612	51 462	0	15 598	16 356	86 120	403 424	7.2%	12.6
2012	76 945	59 908	0	21 103	18 689	97 062	500 485	7.8%	12.6
2013	87 956	67 717	0	27 796	21 131	106 746	607 231	8.3%	12.4
2014	99 483	74 354	0	35 958	23 680	114 199	721 430	9.0%	12.1
2015	111 326	79 284	0	45 087	26 181	119 343	840 773	9.6%	11.8
2016	123 243	82 047	0	54 967	28 582	121 742	962 515	10.2%	11.5
2017	134 958	82 242	0	65 583	30 842	120 774	1 083 289	10.7%	11.2
2018	146 169	79 538	0	77 364	32 987	115 356	1 198 645	11.3%	10.9
2019	158 235	87 712	0	90 546	34 897	120 503	1 319 148	11.9%	10.5
2020	171 214	96 221	0	105 549	36 902	124 984	1 444 132	12.5%	10.1
2021	185 169	105 005	0	122 789	39 026	128 359	1 572 491	13.1%	9.7
2022	200 165	113 995	0	142 043	41 842	130 276	1 702 767	13.8%	9.3
2023	216 272	123 104	0	162 900	44 206	132 270	1 835 038	14.4%	8.9
2024	233 561	132 337	0	185 488	46 685	133 726	1 968 763	14.9%	8.5
2025	252 112	141 660	0	209 707	49 271	134 794	2 103 557	15.4%	8.1
2026	272 004	151 045	0	235 646	51 970	135 433	2 238 990	15.9%	7.8
2027	293 324	160 452	0	263 716	54 797	135 263	2 374 253	16.3%	7.5
2032	424 681	204 887	0	446 211	71 205	112 154	3 000 366	18.3%	5.8
2037	607 467	231 679	0	716 423	92 486	30 237	3 337 702	20.0%	4.1
2042	858 449	217 548	0	1 096 955	119 667	-140 625	3 032 028	21.3%	2.5
2047	1 198 469	118 516	0	1 630 783	153 239	-467 038	1 409 953	22.3%	0.8
2052	1 652 900	-136 186	0	2 408 789	194 827	-1 086 902	-2 628 180	23.6%	-1.0
2057	2 251 969	-683 224	0	3 529 230	246 504	-2 206 989	-11 175 186	25.1%	-3.0

The amount in the column "other revenues" represents the indebtedness

**Figure 5**  
**Pay-as-you-go rate, public sector, private sector and both sectors combined**



**Figure 6**  
**Development of the reserve, 2005-2054 (constant leones of 2007)**



### 3.1.2 Reconciliation with previous actuarial valuation

In this actuarial valuation, the long-term projected costs for the public and private sector are in line with those projected in the last report. However, there are some elements related to the methodology and the assumptions that, when taken alone, produce different results than the ones obtained in the previous valuation. For the reconciliation, we use contribution rates calculated over a period of 50 years to be sure that all elements affecting the cost are taken into account. The main factors that explain the differences between the 2004 and the 2007 actuarial valuations are:

- For the public sector, the main differences are:
  - The change in the mortality rates has produced an increase in the GAP of 1.8%. This result also shows the sensitivity of the scheme to a change in the mortality

assumptions. By lowering mortality, beneficiaries are expected to receive pensions over a longer period.

- The change in the profile of the initial insured population and in the assumption concerning the insured population growth has produced a decrease in the GAP of 2.5%.
  - The increase in the number of initial beneficiaries has produced an increase of 0.6% in the GAP.
  - The average number of years of service in the initial active population has produced a decrease of -1.1% in the GAP. The reader must remember that the number years of service for the public sector is based on a survey which could affect precision in the results of the actuarial valuation.
  - The changes in the salary scale and in the economic assumptions have produced a decrease of 3.2% in the GAP. This is the largest impact for the public sector. Almost all the impact comes from the change in the salary scale (-3.0%).
  - Increase in the assumptions relating to the administrative expenditures has increase the GAP by 2.0%.
  - The modification in the assumption regarding the return on assets in this actuarial valuation and the higher level of initial reserve has produced a decrease of 1.6% in the GAP.
  - Other modifications (refinements and modifications in the actuarial projection model) have produced a decrease of 0.1% in the GAP.
- For the private sector, the main differences are:
- The change in the mortality rates has produced an increase in the GAP of 0.2%. The impact is less for the private sector than the public sector because the scheme is less mature.
  - The change in the profile of the initial insured population and in the assumption concerning the insured population growth has produced a decrease in the GAP of 1.1%.
  - The increase in the number of initial beneficiaries has produced an increase of 0.2% in the GAP.
  - The average number of years of service in the initial active population has produced an increase of 0.6% in the GAP.
  - Introduction of a grandfathering provision<sup>5</sup> has produced an increase of 2.5% in the GAP. This is the most important impact for the private sector since the last actuarial valuation.
  - The fact that we take into account explicitly the impact of the inactive population in this actuarial valuation has produced an increase of 0.7% in the GAP.
  - The change in the salary scale and in the economic assumptions has produced an increase of 0.3% in the GAP.

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<sup>5</sup> The grandfathering provision is:

- Additional credit for service is granted at the time of affiliation (from 2002 to the end of 2007)
  - To qualify:
    - At the time of affiliation, age must be above 30 years and;
    - The participant must contribute to the scheme for at least 27 of the first 36 months of his affiliation.
  - Additional service granted:
    - Half of the period between the age at the time of affiliation and age 30.

- Increase in the assumptions relating to the administrative expenditures has increase the GAP by 1.2%.
- The modification in the assumption regarding the return on assets in this actuarial valuation and the higher level of initial reserve has produced a decrease of 2.3% in the GAP.
- Other modifications (refinements and modifications in the actuarial projection model) have produced an increase of 1.2% in the GAP.

The following tables show the results of the reconciliation with the previous actuarial valuation.

**Table 39**  
**Reconciliation of the GAP, 2004 and 2007 actuarial valuations, public sector**

<b>GAP 2004 report (50 years)</b>	<b>30.3%</b>
Mortality rates	1.8%
Initial population and population growth	-2.5%
Initial beneficiaries	0.6%
Years of service of the insured population	-1.1%
Grandfathering provision	n/a
Inactive population	n/a
Inflation and salary assumptions*	-3.2%
Expenditures	2.0%
Interest rates + initial reserve	-1.6%
Other	-0.1%
<b>GAP 2007 report (50 years)</b>	<b>26.1%</b>

\*Note: The change in the salary scale accounts for -3.0%



**Table 40**  
**Reconciliation of the GAP, 2004 and 2007 actuarial valuations, private sector**

<b>GAP 2004 report (50 years)</b>	<b>14.4%</b>
Mortality rates	0.2%
Initial population and population growth	-1.1%
Initial beneficiaries	0.2%
Years of service of the insured population	0.6%
Grandfathering provision	2.5%
Inactive population	0.7%
Inflation and salary assumptions	0.3%
Expenditures	1.2%
Interest rates + initial reserve	-2.3%
Other	1.2%
<b>GAP 2007 report (50 years)</b>	<b>17.9%</b>

**Table 41**  
**Reconciliation of the GAP, 2004 and 2007 actuarial valuations, both sectors**

<b>GAP 2004 report (50 years)</b>	<b>17.5%</b>
Mortality rates	0.5%
Initial population and population growth	-0.1%
Initial beneficiaries	0.3%
Years of service of the insured population	0.1%
Grandfathering provision	1.8%
Inactive population	0.5%
Inflation and salary assumptions	-0.7%
Expenditures	1.4%
Interest rates + initial reserve	-1.1%
Other	-0.1%
<b>GAP 2007 report (50 years)</b>	<b>20.1%</b>

## 3.2 Sensitivity tests

### 3.2.1 Insured population growth

For the private sector, the population growth assumption in the basic scenario can be said to be high compared to the one in the public sector. Therefore, a sensitivity test using a lower growth rate was performed. Table 42 shows population growth under both scenarios.

**Table 42**  
**Population growth assumption for the private sector, basic and alternate scenario**

<b>Basic scenario</b>	<b>2008</b>	<b>2018</b>	<b>2028</b>	<b>2038</b>	<b>2048</b>	<b>2058</b>
Males	3.5%	3.0%	2.5%	2.0%	1.5%	1.0%
Females	4.0%	3.5%	3.0%	2.5%	2.0%	1.5%

<b>Low growth scenario</b>	<b>2008</b>	<b>2018</b>	<b>2028</b>	<b>2038</b>	<b>2048</b>	<b>2058</b>
Males	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Females	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%

Table 43 shows the results of the projection. The reserve ratio after 20 years is 5.0, which is lower than in the basic scenario but still superior to the target of 3. The GAP for the period of 20 years and 50 years are respectively 12.9% and 22.1%. This sensitivity analysis clearly demonstrates how sensitive the contribution rate of a scheme is to the growth of the insured population. The lower the growth of the insured population, the higher the contribution rate.

Table 43

Financial projections, all sectors, in millions of leones – low growth scenario for the private sector

Years	Contributions	Investment Earnings	Other Income	Benefits	Administrative Expenses	Surplus (Deficit)	Reserve (end of the year)	Pay-as-you-go rate	Reserve Ratio
2008	39 930	26 377	2 500	7 021	11 284	50 501	177 707	6.9%	9.7
2009	46 732	33 944	3 000	8 592	12 265	62 819	240 526	6.7%	11.5
2010	54 120	42 253	0	11 413	13 921	71 039	311 565	7.0%	12.3
2011	62 017	50 267	0	15 569	15 869	80 845	392 410	7.6%	12.5
2012	70 320	57 933	0	21 050	18 009	89 193	481 603	8.3%	12.3
2013	78 898	64 747	0	27 707	20 228	95 710	577 314	9.1%	12.0
2014	87 592	70 201	0	35 825	22 525	99 444	676 757	10.0%	11.6
2015	96 217	73 820	0	44 897	24 750	100 391	777 148	10.9%	11.2
2016	104 567	75 231	0	54 694	26 853	98 251	875 399	11.7%	10.7
2017	112 422	74 157	0	65 188	28 798	92 594	967 992	12.5%	10.3
2018	119 561	70 417	0	76 791	30 618	82 570	1 050 562	13.5%	9.8
2019	127 108	76 108	0	89 727	32 202	81 287	1 131 850	14.4%	9.3
2020	135 091	81 661	0	104 400	33 857	78 496	1 210 345	15.4%	8.8
2021	143 538	86 958	0	121 213	35 606	73 677	1 284 022	16.4%	8.2
2022	152 481	91 862	0	139 926	38 055	66 362	1 350 384	17.5%	7.6
2023	161 949	96 212	0	160 112	39 998	58 050	1 408 434	18.5%	7.0
2024	171 972	99 934	0	181 879	42 029	47 997	1 456 431	19.5%	6.5
2025	182 575	102 910	0	205 106	44 138	36 240	1 492 671	20.5%	6.0
2026	193 783	105 016	0	229 858	46 331	22 609	1 515 281	21.4%	5.5
2027	205 620	106 108	0	256 491	48 619	6 619	1 521 899	22.3%	5.0
2032	275 405	89 254	0	426 119	61 770	-123 229	1 204 397	26.6%	2.5
2037	367 137	9 065	0	662 149	78 545	-364 491	-92 197	30.3%	-0.1
2042	491 435	-174 206	0	948 493	99 320	-730 585	-2 952 700	32.0%	-2.8
2047	664 295	-508 808	0	1 273 481	123 970	-1 241 965	-8 088 789	31.6%	-5.8
2052	898 721	-1 057 153	0	1 696 717	154 033	-2 009 182	-16 464 692	30.9%	-8.9
2057	1 212 509	-1 936 893	0	2 284 628	191 619	-3 200 630	-29 877 336	30.6%	-12.1

The amount in the column "other revenues" represents the indebtedness

### 3.2.1 Higher return on assets

The assumption for the return on assets is a very important component of an actuarial valuation. Table 44 shows the impact of assuming a rate of return 1% lower and 1% higher than the base scenario.

**Table 44**  
Return on assets assumption, basic and alternate scenarios

	Public sector	Private sector	Both sectors
<b>Base Scenario</b>	26.1%	17.9%	20.1%
<b>Low return scenario</b>	27.6%	19.1%	21.4%
<b>High return scenario</b>	24.6%	16.7%	18.8%

### 3.2.2 The cost of the validation of past services

It has been asked to evaluate the cost of the validation of past services for the public sector. To do the analysis, we compare the GAP over 50 years with and without validation of past service. Assumptions used are those presented in section 2.4.2. The following table shows the results of the comparison.

**Table 45**  
Cost of the validation of past services, public sector

	GAP over 20 years	GAP over 50 years
<b>Base scenario (with past services)</b>	19.7%	26.1%
<b>Scenario without validation of past services</b>	9.8%	19.9%
<b>Differences</b>	10.0%	6.2%

According to the analysis done since the NASSIT was introduced, the contribution rate increases by 2.5% until 2021 to pay the validation of past service. The reader must be prudent when comparing this increase in the rate with the results in the Table 45. In fact, the cost of validation of past service (10%) is higher than an additional contribution of 2.5% during 20 years. On the other hand, the cost without the validation, 9.8%, is much lower than the contribution rate that was established at the inception of the scheme, which was 15%.

In addition to these comments, as shown in Table 35, we should keep in mind that globally, the contribution rate is sufficient to pay all the benefits over a period of 20 years. In fact the contribution rate that is necessary is 13.7% for both the public and the private sector. Nothing in the regulations of the NASSIT specifies that the public sector must finance its own benefits. This is the same for the private sector. If this was the case, the contribution rate of the public sector should be increased to 19.7% according to this actuarial valuation but the contribution rate of the private sector could be decreased to 11% (Table 35).

As said previously, things could be clearer if minimal funding rules were included in the regulations or part of a funding policy.

### 3.2.3 Adjustment to pensions in payment

As for the majority of pension schemes in Africa, there is no automatic adjustment to the pensions to take into account the increase in the cost of living (inflation). We were asked to analyze the possibility of increasing pensions in payment to take into account the increase in the cost of living since pensions began to be paid. We encourage such adjustment and it is for that reason that in our projection we take explicitly into account that pensions will be increased in the future.

Section 47 (2) of the NASSIT Act prescribes that “indexation shall be in accordance with increases in income as reflected in the fund of the Trust”. However, the Act does not specify what does it means “in accordance with increases in income as reflected in the fund of the Trust”. Is it the investment incomes? Salary or contribution incomes? Or both? Even if it’s wages, the Act is silent on the proportion of increases in salary that is to be used to adjust the pension. 100 %, 80 %. In the inception report, it was mentioned 80 %. Past wages increases have not been consistent (no particular pattern) across sectors. For example, wages for military people almost doubled in 2007. For that reasons, adjustments to pension in payment that are shown in this section are based on past inflation.

Based on the information in Table 22, we suggest the following schedule of adjustment for pensions in payment. The adjustment factor depends on the date on which participants retired, died or became disabled.

**Table 46**  
**Adjustments to pensions in payment**

Year of contingencies	Adjustment
2002	1.775
2003	1.595
2004	1.394
2005	1.232
2006	1.138
2007	1.000

Table 46 works as follows:

- Adjustment to pensions in payment is given from the year the pension began to the year 2007. If the pension began in 2006 it means that it is adjusted only for one year. The next actuarial valuation will confirm the possibility of a pension increase taking into account the increase in the cost of living for the next three years, and so on.
- An example: John began receiving his pension in 2003. The value of his monthly pension is 120 000 leones. To take into account the increase in cost of living from the year 2003 to 2007, his pension has to be increased by 59.5 per cent. This means that John's monthly pension is now 191 400 leones ( $120\,000 \times 1.595$ ).

Increasing the pension in payment for pensions in payment as the 31 December 2007 is not very expensive. In fact it will increase the GAP over 20 years for both sectors from 13.7% (Table 35) to 13.8%. The NASSIT has enough room to proceed with such a recommendation.

If the intention is to provide adjustment for pensions in payment in December 2008, adjustments shown in Table 46 should be multiplied by  $(1 + \text{inflation rate of the year 2008})$ .

## 4 Conclusion

The actuarial valuation of the NASSIT was carried out as at 31 December 2007. The methodology used is based on a model developed by the ILO for reviewing the long-term actuarial and financial status of national pension schemes. The model has been adjusted to fit the particular situation of the NASSIT. The data collection process was the responsibility of the NASSIT. We did some checks to be sure that the data are reasonable. Despite some incomplete information for doing an actuarial valuation, we can say that in general, the data used in this actuarial valuation are complete enough to obtain a good estimation of the financial soundness of the NASSIT. However, it is important to understand that if some data transmitted to the actuary are materially inaccurate, it could have a significant effect on the results.

An actuarial valuation requires many assumptions. These assumptions, although coherent as a whole, must not be considered individually and are selected to reflect long-term trends rather than giving undue weight to recent experience. The objective of pension projections is not to forecast the exact development of the scheme's income and expenditure, but to verify its financial viability. 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 will have to be undertaken on a regular basis to check the actual experience in the light of the assumptions made. It is also important to understand that the results of the projection cannot be interpreted as objectives that the NASSIT should attain in the future. For example, assumptions regarding the growth in the number of participants should not be used to gauge the performance of the management in attracting new participants. Objectives of the fund should be stated by the Board of trustees and not by an actuarial valuation. It could be very hazardous to interpret the results one by one. The actuarial valuation must be seen as a whole where the main objective is to analyze the financial soundness of the scheme.

According to the data and the assumptions used, this actuarial valuation shows the NASSIT is currently in a good financial condition. That means that the contribution rate level to finance benefits is sufficient over the equilibrium period of 20 years. This actuarial valuation does however point out how important it is that financing objectives for the scheme be included in the regulations or part of a funding policy.

We consider the next actuarial valuation to be very important because the scheme is still young. More scheme experience should be available to increase the precision of the exercise.





# Appendix 1

## Overview of the legal provisions of the scheme administered by the NASSIT

### A1.1 General

The social security system came into effect in 2002 under the *National Social Security and Insurance Trust Act, 2001*. The scheme is administered by the National Social Security and Insurance Trust. The trust consists of:

- The Board of Trustees;
- The Director-General;
- Other persons employed by the trust under the *Act*.

The Board of Trustees is composed of:

- A Chairman;
- One senior official representing the ministry responsible for labour and social security;
- One senior official representing the ministry responsible for finance;
- One senior official representing the ministry responsible for social welfare;
- One senior official representing the Bank of Sierra Leone;
- Two members representing the Sierra Leone Employers Federation;
- Two members representing the Sierra Leone Labour Congress;
- One representative of the Sierra Leone Teachers Association;
- One representative of the Sierra Leone Insurance Association;
- One representative of the Civil Servants Association;
- One representative of the Social Security Pensioners Association;
- One representative of the military;
- The Director-General of the NASSIT.

### A1.2 Coverage

The scheme covers all employees in the public and the private sector. Self-employed workers can be covered on a voluntary basis. Workers must retire no later than age 60.

## A1.3 Funding

The scheme is funded by contributions from employers and employees, as follows:

	Contribution rate	
	Employee	Employer
Employees in the public and the private sector	5.0%	10.0%
Employees working for the police and the army	5.0%	12.0%
Self-employed workers	15.0%	

The government pays an additional contribution rate of 2.5% during 20 years for crediting past service.

## A1.4 Eligibility

### A) Old age benefits:

#### a) Pension:

- Age 55 with a minimum of 180 months of contribution or earned credits. No retirement possible before age 55.
- People aged 60 and over are entitled to a full pension. A reduced pension is paid for early retirement between 55 and 60 years.
- People aged over 55 and who do not meet the minimum number of months of the qualifying period are entitled to make up the shortfall by purchasing additional earned credits.

#### b) Grant:

- For those who are not buying additional years of service to make up the shortfall in the qualifying period.

### B) Disability benefits:

#### a) Pension:

- Person is aged under 60 and;
- Person is permanently and totally incapable of further employment as assessed by the medical board and;
- Person has earned contributions credit
  - for at least 60 months of which 12 months must have been paid during the 36 months preceding the commencement of disability or
  - for at least 180 months;
- The pension ends according to the decision of the medical board or if age of the pensioner is 60 (converted into an old age pension) or if the person go back to work.

#### b) Grant:

For persons who are not eligible for the disability pension.

C) Survivors' benefits:

a) Pension:

- The deceased participant;
  - was receiving or is entitled to an old age pension or a disability pension or;
  - has contributed for at least 60 months of which 12 months must have been paid during the 36 months preceding the death and would have been entitled to disability pension at time of death
  - for at least 180 months;

b) Grant:

For survivors when the deceased did not meet the qualifying conditions for giving entitlement to a survivors' pension.

## A1.5 Amount of benefits:

A) Old age:

- a) Pension: 30% of the average monthly earnings for the first 180 months of contribution or earned credits, plus 2% for each additional period of 12 months of contribution or earned credits. Average earnings for calculating the pension defined as average earnings of the best 5 years. The pension cannot exceed 80% of the reference earnings. Minimum pension is equal to 50% of the minimum wage.

For early retirement, the pension calculated above is reduced by 4% for each year below age 60.

- b) Gratuity: A lump sum equal to 12 months of initial pension is paid as gratuity on the retirement of each person.
- c) Grant: 1.5 times average monthly earnings for every 12 months of paid contributions.

B) Disability:

- a) Pension: 30% of average earnings for the first 180 months of earned credits, plus 2% for each additional period of 12 months of earned credits. The contribution period is increased by 6 months for each year between the commencement of the disability and age 60. Average earnings for calculating the pension defined as average earnings of the best 5 years. The pension cannot be less than 50% of the minimum wage.

- b) Grant: 1.5 times average monthly earnings for every 12 months of paid contribution.

C) Survivors:

- a) Widow or widower: 40% of the participant's pension (the contribution period is increased by 6 months for each year between the death and the age 60). If more than one widow, the pension is shared equally. The pension ceases on remarriage. If a widow remarries or dies, her part is reallocated to the other widows, if any.
  - b) Orphan: 60% of the participant's pension. The pension ceases at age 18 or 23 if in full time-education or at death if the dependant is disabled. If the deceased leaves no widow or widower the pension amount is reallocated to the dependent children. A single child cannot receive more than 60% of the participant's pension. If a child ceases to be a dependent child, his pension is reallocated to other dependent children, if any.
  - c) Lump sum: if participant leaves no widow or widower or dependent children, a lump sum equal to 12 months of survivor pension is paid to the participant's surviving parents who are pensioners or unemployed (if the surviving parents are not pensioners or unemployed the number of months is 24).
  - d) Grant: 1.5 times the average monthly earnings of the deceased for every 12 months of paid contributions. This amount is shared by all the dependants.
- E) Benefit adjustment:  
Indexation is according to increases in employment earnings as reflected in the fund of the Trust.

## **Appendix 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 was undertaken by modifying the generic version of the ILO modeling tools in order to fit the situation of Sierra Leone and of the social security system in particular. These modeling 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.

### **A2.1 Modeling the demographic and economic developments**

The use of the ILO actuarial projection model required 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 flat-rate benefits.

The selection of projection assumptions took into account the recent experience of Sierra Leone to the extent that this information was available. The assumptions were selected to reflect long-term trends rather than giving undue weight to recent experience. The detailed description of the demographic and economic assumptions is presented in the Chapter 2.

#### **A2.1.1 Active Population**

The projection of the labour force, i.e. the number of persons available for work, is normally 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.

However, given the low level of insured people compared to the general population (and even the working population), our actuarial analysis voluntarily omits the analysis and projection of the general and working population.

In our model, the active population is projected starting with most current data on active participants, and applying appropriate mortality, disability and retirement rates.

#### **A2.1.2 Economic growth and inflation**

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

### **A2.1.3 Salaries**

Based on an allocation of total GDP to capital income and to labour income, a starting average wage is normally 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 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 normally 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.

However, considering the absence of a complete macroeconomic framework for the analysis of remuneration, the real wage increase in our model is based on a long term assumption frequently observed in other actuarial valuation.

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 earnings which are used in the computation of benefits are also projected.

## **A2.2 Modeling the financial development of the social Insurance scheme**

The present actuarial review addresses all income and expenditure items of the long-term (pension) benefits.

Projections for pensions are done for each sex separately. Moreover, there is separation by groups of insured (workers in the private sector on the one side, workers in the public sector (military personnel, police, teachers and civil servants) on the other side).

### **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 for building 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 framework already described and, in addition, a set of assumptions specific to the social insurance scheme.

The database as at 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 disability incidence rates and the distribution of retirement by age are determined with reference to scheme provisions and the scheme's historical experience. The data and assumptions specific to the NASSIT are presented in detail in chapter 2.

### **A2.2.3 Pension projection approach**

Pension projections are made following a year-by-year cohort methodology. The existing population is aged and gradually replaced by 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 progression of a scheme's income and expenditures, but to verify its financial viability. This entails evaluating the scheme with regard to the relative balance between future income and expenditures. This type of evaluation is essential, especially in the case of the Sierra Leone scheme, which has not yet reached its mature stage.





## Appendix 3

### Distribution of pensioners and average monthly pension used for the actuarial valuation

#### Orphans

Age	Public sector				Private sector			
	Male Number	Average amount of pension	Female Number	Average amount of pension	Male Number	Average amount of pension	Female Number	Average amount of pension
0	-	-	-	-	-	-	-	-
1	1	19 723	-	-	-	-	-	-
2	3	319 341	1	15 184	-	-	-	-
3	4	31 704	3	18 503	-	-	1	21 830
4	5	101 748	-	-	1	108 894	-	-
5	5	87 395	5	30 647	1	211 926	-	-
6	4	141 261	1	23 108	5	136 365	-	-
7	7	321 681	2	35 273	1	351 515	3	27 503
8	5	128 661	2	29 308	2	385 392	2	227 817
9	10	205 547	3	43 849	4	94 913	-	-
10	6	312 503	5	24 984	4	276 735	1	56 986
11	5	197 992	-	-	3	115 850	1	308 613
12	10	118 945	2	433 440	3	490 621	1	18 719
13	5	127 164	5	40 775	5	556 390	1	45 410
14	9	47 960	7	84 433	2	36 441	-	-
15	8	220 650	4	29 564	5	245 415	-	-
16	11	92 198	8	28 829	1	185 396	1	15 730
17	7	304 944	3	37 316	5	459 147	3	24 863
18	4	52 315	4	117 979	3	215 190	1	18 719
19	6	48 652	3	531 146	-	-	3	70 174
20	11	66 011	7	41 494	2	477 379	-	-
21	14	253 913	3	37 972	2	51 281	1	196 210
22	6	106 624	5	632 767	1	358 425	-	-
23	-	-	-	-	-	-	-	-
24	1	659 206	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-
total	147	161 107	73	114 916	50	281 106	19	-

## Survivors

Age	Public sector				Private sector			
	Male Number	Average amount of pension	Female Number	Average amount of pension	Male Number	Average amount of pension	Female Number	Average amount of pension
20	-	-	-	-	-	-	-	-
21	-	-	1	22 844	-	-	-	-
22	-	-	2	12 264	-	-	-	-
23	-	-	-	-	-	-	-	-
24	-	-	1	10 395	-	-	-	-
25	-	-	1	11 758	-	-	-	-
26	-	-	-	-	-	-	-	-
27	-	-	1	16 979	-	-	-	-
28	-	-	1	14 059	-	-	-	-
29	-	-	1	25 218	-	-	-	-
30	-	-	1	61 773	-	-	-	-
31	-	-	-	-	1	13 266	-	-
32	-	-	2	17 105	-	-	-	-
33	-	-	3	13 244	-	-	-	-
34	-	-	7	32 922	-	-	-	-
35	-	-	1	14 181	-	-	-	-
36	-	-	2	16 201	-	-	-	-
37	1	10 122	3	30 485	-	-	-	-
38	-	-	1	13 327	-	-	1	23 936
39	-	-	3	82 960	1	10 962	1	61 723
40	-	-	3	41 732	-	-	3	31 690
41	-	-	-	-	-	-	-	-
42	-	-	3	21 851	-	-	4	74 133
43	-	-	2	53 401	-	-	-	-
44	-	-	4	18 286	-	-	-	-
45	-	-	2	30 910	-	-	1	17 482
46	-	-	1	16 465	-	-	-	-
47	-	-	3	36 993	-	-	-	-
48	-	-	2	46 440	-	-	-	-
49	1	32 371	2	88 806	-	-	1	88 718
50	2	38 514	-	-	-	-	-	-
51	-	-	1	17 001	-	-	-	-
52	-	-	4	64 598	-	-	-	-
53	1	40 927	-	-	-	-	-	-
54	1	45 804	1	26 023	-	-	-	-
55	-	-	-	-	-	-	1	8 000
56	-	-	1	31 849	-	-	-	-
57	-	-	2	12 462	-	-	-	-
58	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-
60	1	23 853	1	17 393	-	-	-	-
total	1	10 122	46	29 156	2	12 114	10	-

## Invalidity

Age	Public sector				Private sector			
	Male Number	Average amount of pension	Female Number	Average amount of pension	Male Number	Average amount of pension	Female Number	Average amount of pension
35	-	-	-	-	-	-	-	-
36	-	-	-	-	-	-	-	-
37	-	-	-	-	1	30 058	-	-
38	-	-	-	-	1	20 000	-	-
39	-	-	-	-	-	-	-	-
40	1	20 000	-	-	-	-	-	-
41	-	-	-	-	1	45 472	-	-
42	-	-	1	61 779	-	-	-	-
43	-	-	-	-	-	-	-	-
44	-	-	-	-	-	-	-	-
45	-	-	1	47 055	1	22 712	-	-
46	-	-	-	-	1	127 547	-	-
47	1	77 985	-	-	-	-	-	-
48	-	-	-	-	1	240 574	-	-
49	-	-	-	-	2	40 815	-	-
50	-	-	-	-	1	78 292	-	-
51	1	71 578	-	-	1	80 555	-	-
52	-	-	-	-	-	-	-	-
53	1	165 883	1	67 273	-	-	-	-
54	1	196 967	-	-	-	-	-	-
55	-	-	-	-	1	61 600	-	-
56	-	-	-	-	-	-	-	-
57	-	-	-	-	-	-	-	-
58	-	-	-	-	-	-	-	-
59	1	55 373	-	-	1	60 518	-	-
60	-	-	-	-	-	-	-	-
total	6	97 964	3	58 702	12	70 746	-	-

## Old age

Age	Public sector				Private sector			
	Number	Male Average amount of pension	Female Number	Female Average amount of pension	Number	Male Average amount of pension	Female Number	Female Average amount of pension
55	39	133 248	-	-	2	269 132	1	448 587
56	50	83 852	-	-	4	374 083	-	-
57	88	74 396	2	57 902	11	216 623	2	29 203
58	77	94 583	7	193 747	9	72 582	2	84 566
59	91	93 225	10	125 311	28	171 155	2	182 394
60	188	116 041	29	165 341	103	287 455	11	355 417
61	122	172 368	40	158 445	68	234 573	18	256 880
62	88	137 577	31	178 870	59	160 521	7	218 775
63	30	181 528	9	186 895	20	142 776	3	134 467
64	11	148 204	9	109 542	9	205 868	1	39 290
65	23	201 582	5	180 538	4	270 302	-	-
66	7	244 578	2	200 545	3	176 347	-	-
67	3	233 316	2	125 470	-	-	-	-
68	10	222 944	1	80 640	1	24 841	-	-
69	7	169 293	1	258 710	-	-	-	-
70	3	209 231	-	-	1	43 668	-	-
71	5	160 006	-	-	-	-	-	-
72	4	177 687	-	-	-	-	-	-
73	-	-	1	107 713	-	-	-	-
74	1	259 862	-	-	-	-	-	-
75	1	276 538	1	30 004	-	-	-	-
76	1	110 001	-	-	-	-	-	-
77	1	256 666	1	137 039	-	-	-	-
78	-	-	-	-	-	-	-	-
79	1	150 326	-	-	-	-	-	-
80	-	-	-	-	-	-	-	-
81	1	37 900	-	-	-	-	-	-
82	-	-	-	-	-	-	-	-
83	-	-	-	-	-	-	-	-
84	-	-	-	-	-	-	-	-
85	-	-	-	-	-	-	-	-
86	-	-	-	-	-	-	-	-
87	1	115 466	-	-	-	-	-	-
total	853	126 070	151	160 527	322	221 365	47	245 712