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# Mozambique

## Report to the Government

## Actuarial Review of the National Social Security System (NSSS) as of 31 December 2011

**Public Finance, Actuarial and Statistics Services Branch (SOC/PFACTS)**
**Social Protection Department**
**International Labour Office**

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## Abstract

This report presents the results of the actuarial review of the National Social Security System as of 31 December 2011. It includes projections and recommendations.



**JEL Classification:** H55, G22, J11, E17,

**Keywords:** social security and public pensions, actuarial studies, demographic trends, measurement and data on national income, forecasting and simulation: models and applications

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# Executive summary

This actuarial review covers the five-year period up to 31 December 2011. An actuarial valuation relies on a large number of assumptions. Its results are not forecasts or predictions; they present the outcomes if all the assumptions were to come true in the future. The estimates provide guidance for the financing of the scheme and for the planning and management functions. Sensitivity tests give indications of a range of possible actual outcomes.

## Experience of the NSSS since the last actuarial review

The scope of experience analysis is limited because the previous valuation was performed on a basis that is not generally applied for social security systems, but for occupational pension plans. As the projection of benefits payments has been materially overestimated in the intervaluation period, the reserve at 31 December 2011 is larger than projected.

## Demographic and macroeconomic trends

The Mozambique population is still relatively young; it is expected to slowly age in the next decades as fertility decreases and longevity improves. The ratio of the working-age population to the old-age population will decrease moderately from 10.3 to 5.0 over the next 60 years. Mozambique has many natural resources and their development is expected to generate sustained economic growth. In such a context, increases in productivity, wages and prices are expected to be substantial as compared to developed countries, but uncertainty and volatility are high. The informal sector is still predominant in the labour market and, as no reliable information on long-term possible structural changes is available, maintenance of the status quo is assumed over the projection period. Overall, the demographic and macroeconomic framework is positive for the development of the social security system, and this provides some flexibility on the timing in the review of key parameters of the pension system that long-term financial sustainability would command.

## NSSI demographic and financial projections

The total number of pensioners is projected to increase significantly in the future, from 41,807 in 2012 to 1,306,354 in 2071, while at the same time the number of contributors will increase from 312,465 to 1,557,797. As the system is maturing, the ratio of contributors to pensioners will decrease materially from 7.5 to 1.2 over the next 60 years.

The financial projections reveal that the system's expenditure will exceed contribution income from financial year 2023. The total assets of the NSSI will however continue to increase until 2028. From 2029, assets will rapidly decrease and the NSSI funds will be completely depleted in 2035 if nothing is modified in terms of contributions or benefits of the system. The pay-as-you-go (PAYG) cost rate is projected to increase from its current level of 4.2 per cent in 2011 to 16.1 per cent in 2071. The general average premium of the system (the constant contribution rate necessary to finance all NSSI benefits over the next 60 years) is 11.9 per cent. This may be compared to the present contribution rate of 7 per cent. The results of this valuation are subject to uncertainty due to the limitations of the NSSI database. The situation is expected to improve in the near future further to implementation of computer systems and capacity building of staff.

Although there is no impetus to increase the contribution rate before the results of the next actuarial valuation are available, an illustrative contribution rate schedule applicable in the projection period has been made. Under this scenario, the ratio of assets to expenditures would never decrease below 3.

| Period | Contribution rate (%) |
|---|---|
| 2012 to 2017 | 7.0 |
| 2018 to 2035 | 9.2 |
| 2036 to 2053 | 12.3 |
| 2054 to 2071 | 15.6 |

## Policy issues

### *Branch accounting*

Branch accounting in the NSSI context refers only to the determination of reserves according to the provisions of Decree No. 53/2007 on the System of Compulsory Social Security for Workers. The current accounting procedure is more limited than what is generally considered branch accounting as there is no statement of income and expenditures by branch. The report analyses the current procedure and identifies certain issues. It proposes two sets of recommendations. Application of the first set would require legislative changes, while the second set has been made suitable under the current Decree. It is understood that the NSSI may have more urgent priorities than improving the articles of the Decree dealing with branch accounting, but it would be undesirable to put the proposed fundamental changes aside indefinitely.

### *Extension of coverage to self-employed persons*

The NSSI has been hesitant to implement coverage for the self-employed and has preferred to wait for guidance from the actuarial valuation regarding the contribution rate. The report presents detailed demographic and financial projections based on scarce data and plausible but very uncertain assumptions, especially regarding the evolution of the coverage rate. The financial projections are consistent with those of a starting scheme, as the fund would increase during the full projection period for a contribution rate of 7 per cent. It is recommended to use this contribution rate for both financial and fairness reasons.

### *Design issues*

Several aspects of the design and administrative practices have been analysed. Those having the largest immediate impact deal with pension indexing and revaluation of career earnings for the calculation of the reference salary in the determination of the initial pension.

Pension indexing is subject to the discretion of ministers supervising the NSSI. The current practice consists in increasing all pensions by the nominal amount corresponding to the increase in the minimum pension. The link between the minimum pension and minimum salaries set by the Government has raised some practical difficulties in recent years. The report discusses potential solutions to this issue but more importantly raises concerns about the long-term impact of the current practice on the protection against loss of purchasing power for large pensions. It is recommended that the annual increase in

pensions be made according to the variation of the consumer price index, while ensuring that all pensions will be at least equal to the minimum pension. The financial impact of the change is moderate.

Revaluation of career earnings for pension calculation follows a simplified method. The approximations are valuable for certain career profiles but may create severe distortions in other cases. It is recommended to apply a more accurate formula for equity purposes.

The system covers the earnings in total without limit both for contributions and the calculation of earnings-related benefits. The absence of limit may cause some redistribution towards high earners and it is recommended to establish a ceiling. This should be set in such a manner that a significant proportion of all workers would have their earnings covered by the system. The level should be determined by consensus among stakeholders. It should take into consideration the long-term objectives of the country in terms of the balance between the public and the private sector in the matter of pension systems. The report presents the financial impact of a scenario where the earnings ceiling would represent about two-and-a-half times average earnings.

For persons unable to comply with the requirements other than attainment of the specified age for eligibility of a retirement or survivors' pension, a grant is available until 2017. The NSSI is concerned about the abolition of this benefit. The ILO recommends that the provision regarding retirement and survivors' grants be maintained indefinitely.

The accrual rate of pensions at 2.5 per cent per year of service is high according to international standards. Rates between 1.5 and 2.0 per cent are more usual. Besides, the retirement age is low and discriminates by gender. The results of this valuation do not indicate a need to make immediate changes to those parameters on financial grounds, but given the long-term trends the need for change will eventually become clear. Changes in the parameters, especially the retirement age, must be planned far in advance so that individuals can plan their retirement accordingly. Gender discrimination in the retirement age is however a social issue that should be addressed promptly.

### *Actuarial bases for transfer of liabilities*

In certain circumstances, the NSSI may be asked to determine the amount needed to cover the cost of pension rights for which employers are liable. It has to determine the fair cost so that the system does not suffer a financial loss from the acceptance of the transferred liabilities. This kind of operation can be achieved most of the time through the application of factors representing the present value per unit of pension. The determination of a simple set of fair values causes some difficulties due to the current indexing formula which makes the factors subject to the level of pensions. Different approaches are analysed.

The payment of a lump sum may not be a realistic solution for workers to buy back service. This may happen when a worker is given an option to compensate for failure to comply with eligibility conditions. An alternative to this approach, consisting in reduction factors applicable to pensions, has been analysed.

Illustrative quantitative values have been presented at certain ages only and the ILO will make the complete tables available upon request, if the NSSI elects to go forward with the proposals.

### *Health and social actions*

The programme of health and social actions is limited in scope. Given its small financial impact, it has not been considered explicitly in the projections. Though probably justified on social protection principles, the presence of this programme in a contributory pension system rather than in another area of social protection financed through general revenues is questionable.

### *Investment policy*

The absence of an investment policy precludes the optimal use of funds available for investments. This actuarial valuation should provide sufficient information regarding the estimated size of the fund in the next decades, so long as the NSSI long-term strategy regarding the balance between contribution income and benefits is defined. This information is the starting point for the development of the investment policy.

The development of an investment policy is not in itself a guarantee of success in obtaining higher yields through investments in riskier and more volatile assets. Sophisticated expertise is needed to reach ambitious targets and the NSSI will have to identify its ability to develop and maintain such expertise in a local modest financial market. One of the decisions to be made is the balance between outsourcing and internal expertise. It can be expected that the investment policy will respond not only to theoretical financial considerations but will also be influenced by the NSSI's position regarding its management.

### *Administrative expenditures*

The level of administrative expenditures has been decreasing in relative terms and it is expected that the limit stipulated in the Decree will be respected. The limit is however far from the benchmarks in developed countries and should be periodically revised to promote sustained improvement in administrative efficiency.

## List of recommendations

1. It is recommended to maintain the total contribution rate at 7 per cent until 2017.

2. It is recommended to improve the data collection and validation system for the purpose of actuarial valuations.

3. It is recommended that the NSSI develop a long-term strategy for future rate increases that would set the target ratio of assets to expenditures.

4. It is recommended under the current legislation to allocate the contribution rate among funds as follows:

   – Sickness and maternity: 0.20 per cent

   – Death benefits and funeral subsidy: 0.50 per cent

   – Pensions: 5.25 per cent

   – General: 1.05 per cent

5. It is recommended to reinforce the branch accounting through implementation of following measures among others:

- Abolition of the general reserve (the pension reserve turns into a balancing item)
- Implementation of a statement of income and expenditure for each fund
- Allocation of investment income by fund according to the size of funds
- Allocation of administrative expenditures by fund according to contribution income and benefits expenditures in proportions to be determined

6. It is recommended that the contribution rate for self-employed persons be 7 per cent. Its distribution by fund should be similar to that of salaried workers.

7. It is recommended to change the administrative practice in the matter of pension indexing. All pensions should be indexed according to the variation in the price index or a combination of price and wage index. No pension should be smaller than the minimum pension except in special circumstances involving actuarial equivalence factors as described in No. 11 below.

8. It is recommended to redefine the evolution of the minimum pension according to prevailing practices in the determination of minimum salaries by industry.

9. It is recommended to improve the accuracy of the career average revalued earnings calculation through application of the proper indexing factor to earnings of each year.

10. It is recommended to implement a maximum insurable earnings definition that is consistent with guidance provided in the ILO Social Security (Minimum Standards) Convention, 1952 (No. 102).

11. It is recommended to use the actuarial bases of this valuation in determining present values of pensions for the purpose of transfer of liabilities.

12. It is recommended to accept during a limited window period that employers joining the system pay for the past years on the basis of a contribution rate of 7 per cent and the current earnings of workers.

13. It is recommended that workers unable to comply with the minimum registration period for eligibility to a retirement pension have the option to receive a reduced pension.

14. It is recommended to define the investment policy taking into consideration the pattern of evolution of the fund as well as the resources required for its application.

15. It is recommended to continue the efforts to reduce the ratio of administrative expenditures to contributions below the target in the law.

## Abbreviations and acronyms

| | |
|---|---|
| AIDS | Acquired Immune Deficiency Syndrome |
| CIPRES | Conférence interafricaine de la prévoyance sociale |
| CPI | Consumer Price Index |
| GAP | General Average Premium |
| GDP | Gross Domestic Product |
| HIV | Human Immunodeficiency Virus |
| IISLP | International Institute for Social Law and Policy |
| ILO | International Labour Office |
| ILO PFACTS | Public Finance, Actuarial and Statistics Services Branch |
| INE | National Institute of Statistics (Instituto Nacional de Estatística) |
| MT | METICAL |
| NSSI | National Social Security Institute |
| NSSS | National Social Security System |
| PAYG | Pay-as-you-go |
| PV | Present value |
| SEP | Self-Employed Persons |
| TFR | Total fertility rate |
| UN | United Nations |

# Introduction

The Minister of Labour requested the International Labour Office (ILO) to carry out the actuarial valuation of the National Social Security System (NSSS). The National Social Security Institute (NSSI) administers the NSSS. The present actuarial review covers the five-year period up to 31 December 2011. The main objectives of this review are to assess the long-term financial sustainability of the NSSS and consider appropriate measures based on the findings. The present report focuses as well on certain specific issues raised at the request of the NSSI.

This report has been prepared by the ILO based on the information provided by the NSSI. The Director-General of the ILO appointed Mr. Gilles Binet, Senior Actuary, and Ms. Doan-Trang Phan, Actuary, to complete the actuarial valuation and to prepare the draft of the present report under the general and technical supervision of Mr. Hiroshi Yamabana, ILO Public Finance, Actuarial and Statistics Services Branch (ILO SOC/PFACTS) and with the support of Mr. Nuno Cunha, ILO STEP Programme Coordinator in Mozambique. The actuaries worked in close cooperation with Mr. Mario Madime, Head of Planning and Statistics at the NSSI.

Mr. Binet and Ms. Phan were on mission in Maputo from 14 to 26 May 2012 to gather and study statistical data and information on the social security system, all of which was ably supplied by NSSI staff. A second mission took place from 15 to 22 November 2012 to complete the data collection, clarify certain legal issues, discuss a partial draft report and provide training on the ILO pension model. The model of ILO SOC/PFACTS was used to prepare the demographic and financial projections associated with the actuarial review.

Section 1 of the report presents a review of the experience of the five-year period from 1 January 2007 to 31 December 2011. Section 2 describes the projection of the general population and the macroeconomic framework used for the valuation. Section 3 presents the NSSI demographic and financial projections on the basis of the present provisions of the scheme. Section 4 analyses different policy issues and administrative practices. The appendices contain a summary of key NSSI contribution and benefit provisions, a description of the methodology used for the valuation, key data inputs and assumptions and detailed information on NSSI finances for the five-year period ending on 31 December 2011.

The Director-General of the ILO would like to express his appreciation to Mr. Baptista Ismael Machaieie, Director General of the NSSI, and its Executive Committee, particularly particularly Mr. Celso Tomás, Director of Social Security, and Mr. Mario Madime, Director of Studies and Cooperation, for the cooperation of the Institution in providing information and timely support to the actuaries.

# 1. Review of the experience of the NSSS since the previous actuarial review

This section discusses the evolution of the financial situation of the NSSS fund from 31 December 2006 (effective date of the previous actuarial valuation) to 31 December 2011. At the time of completing this report, only estimates of financial results for the year 2011 were available. Because the actuarial valuation focuses on long-term trends rather than short-term accuracy, it has been considered reasonable to use the 2011 estimates after validation of their consistency.

The scope of the reconciliation of the experience and this actuarial valuation's projections with the 2006 actuarial valuation's projections is limited as compared to usual practice for the following reasons:

- The previous actuarial valuation, performed by a private firm, was based on the premise that the NSSS should be fully-funded. This is not consistent with general practice in social security and with the original and current intentions of the Government. Therefore, certain financial information available in the 2006 valuation report is not readily comparable to results in financial statements and those of the current valuation that are based on a different premise.

- The 2006 actuarial report has very little information on the evolution of beneficiary counts. This could be related to the poor quality of the database as, in such circumstances, actuarial analyses generally focus on aggregate results. It was considered neither feasible nor essential to contact the actuaries in order to obtain more detailed projections.

The experience review is subject to uncertainty for another reason. The independent auditor of the financial statements of the NSSI in the intervaluation period was not in a position to fully confirm their exactness because of lack of information. This qualification of the financial statements has no impact on the key data used in the experience review and is therefore irrelevant for the present purpose.

## 1.1. Legislative changes to the NSSS since the previous actuarial review

Substantial legislative changes have been implemented since the 2006 actuarial valuation. A Social Protection Act was adopted in February 2007 and the Regulation regarding the compulsory social security system was adopted in December 2007. The main changes in the design of benefits are the following:

*Retirement benefits*

– Change of the benefit formula. The accrual rate in the previous formula was 40 per cent for 20 contribution years plus 1 per cent for each additional contribution year. The reference salary was the average of the last two years before retirement. According to the new formula, it is possible to receive a pension after 10 years of contribution if the 20-year registration condition is met. The accrual rate is now uniform at 2.5 per cent per contribution year, but it is applicable to an indexed average salary. The number of years for the calculation of the average salary was 10 in 2008 and it is increased by one every year until it reaches 20 in 2017.

*Invalidity benefits*

– The benefit formula was changed to align with the retirement pension benefit formula. The definition of invalidity has changed. The new one stipulates that the loss of earnings capacity must be total, while the previous one accepted a residual capacity up to a third of the remuneration. Besides, the incapacity had to be permanent according to the 1989 regulation while that of 2007 does not include that condition.

*Survivors' benefits*

– The pension benefit formula was changed to align with the retirement pension benefit formula. The reduced pension paid to survivors of contributors who did not meet the eligibility criterion of 60 contribution months was abolished. However, a lump sum is now paid to survivors of all pensioners and contributors registered for at least three years and with six contribution months in the year preceding death.

*Funeral grant*

– This is a new benefit. At the death of a pensioner and an active worker who contributed during at least three months, a funeral grant (MT 3,000 in 2011) is paid.

*Maternity benefits*

– This is a new benefit. A maternity subsidy equivalent to 60 days of salary is granted at childbirth.

There is no formal actuarial valuation providing an estimate of the financial impact of the changes in regulations. Therefore, it is impossible to identify the part of experience deviations in the intervaluation period related to legislation changes and that related to normal statistical deviations.

The regulation changes have apparently weakened the governance rules regarding the realization of actuarial valuations. Article36 of the previous regulation stipulated that an actuarial analysis had to be completed at least every five years. There is no such requirement in the current regulation, but Section 111 stipulates that an actuarial analysis can modify the calculation formula of reserves and thus indirectly refers to completion of an actuarial valuation. Also, there is apparently some confusion on the prevailing regulation, as the auditor in his report of the 2009 financial statements still referred to Section 36 of the previous regulation for his statement on the reasonableness of reserves. Governance principles require the inclusion in the legislation of social security systems of the obligation of completing actuarial valuations at regular intervals. Therefore, an amendment to the regulation is necessary.

## 1.2. Analysis of the experience of the NSSI for the period 2007 to 2011 and comparison with projections

Table 1.1 presents the principal components of revenues and expenditures. Minor items that cannot be included in main categories have been left aside. At the time of writing this report, data for 2011 are not official and include estimates by the author.

Projections of the 2006 actuarial valuation were carried out based on the so-called Static Fund assumption under which the number of contributors is assumed to remain constant over the projection period. Contributors leaving the system at the times of retirement, death or disability are replaced by an exact same number of new entrants. Actuarial valuations of social security schemes should assume the growth of the insured population in line with employment growth in the economy.

Certain items in the NSSI financial statements have been rearranged in order to simplify the presentation and make them consistent with general practice:

1. Amortization costs have been added to administrative expenditures.

2. In 2008, the investment earnings have been reduced by the provision for the anticipated loss on investment in the *Banco Mercantil e de Investimentos*.

**Table 1.1. Comparison of projected versus actual results of the NSSI regarding main components of revenue and expenditure, 2007–11** (MT millions)

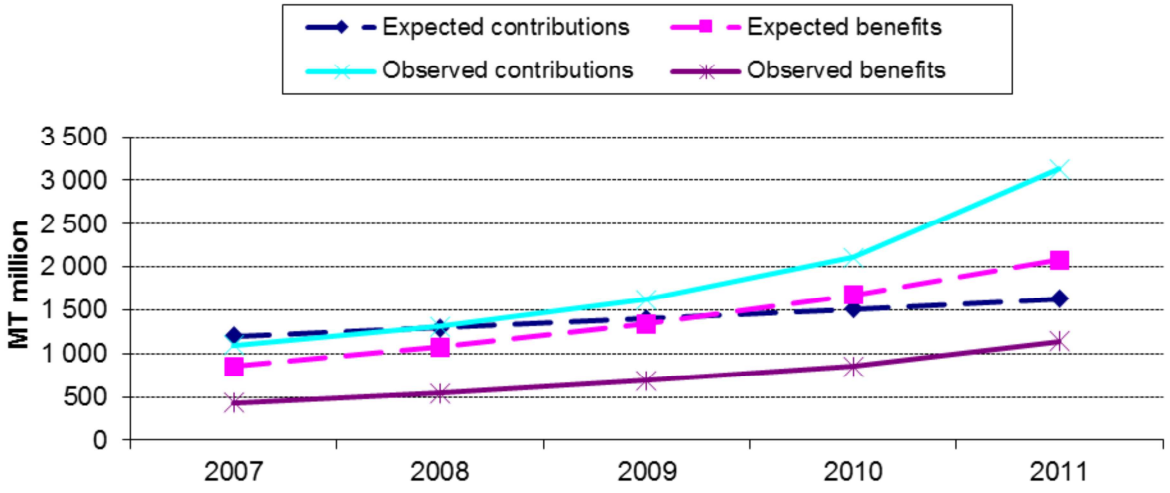
| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| **Projections of the 2006 Actuarial Review*** | | | | | |
| Contribution income | 1 201 | 1 296 | 1 400 | 1 511 | 1 631 |
| Investment income | 196 | 222 | 236 | 229 | 191 |
| Benefit expenditure | 850 | 1 072 | 1 341 | 1 675 | 2 082 |
| Administrative expenses | 305 | 330 | 356 | 384 | 415 |
| **Actual results **** | | | | | |
| Contribution income | 1 094 | 1 312 | 1 624 | 2 111 | 3 127 |
| Investment income | 192 | 164 | 464 | 542 | 945 |
| Benefit expenditure | 431 | 539 | 688 | 852 | 1 143 |
| Administrative expenses | 397 | 403 | 535 | 647 | 746 |

* Actuarial valuation of the NSSI as at 31 December 2006, Phase B report, Appendix 7: Cash flow projections, p. 44.

** NSSI 2007 to 2009 audited financial statements for 2007 to 2009, NSSI 2010 preliminary financial statements, NSSI 2011 budget realization and calculation by author.

Figure 1.1 shows the comparison of expected and observed contributions and benefits in the past years.

**Figure 1.1. Evolution of contributions and benefits, 2007–11**




Totally different patterns of contributions and benefits are seen between the past experiences and the projections. While the expected and observed contributions are fairly

close at the start of the projection period and diverge gradually, the gap between the observed benefits and those expected is substantial even in the first projection year and continues to increase. The deviations in benefits are the main source of the deviations between the expected and the observed reserves shown in table 1.2. The reason for deviations in contributions is related to the static projection methodology used for the last valuation.

Table 1.2 presents a comparison of the NSSI's projected and actual reserves. For the purpose of this exercise, the total *Situaçao Liquida* has been considered as the reserves. In the 2006 valuation report, there is no specific reference to the source of the amount selected as the starting reserves in 2006. There is a material difference of MT 294 million between the reserves used in the actuarial valuation and those in the financial statements. A possible explanation could be that estimated reserves were used in the previous valuation due to non-availability of the official financial statement.

**Table 1.2. Evolution of reserves as at 31 December, 2006−11** (MT millions)

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| Projections of the 2006 actuarial valuation | 1 613 | 1 855 | 1 971 | 1 910 | 1 591 | 916 |
| Actual results (excluding capital reserve)* | 1 864 | 2 348 | 2 977 | 3 922 | 5 388 | 7 383 |
| Ratio actual / projection of the 2006 valuation (%) | 116 | 127 | 151 | 205 | 339 | 806 |

* The value for 2010 is unaudited while the value for 2011 is an estimate.

The observed reserves are larger than those expected for the whole period. This is because the excess of revenues over expenditures has been consistently larger than expectations, mainly due to overestimated benefits. In addition, the conservative static insured population assumption contributed to the underestimated contribution income. The investment income has been higher in the past than the estimation. This is not due to the higher rate of return, but to the larger accumulated reserves because of favourable cash flow. The observed geometric average rate of return of the reserve[1] has been 11.7 per cent while the projection assumption was 12 per cent. Observed investment rates of return have been moderately volatile, varying between 8.5 and 15.2 per cent. Administrative expenditures have been consistently higher in the past than the projection.

Finally, the projected fund depletion by 2012 is not expected to materialize.

## NSSS demographic data

Projections of neither contributors nor pensioners are available in the last valuation. Despite the absence of comparison, it is important to analyse past trends. Figure 1.2 shows the evolution of contributors and pensioners (total numbers of old-age, invalidity and survivors' pensioners) observed since 2006. Substantial increases have been observed during the period, namely 64 per cent for contributors and 61 per cent for pensioners in the past five years.

[1] Calculated as 2 x I / (A + B - I), where I is the annual investment income, A is the reserve at beginning of the year and B is the reserve at the end of the year.

Detailed information by type of pension is available in Appendix 4. The number of pensioners in 2006 coincides with the number reported in the 2006 valuation, while the number of contributors is slightly higher in figure 1.2 than in the 2006 valuation report.

**Figure 1.2. Contributors and pensioners, 2006−11**

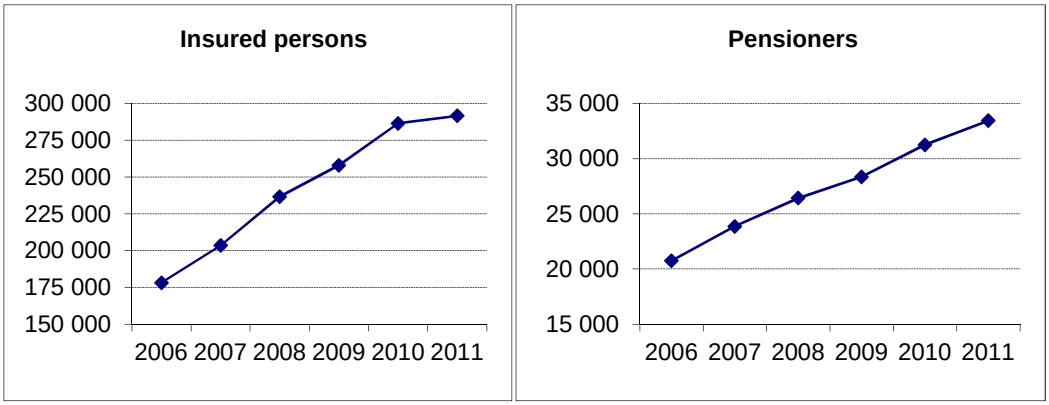
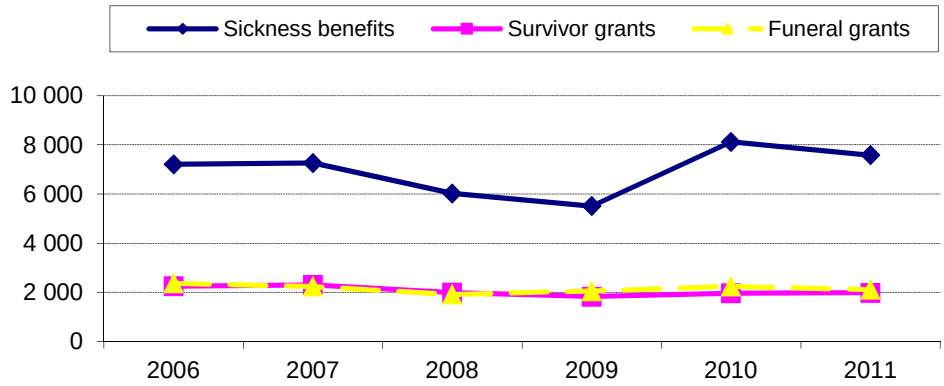



Figure 1.3 shows the number of benefit recipients for sickness benefits and grants awarded at death of contributors and pensioners.

**Figure 1.3. Sickness benefits and death grants, 2006−11**




The maternity benefits only began in 2008, and the experience has not apparently stabilized yet, as can be seen in table 1.3.

**Table 1.3. Maternity benefits, 2008−11**

| | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| Number of beneficiaries | 94 | 552 | 1,204 | 871 |

# 2. Demographic and macroeconomic environment of Mozambique

The future income and expenditure of the NSSI will be closely linked to changes in the size and age structure of the population of the country, employment levels, economic and wage growth, inflation, and rates of return on investments. Therefore, in order to estimate future NSSI finances, a projection of Mozambique's total population and economic activity is required. Demographic projections provide estimates of the size and composition of the labour force, while projections of the gross domestic product (GDP) and the growth of labour productivity are necessary to project the number of workers and their earnings. Population and economic projections are interrelated. They are thus performed together to ensure consistency of results.

Demographic and macroeconomic variables were projected for a period of 60 years, following an analysis of past trends and an estimate of plausible future experience. Population and economic projections are an intermediary step to derive NSSI projections.

## 2.1. Population projection

The determinants of future population changes are fertility, mortality and net migration. Fertility rates determine the number of births, while mortality rates determine how many, and at what ages, people are expected to die. Net migration represents the difference between the number of people who permanently enter and leave Mozambique and is the most volatile of the three factors.

The last official population census took place in 2007, when the resident population was estimated at 20,632,434. Estimations of the population made by the National Institute of Statistics (INE) for the period 2007 to 2060 were used.[2] For the purpose of this valuation, projections for the additional projection period were made by assuming that the trends of each determinant would remain till 2071. It is noteworthy that INE population projections were performed separately for the urban and rural areas.

### Fertility

The total fertility rate (TFR) represents the average number of children each woman of childbearing age would have if she had all her children in a particular year. If there is no migration, a TFR of 2.1 is required for each generation to replace itself. The TFR in Mozambique is relatively high, at 5.4 in 2011. According to INE projections, it decreases to 3.3 in 2040 and 2.3 in 2060. It has been assumed that it would reach 2.1 in the last projection year (2071).

### Mortality

Life expectancy at birth is low, at 48.8 and 52.9 for males and females respectively in 2007. Improvement of mortality in urban areas for the period from 2007 to 2017 is assumed to be equal to the observed improvement in the City of Maputo between 1997 and 2007. For the rural areas, the 2017 mortality has been assumed to be that of urban areas in 2007. INE made projections till 2060 according to different formulae and assumptions. For the rest of the projection period (2061−71), life expectancy and improvements in

[2] Detailed results are available for 2007−2040 in Instituto Nacional de Estatistica: *Projecçoes Anuais da Populaçao Total Urbana e Rural 2007−2040* (Maputo, 2010).

mortality are assumed to occur in accordance with UN estimates, taking into consideration the trends in previous years in INE projections.

Deaths due to HIV and AIDS are implicitly considered in the projections. Prevalence is high in Mozambique and affects the economy not only in terms of mortality but also in terms of work absenteeism. Information published in a study on the prevalence of HIV[3] was used by INE to ensure that mortality rates are consistent with the findings of the study.

## Migration

Data on international migration are non-existent in Mozambique. INE has analysed the internal migration phenomenon between the 1997 and 2007 censuses and concluded that international migration was the major factor explaining the mismatch between the expected population and that observed. Net migration was negative in 2007 but very small as a percentage of the total population (less than 0.1 per cent). The population projections presume that net migration in absolute value will decrease linearly from the level observed in 2007 to 2030 and will thereafter remain at zero.

Table 2.1 shows key demographic assumptions for selected projection years.

**Table 2.1. Demographic assumptions, selected years 2011−71**

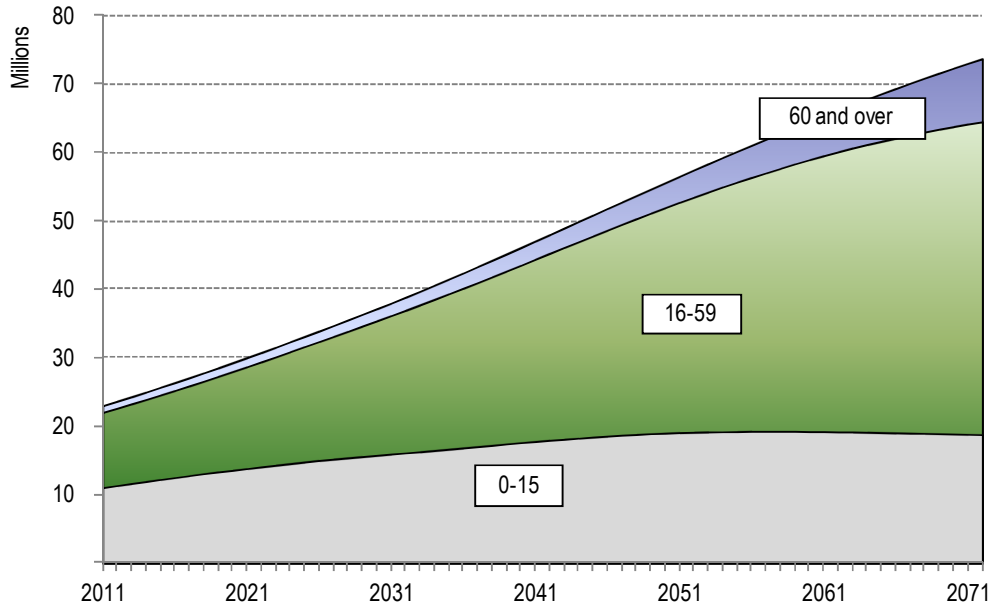
| Year | Total fertility rate | Life expectancy at birth | | Net migration |
|---|---|---|---|---|
| | | Males | Females | |
| 2011 | 5.4 | 50.3 | 54.5 | -1 770 |
| 2021 | 4.6 | 54.6 | 59.0 | -842 |
| 2031 | 3.9 | 60.1 | 64.7 | 0 |
| 2041 | 3.2 | 64.4 | 69.2 | 0 |
| 2051 | 2.7 | 67.0 | 72.0 | 0 |
| 2061 | 2.3 | 69.0 | 74.1 | 0 |
| 2071 | 2.1 | 70.8 | 75.8 | 0 |

## Projected population

Figure 2.1 presents the projected population of Mozambique from 2011 to 2071, separated into three age groups: children (0−15), working population who can potentially contribute to the NSSS (16−59) and persons of pensionable age (60) and over. Although the population is gradually ageing over the projection period, the evolution of the relative size of the age groups indicates that the ageing process is not rapid.

[3] INSIDA: *Inquerito Nacional de Prevalencia, Riscos Comportamentarios e Informaçao sobre o HIV e SIDA em Mocambique* (Maputo, 2009).

**Figure 2.1. Projected population of Mozambique, by age group, 2011−71**




In the population projections in table 2.2, it is observed that the total population will increase steadily from 23,049,621 in 2011 to 73,113,265 in 2071. The number of persons of pensionable age (60 and over) will grow from 1,072,565 in 2011 to 9,063,961 in 2061. The ratio of persons of working age to those of pensionable age will thus fall from 10.3 to 5.0 over the projection period.

**Table 2.2. Projected population of Mozambique, 2011−71**

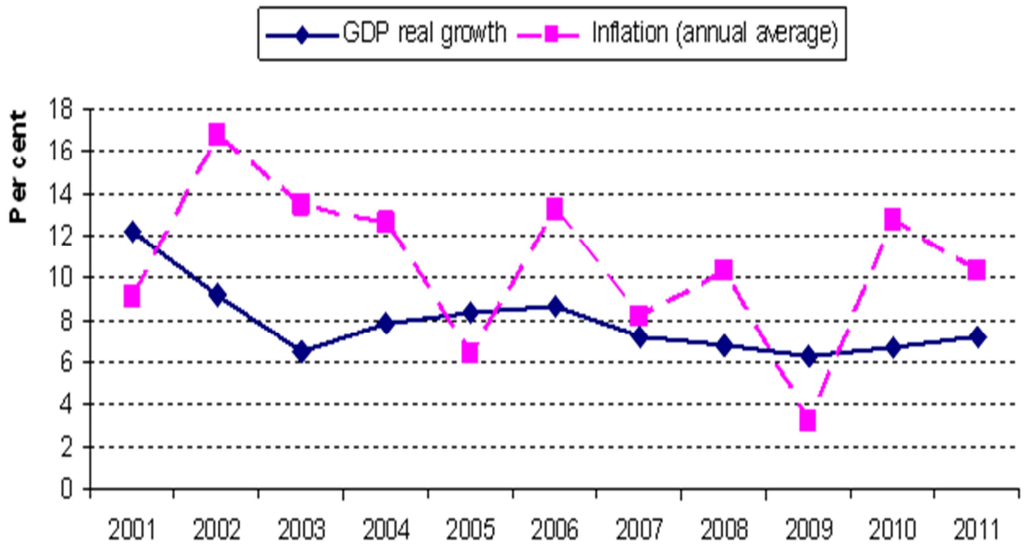
| Year | Total | Age | | | Ratio of persons 16-59 to 60 & over |
|---|---|---|---|---|---|
| | | 0-15 | 16-59 | 60 & over | |
| 2011 | 23 049 621 | 10 973 767 | 11 003 289 | 1 072 565 | 10.3 |
| 2021 | 30 061 139 | 13 733 904 | 14 924 308 | 1 402 927 | 10.6 |
| 2031 | 38 063 907 | 15 833 684 | 20 286 807 | 1 943 416 | 10.4 |
| 2041 | 47 130 044 | 17 674 909 | 26 669 708 | 2 785 428 | 9.6 |
| 2051 | 56 600 836 | 18 964 274 | 33 697 806 | 3 938 756 | 8.6 |
| 2061 | 65 441 028 | 19 106 335 | 40 372 146 | 5 962 547 | 6.8 |
| 2071 | 73 113 265 | 18 716 700 | 45 382 604 | 9 013 961 | 5.0 |

## 2.2. Macroeconomic framework

### Economic growth

The Mozambique economy has been growing fast for two decades. In the period 2001−11, annual GDP growth rate averaged 7.9 per cent. It is expected to remain near 8 per cent over the mid-term on account of activities in natural resources. Figure 2.2 shows that inflation has been high in the period, with an average of 10.5 per cent.

**Figure 2.2. Key economic indicators, 2001−11**




Mozambique benefits from important natural resources including coal, natural gas, ore deposits, forestry reserves and hydro power generation capabilities. The country's youthful population, reflecting potential for social and economic dynamism, its geographical positioning and economic diversification as well as political stability are also considered strengths and opportunities for Mozambique's economic development. However, the country faces important challenges and weaknesses such as lack of efficiency, corruption, inadequate infrastructure, weak institutional and human capacity and an underdeveloped private sector.[4] Overall, it seems that conditions for long-term sustained economic growth are present in Mozambique, but the framework to ensure that it will materialize into sustainable social development appears to be a work in progress for which the end result is uncertain.

For the present valuation, an expected real GDP growth of near 8 per cent for the mid-term has been considered a reasonable assumption in the economic framework. The long-term GDP growth assumption is the result of assumptions on the future evolution of the labour force, the employment and labour productivity. The evolution of the labour force is the result of the population projection and assumptions regarding the participation rates mentioned below. Annual labour productivity has been set to increase from its 2011 level at 4.2 per cent to 4.5 per cent in 2013, which corresponds to 7.6 per cent GDP growth in that year, and remains constant thereafter. Table 2.3 shows the real GDP growth and the increase of the number of workers for selected years.

[4] African Development Bank Group: *Republic of Mozambique: Country Strategic Paper 2011−2015* (Tunis, 2011).

**Table 2.3. Projected GDP growth and total employment, selected years 2011−71 (percentages)**

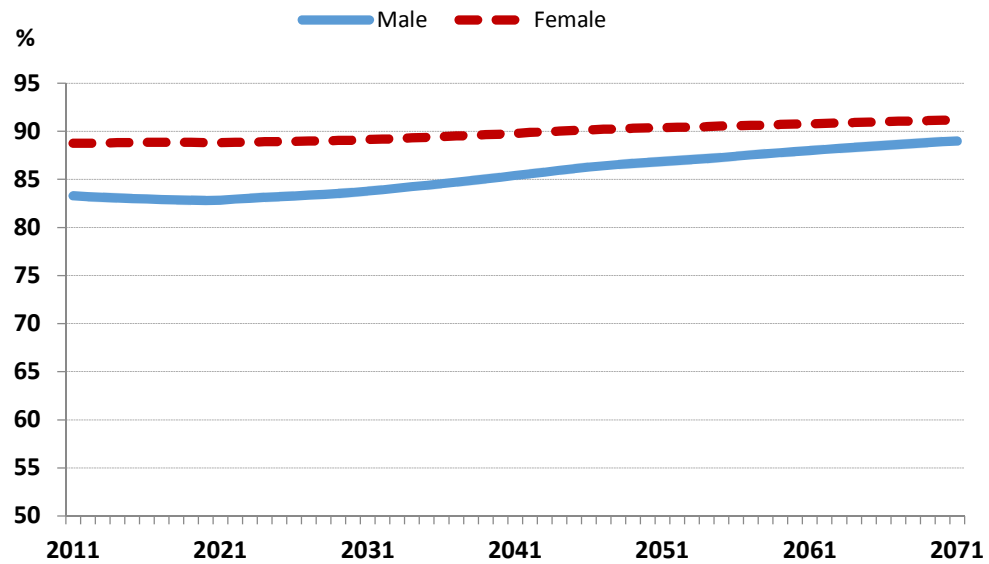
| Year | Real GDP growth (%) | Increase in the number of workers (%) |
|---|---|---|
| 2011 | 7.2 | 2.9 |
| 2021 | 7.8 | 3.2 |
| 2031 | 7.7 | 3.1 |
| 2041 | 7.4 | 2.8 |
| 2051 | 7.0 | 2.4 |
| 2061 | 6.4 | 1.8 |
| 2071 | 5.8 | 1.3 |

## Labour force

Table 2.4 presents the labour market balance over the projection period. Data on labour force and its characteristics have been mainly extracted from the INE report covering the years 2004 and 2005. [5] The ILO database (LABORSTA) has also been used when the required information was not available in the INE report. The concept of unemployment used in the INE report is different from the usual one in that it includes people not employed and not seeking employment at the time of inquiry. Though this approach may be useful for certain studies, it has been necessary for the purpose of this valuation to rearrange the data in order to apply the concept used in the ILO model.

For the future, it is assumed that gender- and age-specific labour participation rates will stay constant at their level of 2004/05 for the entire projection period. Under this scenario, the total participation rate for ages 15−69 increases from 83 to 89 per cent for males and from 89 to 91 per cent for females over the projection period (figure 2.3).

**Figure 2.3. Projected total participation rates, by sex, 2011−71**




[5] National Institute of Statistics: *Inquiérito integrado à força de trabalho (IFTRAB 2004/05), Relatorio final* (Maputo, 2006).

The age-specific employment rates based on IFTRAB data have been kept constant for each sex during the total projection period. The distribution of the employed population between the salaried and the self-employed stays constant during the period. Salaried workers represent 19.9 per cent of the male employed population, and the corresponding proportion for females is 4.2 per cent. It can be expected that such proportions will increase with the economic development of the country but no study on this issue is available. Due to the particular definition of the employed population in the IFTRAB report, the unemployment rate is determined as a residual item in this projection. The decreasing trend in the unemployment rate is uniquely due to the change in the age composition of the active population.

**Table 2.4. Labour market balance, 2011−71 (in thousands)**

| | 2011 | 2021 | 2031 | 2041 | 2056 | 2071 |
|---|---|---|---|---|---|---|
| **Total population** | **23 050** | **30 061** | **38 064** | **47 130** | **61 138** | **73 113** |
| Male | 11 108 | 14 550 | 18 508 | 22 999 | 29 914 | 35 801 |
| Female | 11 941 | 15 511 | 19 556 | 24 131 | 31 224 | 37 312 |
| **Population 15-69** | **12 173** | **16 478** | **22 338** | **29 335** | **41 319** | **51 987** |
| Male | 5 709 | 7 808 | 10 702 | 14 175 | 20 228 | 25 622 |
| Female | 6 464 | 8 671 | 11 636 | 15 160 | 21 090 | 26 365 |
| **Labour force** | **10 490** | **14 167** | **19 336** | **25 718** | **36 782** | **46 841** |
| Male | 4 755 | 6 467 | 8 965 | 12 106 | 17 682 | 22 798 |
| Female | 5 736 | 7 701 | 10 371 | 13 612 | 19 101 | 24 043 |
| **Total participation rate** | **86%** | **86%** | **87%** | **88%** | **89%** | **90%** |
| Male | 83% | 83% | 84% | 85% | 87% | 89% |
| Female | 89% | 89% | 89% | 90% | 91% | 91% |
| **Total employed** | **9 469** | **12 777** | **17 431** | **23 210** | **33 381** | **42 759** |
| Male | 4 271 | 5 797 | 8 023 | 10 851 | 15 950 | 20 693 |
| Female | 5 199 | 6 980 | 9 408 | 12 359 | 17 431 | 22 065 |
| **Salaried** | **1 244** | **1 685** | **2 317** | **3 113** | **4 535** | **5 852** |
| Male | 948 | 1 287 | 1 781 | 2 409 | 3 541 | 4 594 |
| Female | 296 | 398 | 536 | 704 | 994 | 1 258 |
| **Self-employed** | **8 225** | **11 092** | **15 114** | **20 097** | **28 847** | **36 907** |
| Male | 3 323 | 4 510 | 6 242 | 8 442 | 12 409 | 16 099 |
| Female | 4 903 | 6 582 | 8 872 | 11 655 | 16 437 | 20 808 |
| **Unemployed** | **1 021** | **1 390** | **1 905** | **2 508** | **3 401** | **4 082** |
| Male | 484 | 669 | 942 | 1 255 | 1 731 | 2 105 |
| Female | 537 | 721 | 963 | 1 253 | 1 670 | 1 977 |
| **Unemployment rate** | **9.7%** | **9.8%** | **9.9%** | **9.8%** | **9.2%** | **8.7%** |
| Male | 10.2% | 10.4% | 10.5% | 10.4% | 9.8% | 9.2% |
| Female | 9.4% | 9.4% | 9.3% | 9.2% | 8.7% | 8.2% |

## Inflation

A large part of inflation in Mozambique is related to the import of commodities. In the context of sustained economic growth, it is expected that it will remain at high levels.

Convergence between 5 and 6 per cent is expected. For this valuation, it has been set at 7.2 per cent in 2012 and 5.6 per cent in 2013 and remains constant thereafter.

### Wage increases

The real wage increase is assumed to correspond to the productivity increase per worker, based on the assumption that wages will adjust to the efficiency increase over time. Nominal wage increases will thus fluctuate slightly at around 10.4 per cent over the projection period.

### Interest rates and yield on investments

Article 106 of Decree No. 53/2007 stipulates that investment of funds must be made according to liquidity, yield and security principles described in the investment policy. The investment policy must be adopted by the NSSI Board of Directors and approved by the supervising Minister. So far, over 80 per cent funds have been steadily invested in fixed income assets.

The NSSI mandated a private firm to develop an investment policy in the 2006 actuarial valuation. The recommendation was based on premises that the system should be fully funded, and relied on principles in asset and liabilities matching consistent with that approach. The recommended allocation by asset classes was the following: cash (5 per cent), bonds (15 per cent), property (5 per cent) and equity (75 per cent). The high proportion in equity is considered unrealistic in the prevailing financial market and thus the NSSI did not implement the recommended policy.

In this valuation, the investment yield assumption is based on the expected cash flow pattern in the base scenario. Under the current conditions, it is expected that expenditures will exceed contributions in less than 10 years. Five years later, investment earnings would not be sufficient and the fund would start to be depleted. Therefore, it cannot be expected that a long-term investment strategy will be adopted afterwards. Liquidity of assets for benefit payments needs to be carefully taken into account in the mid-term financial strategy.

Because of expected mid-term liquidity requirements, it would not be prudent to move significantly towards the equity-based target that is recommended in the previous valuation even if the market opportunities were present. This strategy would generate volatility in the returns and leave little leeway to manage liquidity requirements. However, a certain move would be advisable if an investigation of financial instruments concludes that the fund's participation in the wealth creation resulting from the expected accelerated development of natural resources in the next decade can meet the scheme's needs and requirements.

Table 2.5 shows the asset allocation and expected real rates of return used in the first and the tenth projection years. The latter is used in the rest of the projection period, but it should not be perceived as a formal recommendation, because a long-term asset allocation should be determined only after actions to avoid fund depletion are determined. The real rates of return of each asset class of the first projection year were determined by taking into account the experience in recent years. Long-term rates of return are based on those used by NSSI in its analysis. Rates were interpolated linearly in projection years between the years 2 and 9. The uncertainty of future investment yields is significant, and sensitivity analysis was carried out on deviations in the future rates of return.

**Table 2.5. Asset allocation and annual rate of return** (percentages)

| Type of investment | Target asset allocation (%) | First projection year | | Target asset allocation (%) | Projected long-term return (10 years and over) | |
|---|---|---|---|---|---|---|
| | | Real | Nominal | | Real | Nominal |
| Equities | 5 | 0.5 | 7.7 | 20 | 6.0 | 11.9 |
| Property and mortgages | 5 | 0.5 | 7.7 | 5 | 5.0 | 10.9 |
| Local fixed-income securities | 15 | 3.5 | 11.0 | 15 | 3.0 | 8.8 |
| Term deposits | 60 | 4.0 | 11.5 | 50 | 3.5 | 9.3 |
| Cash and money market | 15 | 0.5 | 7.7 | 10 | 0.5 | 6.1 |
| **Total** | **100** | **3.1** | **10.5** | **100** | **3.7** | **9.5** |

# 3. NSSI demographic and financial projections

This valuation deals with the ability of the NSSI 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 by the NSSI, namely paying contributions, accruing benefit entitlements and later receiving benefits in accordance with the legal provisions of the scheme. Future contributions and benefits are estimated based on the demographic and economic assumptions presented in Section 2 and the starting data and future assumptions seen in Appendix 3.

The main purpose of the valuation is to find out whether the financing of the NSSS is on the right track, and not to forecast exact numerical values. Due to the long-term nature of the projections, absolute values contain a high degree of uncertainty. However, the global picture of the finance and the main financial indicators such as the demographic ratio and the financial ratio will be more stable in spite of different future assumptions. Therefore, results should be interpreted carefully; future actuarial reviews undertaken on a regular basis will allow validation of the assumptions in the light of the actual experience.

This review deals with the expenditure and revenue of all branches administered by the NSSI, namely: long-term benefits, death benefits and short-term benefits comprising sickness and maternity benefits. The key area will be the long-term branch since it accounts for the largest proportion of future expenditure. It is certain that this proportion will grow significantly in the future from its current immature state. The long-term benefit branch will reach maturity only after the first generation of contributors have become pensioners and have died and all survivors' pensions paid on their behalf have ceased. This requires that the situation of the scheme be analysed over the next 60 years. The general methodology of the actuarial review is presented in Appendix 2.

## 3.1. Defining the "base scenario"

The NSSI position is to maintain the linkage between contributions and benefits and to take into account the economic environment. It has adopted important policies in the pension calculation in order to maintain the relevance of the social security system. The base scenario assumes those practices will be maintained over the projection period. They are described below.

### Career salary indexing

In 2012, the pension calculation is based on the average of the most recent 14 years of salary. The number of years for the calculation of the average salary will be increased by one every year until it reaches 20 years in 2017. Although the law does not stipulate any indexing formula for career average salaries, salaries used in the calculation, except those of the most recent years, are indexed up to the third year before retirement in line with annual inflation (i.e. the increase in the consumer price index).

### Pension indexing

The minimum pension is fixed at 60 per cent of the minimum salary annually indexed in line with the average salary. All retirement and invalidity pensions are annually increased by the same amount corresponding to the annual increase of the minimum pension. Survivors' pensions are similarly indexed.

### Retirement and survivors' grants

The NSSI may award grants to people who reach the retirement age without meeting the criteria of the minimum 20 years of registration and the minimum 10 years of contributions. Under the base scenario, it has been assumed that a grant will be awarded to all those meeting certain conditions.

These policies will be discussed further in Section 4, as their application raises some issues.

## 3.2. Demographic projections

As shown in Table 3.1, the total number of pensioners is projected to increase significantly in the future, from 41,807 in 2012 to 1,306,354 in 2071, while at the same time the number of contributors will increase from 312,465 to 1,557,797. The ratio of contributors to pensioners will thus decrease from 7.5 to 1.2 over the next 60 years.

**Table 3.1. Projected numbers of contributors and pensioners: Long-term benefits, 2012−71**

| Year | Number of contributors | Number of pensioners | | | Total number of pensioners | Ratio of contributors to pensioners |
|---|---|---|---|---|---|---|
| | | Retirement | Invalidity | Survivors | | |
| 2012 | 312 465 | 17 891 | 1 473 | 22 443 | 41 807 | 7.5 |
| 2013 | 322 570 | 18 991 | 1 644 | 25 924 | 46 558 | 6.9 |
| 2014 | 333 020 | 20 562 | 1 837 | 29 640 | 52 039 | 6.4 |
| 2015 | 343 802 | 22 609 | 2 044 | 33 602 | 58 256 | 5.9 |
| 2016 | 354 928 | 25 107 | 2 262 | 37 852 | 65 221 | 5.4 |
| 2017 | 366 669 | 27 808 | 2 490 | 42 442 | 72 739 | 5.0 |
| 2018 | 378 321 | 31 527 | 2 725 | 47 385 | 81 637 | 4.6 |
| 2019 | 390 632 | 35 572 | 2 968 | 52 659 | 91 200 | 4.3 |
| 2020 | 403 612 | 39 916 | 3 219 | 58 219 | 101 354 | 4.0 |
| 2021 | 417 330 | 44 510 | 3 476 | 64 066 | 112 052 | 3.7 |
| 2026 | 498 658 | 70 056 | 4 879 | 94 509 | 169 444 | 2.9 |
| 2031 | 593 195 | 102 915 | 6 543 | 123 780 | 233 239 | 2.5 |
| 2036 | 700 020 | 145 093 | 8 554 | 156 107 | 309 754 | 2.2 |
| 2041 | 820 814 | 196 388 | 10 878 | 192 883 | 400 149 | 2.0 |
| 2051 | 1 092 051 | 318 407 | 16 635 | 280 969 | 616 011 | 1.8 |
| 2061 | 1 349 050 | 487 536 | 24 575 | 388 678 | 900 789 | 1.5 |
| 2071 | 1 557 797 | 733 482 | 33 961 | 538 911 | 1 306 354 | 1.2 |

Demographic projections concerning death and short-term benefits are presented in Table 3.2. As regards sickness benefits, the number of beneficiaries will increase steadily in line with the increase in the insured population.

The number of maternity benefits will increase much less than the number of insured persons. This is because the increase in the insured female population will be offset by a decrease in the fertility rate. As the incidence of maternity benefits has been so far low,

less than 10 per cent of the estimated fertility of the total population, a uniform multiplication factor has been applied over the full projection period in order to recognize the past experiences of the programme. The long-term cost could be underestimated if this multiplication factor should decrease over time. Further investigations should be conducted in order to better understand the incidence of the programme.

The number of death benefits will increase continuously over the projection period, due to the combined impact of the increase in the insured population and the general ageing of the population, although the ageing effect is partially offset by an improvement in mortality.

**Table 3.2. Projected number of beneficiaries: Short-term and death benefits, 2012−71**

| Year | Sickness benefits | | Maternity benefits | | Funeral grants and subsidy | |
|---|---|---|---|---|---|---|
| | Number of beneficiaries | Ratio of contributors to beneficiaries | Number of beneficiaries | Ratio of contributors to beneficiaries | Number of beneficiaries | Ratio of contributors to beneficiaries |
| 2012 | 7 834 | 39.9 | 888 | 351.9 | 2 661 | 117.4 |
| 2013 | 8 094 | 39.9 | 905 | 356.3 | 2 786 | 115.8 |
| 2014 | 8 360 | 39.8 | 923 | 361.0 | 2 918 | 114.1 |
| 2015 | 8 633 | 39.8 | 940 | 365.8 | 3 054 | 112.6 |
| 2016 | 8 914 | 39.8 | 957 | 370.9 | 3 196 | 111.1 |
| 2017 | 9 209 | 39.8 | 973 | 376.7 | 3 341 | 109.7 |
| 2018 | 9 506 | 39.8 | 990 | 382.2 | 3 494 | 108.3 |
| 2019 | 9 820 | 39.8 | 1 006 | 388.4 | 3 647 | 107.1 |
| 2020 | 10 149 | 39.8 | 1 022 | 395.1 | 3 806 | 106.0 |
| 2021 | 10 494 | 39.8 | 1 037 | 402.4 | 3 975 | 105.0 |
| 2026 | 12 484 | 39.9 | 1 116 | 446.6 | 4 992 | 99.9 |
| 2031 | 14 832 | 40.0 | 1 187 | 499.8 | 6 372 | 93.1 |
| 2036 | 17 535 | 39.9 | 1 245 | 562.3 | 8 111 | 86.3 |
| 2041 | 20 683 | 39.7 | 1 294 | 634.5 | 10 075 | 81.5 |
| 2051 | 27 962 | 39.1 | 1 335 | 817.8 | 14 808 | 73.7 |
| 2061 | 34 806 | 38.8 | 1 312 | 1 028.5 | 21 098 | 63.9 |
| 2071 | 40 379 | 38.6 | 1 299 | 1 199.1 | 29 812 | 52.3 |

## 3.3. Financial projections

Apart from being driven by the number of beneficiaries, the cost of the NSSS is also determined by the average amount of benefits paid to these persons. One indicator of the evolution of pension amounts is the evolution of pension replacement ratios (ratio of the average pension to the average wage of active contributors). Table 3.3 presents these replacement ratios for each type of pension and by sex.

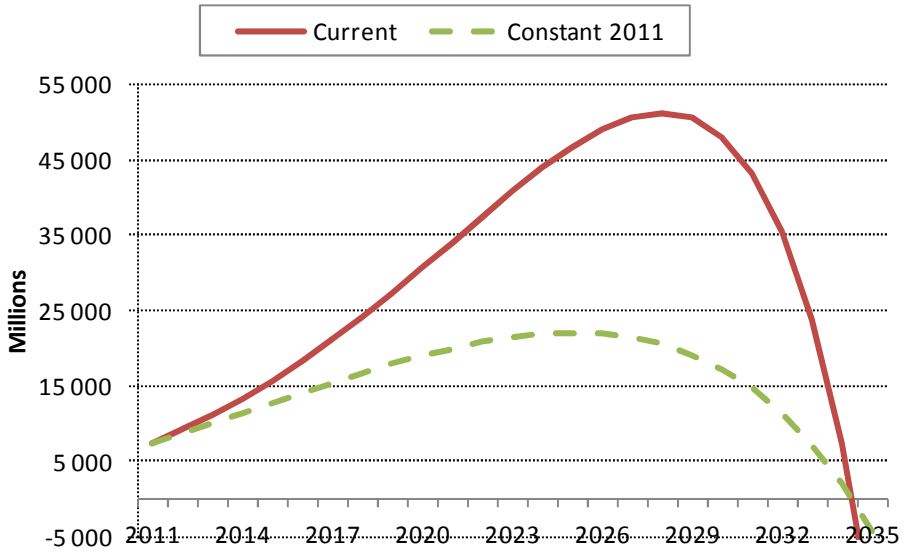
The replacement rates for retirement pensions fluctuate slightly over time. They increase in the first decade and undertake a slow decrease thereafter. The short-term increase is due to the impact of new pensions that tend to be higher than existing pensions. However, over time the ratio tends to decrease due to two reasons. First, the weight of new pensions decreases. Second, pensions increase more slowly than salaries as the annual increase of pensions in payment is smaller than the general average salary increase. For invalidity and survivors' pensions, the decreasing trend is almost straightforward and is driven by the same factors.

**Table 3.3. Projected replacement ratios, by sex: Long-term benefits, 2012−71**

| Year | Retirement | | Invalidity | | Survivors | |
|---|---|---|---|---|---|---|
| | Males | Females | Males | Females | Widows | Widowers |
| 2012 | 0.27 | 0.26 | 0.23 | 0.19 | 0.14 | 0.12 |
| 2013 | 0.27 | 0.27 | 0.23 | 0.19 | 0.13 | 0.11 |
| 2014 | 0.28 | 0.27 | 0.23 | 0.20 | 0.13 | 0.11 |
| 2015 | 0.29 | 0.28 | 0.23 | 0.20 | 0.12 | 0.11 |
| 2016 | 0.29 | 0.28 | 0.23 | 0.20 | 0.12 | 0.11 |
| 2021 | 0.30 | 0.27 | 0.22 | 0.19 | 0.11 | 0.10 |
| 2031 | 0.28 | 0.24 | 0.21 | 0.17 | 0.11 | 0.09 |
| 2041 | 0.27 | 0.22 | 0.20 | 0.17 | 0.10 | 0.09 |
| 2051 | 0.26 | 0.21 | 0.19 | 0.16 | 0.10 | 0.08 |
| 2061 | 0.25 | 0.20 | 0.19 | 0.15 | 0.09 | 0.08 |
| 2071 | 0.25 | 0.20 | 0.18 | 0.15 | 0.09 | 0.08 |

For accounting purposes, the NSSI determines reserves for three benefit branches and a residual one, named general reserve. The benefit branches are: long-term benefits, death benefits and short-term benefits. The legislation stipulates rules for the calculation of benefit reserves, and the residual excess of income over expenses is allocated to the general reserve. In this section, it is considered more convenient to present the evolution of total assets irrespective of their allocation by branch. The financial projections assume that the present contribution rate of 7.0 per cent is maintained for the whole projection period. Figure 3.1 presents the projection of assets (until the fund is depleted) in current and constant Meticals (MT).

**Figure 3.1. Projected evolution of total NSSI assets, 2012−35 (in MT)**




The financial projections reveal that the scheme's expenditure will not exceed contribution income until 2023. After expenditure exceeds contributions, total assets will continue to increase until 2028 due to the investment income. From 2029 onwards, assets will rapidly decrease and the NSSI funds will be depleted in 2035 if nothing is modified in terms of contributions or benefits of the scheme (table 3.4).

**Table 3.4. Key moments in the future evolution of NSSI assets**

| | Year |
|---|---|
| Scheme's expenditure first exceeds contributions | 2023 |
| Scheme's expenditure first exceeds contributions plus investment income (assets start to decrease) | 2029 |
| Assets are exhausted | 2035 |

The projected ratio of assets to total expenditure of the scheme is 4.0 in 2012; it will increase until 2015, then will start to decrease and will become negative in 2035, as shown in figure 3.2.

**Figure 3.2. Ratio of assets to total expenditure** (funding ratio)

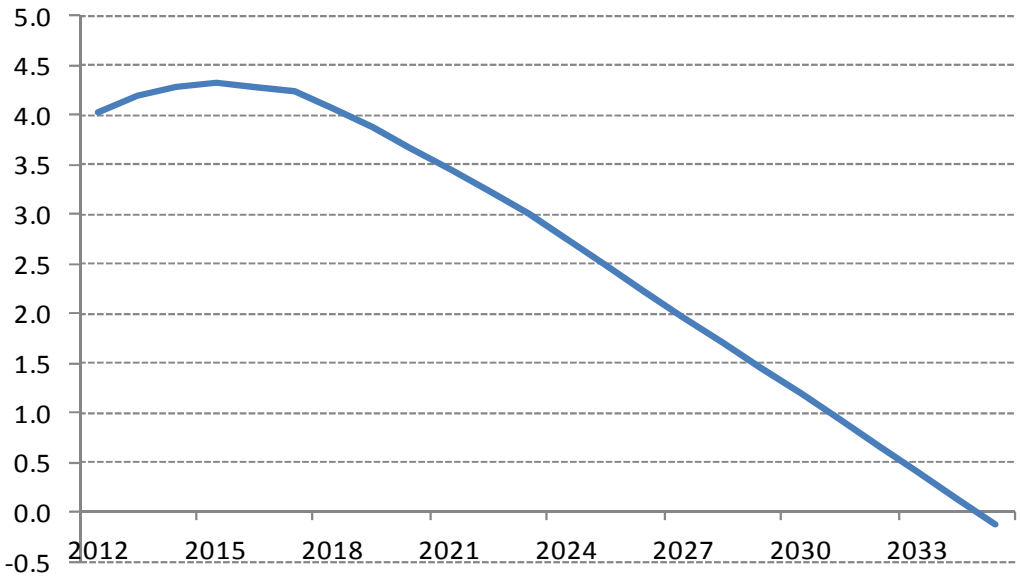



Table 3.5 presents the future evolution of NSSI expenditures for each branch. It also presents the total expenditure in relation to total insurable earnings (the pay-as-you-go cost rate) and to GDP. The PAYG cost rate is projected to increase from 5.0 per cent in 2012 to 16.1 per cent in 2071 and shows an upward trend (see figure 3.3). The general average premium (GAP) of the scheme (the constant contribution rate necessary to finance all NSSI benefits over the next 50 years) is 11.9 per cent. The comparison of this to the present contribution rate of 7.0 per cent suggests that it is necessary to plan future contribution rate increases. Detailed financial projections are presented in table 3.6.

**Table 3.5. Projected NSSI expenditure, 2012−71** (MT millions)

| Year | Benefit expenditure | | | | | Admin. expenses | Total expenditure | Expenditure as % of | |
|---|---|---|---|---|---|---|---|---|---|
| | Long-term | | | Funeral grant and subsidy | Short-term | | | | |
| | Retirement | Invalidity | Survivors | | | | | Ins. earnings | GDP |
| 2012 | 742 | 48 | 426 | 184 | 65 | 816 | 2 281 | 5.0 | 0.5 |
| 2013 | 897 | 59 | 513 | 217 | 74 | 881 | 2 641 | 5.0 | 0.5 |
| 2014 | 1 107 | 73 | 619 | 251 | 84 | 951 | 3 085 | 5.2 | 0.6 |
| 2015 | 1 378 | 90 | 746 | 289 | 95 | 1 026 | 3 623 | 5.3 | 0.6 |
| 2016 | 1 716 | 109 | 898 | 331 | 108 | 1 108 | 4 269 | 5.5 | 0.6 |
| 2017 | 2 105 | 131 | 1 080 | 377 | 122 | 1 196 | 5 011 | 5.7 | 0.6 |
| 2018 | 2 667 | 157 | 1 299 | 431 | 139 | 1 292 | 5 984 | 6.0 | 0.7 |
| 2019 | 3 316 | 187 | 1 562 | 487 | 157 | 1 395 | 7 103 | 6.2 | 0.7 |
| 2020 | 4 082 | 221 | 1 875 | 550 | 178 | 1 506 | 8 412 | 6.5 | 0.7 |
| 2021 | 4 981 | 261 | 2 247 | 621 | 202 | 1 626 | 9 937 | 6.7 | 0.7 |
| 2026 | 11 975 | 576 | 5 216 | 1 173 | 380 | 3 042 | 22 362 | 7.7 | 0.9 |
| 2031 | 27 290 | 1 231 | 11 028 | 2 275 | 712 | 5 925 | 48 462 | 8.6 | 1.0 |
| 2036 | 61 435 | 2 583 | 22 630 | 4 395 | 1 332 | 11 491 | 103 865 | 9.5 | 1.1 |
| 2041 | 133 951 | 5 310 | 45 613 | 8 204 | 2 498 | 22 238 | 217 815 | 10.3 | 1.2 |
| 2051 | 563 033 | 21 547 | 177 197 | 28 148 | 8 712 | 81 216 | 879 852 | 11.4 | 1.4 |
| 2061 | 2 282 178 | 85 013 | 655 358 | 98 592 | 28 537 | 273 641 | 3 423 318 | 13.1 | 1.7 |
| 2071 | 9 128 198 | 313 282 | 2 432 896 | 345 471 | 87 921 | 855 892 | 13 163 660 | 16.1 | 2.1 |

**Figure 3.3. Projected cost rates as a percentage of insurable earnings, 2012−71**

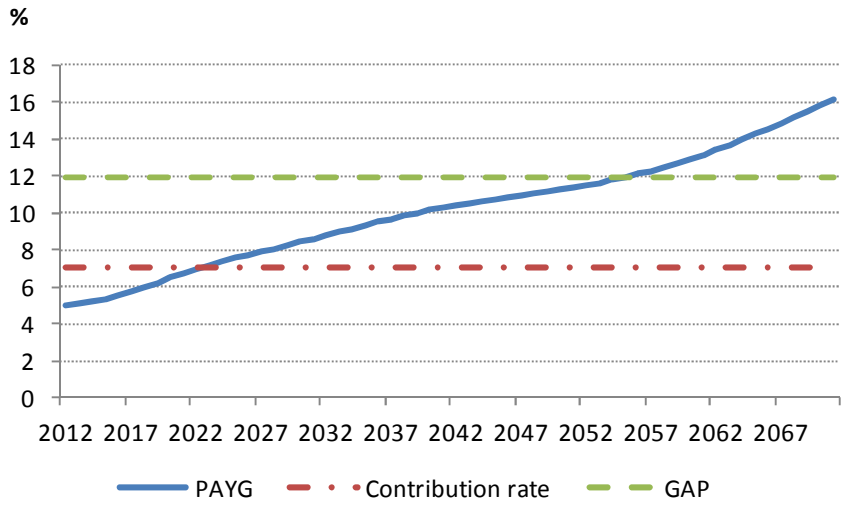


**Table 3.6. Projected revenue, expenditure and assets, 2012−71** (MT millions)

| Year | Revenue | | | Expenditure | | | Assets | |
|---|---|---|---|---|---|---|---|---|
| | Contribution income | Investment income | Total | Benefits | Administrative expenses | Total | Year-end | Number of times current year's expenditure |
| 2012 | 3 213 | 823 | 4 036 | 1 465 | 816 | 2 281 | 9 138 | 4.0 |
| 2013 | 3 664 | 867 | 4 531 | 1 760 | 881 | 2 641 | 11 029 | 4.2 |
| 2014 | 4 175 | 1 041 | 5 215 | 2 134 | 951 | 3 085 | 13 159 | 4.3 |
| 2015 | 4 756 | 1 248 | 6 004 | 2 597 | 1 026 | 3 623 | 15 540 | 4.3 |
| 2016 | 5 416 | 1 465 | 6 882 | 3 161 | 1 108 | 4 269 | 18 153 | 4.3 |
| 2017 | 6 174 | 1 722 | 7 897 | 3 815 | 1 196 | 5 011 | 21 038 | 4.2 |
| 2018 | 7 026 | 2 004 | 9 030 | 4 692 | 1 292 | 5 984 | 24 085 | 4.0 |
| 2019 | 8 001 | 2 305 | 10 306 | 5 709 | 1 395 | 7 103 | 27 287 | 3.8 |
| 2020 | 9 116 | 2 597 | 11 713 | 6 907 | 1 506 | 8 412 | 30 588 | 3.6 |
| 2021 | 10 395 | 2 927 | 13 322 | 8 311 | 1 626 | 9 937 | 33 973 | 3.4 |
| 2026 | 20 280 | 4 336 | 24 616 | 19 320 | 3 042 | 22 362 | 48 911 | 2.2 |
| 2031 | 39 502 | 4 147 | 43 648 | 42 537 | 5 925 | 48 462 | 43 213 | 0.9 |
| 2036 | 76 609 | -2 712 | 73 897 | 92 374 | 11 491 | 103 865 | -45 195 | -0.4 |
| 2041 | 148 256 | -29 707 | 118 550 | 195 577 | 22 238 | 217 815 | -377 980 | -1.7 |
| 2051 | 541 439 | -300 686 | 240 753 | 798 636 | 81 216 | 879 852 | -3 638 846 | -4.1 |
| 2061 | 1 824 274 | -1 809 671 | 14 603 | 3 149 677 | 273 641 | 3 423 318 | -21 676 504 | -6.3 |
| 2071 | 5 705 944 | -9 552 591 | -3 846 647 | 12 307 768 | 855 892 | 13 163 660 | -113 919 632 | -8.7 |

## 3.4. Reconciliation with the results of the 2006 actuarial review

According to generally acceptable actuarial practices, the demographic and financial projections of this valuation should be compared to those of previous actuarial valuations and sources of differences should be analysed. Because of fundamental differences in the methodologies of valuations, this exercise is not possible and any attempt to compare certain pieces would generate confusion rather shedding light. For example, the GAP established in this valuation is not comparable to the average premium determined in the previous report. Hopefully, the methodology used in this valuation will be applied in the next ones so that reconciliation will be possible.

## 3.5. Actuarial liability

Actuarial liability refers to the present value, as of the valuation date, of future payments related to pensions in payment and to the accrued rights of the present participants. For social security systems that are financed on a PAYG basis or that are partially funded, financial indicators based on the actuarial liability concept are not generally used as a toll to measure the financial situation from a particular angle. Nevertheless, the trend is to provide basic information on actuarial liability as it may help to illustrate the magnitude of certain commitments of a social security system.

Table 3.7 shows the actuarial liability related to pensions in payment at the valuation date. It includes the pension branch but not the death and short-term benefits branches, for which this indicator is less meaningful. Table 3.7 also presents the relationship between the actuarial liability and the annual benefit expenditure of 2011.

**Table 3.7. Actuarial liability related to pensions in payment on the valuation date** (MT millions)

| | |
|---|---|
| A. Actuarial liability related to pensions in payment | 19 937 |
| B. Annual benefit expenditure | 975 |
| Ratio (A/B) | 20.4 |

## 3.6. Sensitivity analysis

Projections rely on an extensive set of demographic, economic and scheme-specific assumptions. Actual experience will inevitably differ from the projections. This section analyses four series of alternative assumptions regarding (1) the real wage increase; (2) the investment yield; (3) the mortality rates; and (4) the retirement rates. It presents the impact of alternative scenarios on the GAP and on the year of reserve exhaustion.

### Sensitivity of the real wage increase

The results of the valuation are very sensitive to the difference between the assumed future average wage increase and the inflation rate (the real wage increase). Under the base scenario, the real wage increase is 4.5 per cent constant. The sensitivity test assumes that the rate will start decreasing by 0.25 per cent in 2031 and stabilize at 2 per cent in 2040. Under the sensitivity test, the GAP increases from 11.9 per cent to 12.4 per cent (table 3.8). The depletion of reserves occurs in the same year as under the base scenario (namely in 2035) because the change in the wage increase only starts around that time and its full impact will be felt later.

**Table 3.8. Sensitivity test on real wage increase**

| Scenario | GAP (% of insurable earnings) | Year of reserve exhaustion |
|---|---|---|
| **Base scenario** (real wage increase of 4.5%) | 11.9 | 2035 |
| Sensitivity test (real wage increase of 4.5% until 2030, decreasing linearly to 2% in 2040) | 12.4 | 2035 |

### Sensitivity of investment yield

The base scenario assumes a nominal investment yield of 9.6 per cent. Sensitivity tests have been performed by assuming a yield of 1 per cent higher and 1 per cent lower than the base scenario. Under the lower yield test, the GAP increases to 12.2 per cent and the reserve is exhausted one year earlier. Under the higher yield test, the GAP decreases to 11.5 per cent and the reserve is exhausted one year later.

**Table 3.9. Sensitivity test on investment yield**

| Scenario | GAP (% of insurable earnings) | Year of reserve exhaustion |
|---|---|---|
| Sensitivity test #1 (yield of 8.6%) | 12.2 | 2034 |
| **Base scenario** (yield of 9.6%) | 11.9 | 2035 |
| Sensitivity test #2 (yield of 10.6%) | 11.5 | 2036 |

## Sensitivity of mortality rates

Experience data indicate that the current mortality level of NSSS participants is similar to what the INE projects for the Mozambique population in 40 years. Thus, the base scenario assumes that life expectancy of NSSS participants in 2011 is equal to that of the 2051 INE projections. Without hindsight on the mortality level of participants in the NSSS, theoretical considerations would suggest using the mortality rates by INE for the urban population for the base scenario. However, this would not be appropriate, because mortality rates would be high compared to experience. Nevertheless, a sensitivity test remains interesting to quantify the impact between the base scenario and what intuition would suggest. According to INE mortality projections, the life expectancy of the urban population in 2011 is approximately the same as life expectancy of the total population in 2016. Table 3.10 shows that the estimated GAP would be the same if the 2016 mortality rates of total population were used in 2011. Despite the lower life expectancy levels, the fund would be depleted earlier than in the base scenario. This is because higher mortality rates would have a significant immediate impact on survivors' benefits, while in the long term the decrease in old-age pensions would more than offset the increase in survivors' benefits.

**Table 3.10. Sensitivity test on mortality rates**

| Scenario (life expectancy in 2011 at age 60) | GAP (% of insurable earnings) | Year of reserve exhaustion |
|---|---|---|
| **Base scenario** (NSSS participants - male: 17.0, female: 19.7) | 11.9 | 2035 |
| **Sensitivity test** (Urban population - male: 13.8, female: 15.5) | 11.8 | 2030 |

## Sensitivity of retirement rates

In the base scenario, the age-specific retirement rates change over time (see table A3.8) in such a manner that the average retirement age decreases ultimately from 63.2 in 2012 to 61.4 in 2071 for males and from 57.5 to 56.2 for females. For the sensitivity test, the starting retirement rates have been kept constant over time. Even in this scenario, the average retirement age decreases but less than in the base scenario because of changes in the insured profile.

Under the alternative set of retirement rates, table 3.11 shows that the GAP would be lower by 0.5 per cent and the fund would be depleted two years later. As the retirement rates have been determined from an incomplete database, this test is useful to illustrate the impact of uncertainty on results.

**Table 3.11. Sensitivity test on retirement rates**

| Scenario (average retirement age in 2026 and 2071) | GAP (% of insurable earnings) | Year of reserve exhaustion |
|---|---|---|
| **Base scenario** (male: 61.5−61.4, female: 56.9−56.2) | 11.9 | 2035 |
| **Sensitivity test** (male: 62.1−62.0, female: 57.1−57.0) | 11.4 | 2037 |

## 3.7. Future contribution rate increases

Projection results so far indicate that there is a need for gradual increases in future contribution rates. However, there is no impetus to increment the rate in the very short term unless there would be some willingness to target a high level of partial funding in order to benefit from outstanding investment opportunities. If the trends of this actuarial valuation are maintained until the next one (with an effective date of December 2016) then the contribution rate would have to be increased in order to avoid a deterioration in the assets/expenditures ratio and to maintain the fund capacity to benefit from the expected economic growth, provided the NSSI would have developed such capacity.

Table 3.12 shows a possible schedule of contribution rates as an illustration. One of the criteria has been to avoid decreasing the assets/expenditures ratio below 3 during the projection period. The 60-year projection period has been divided into four parts. The first covers six years and the next three each cover 18 years.

**Table 3.12. Illustration of a possible contribution rate schedule, all branches combined**

| Period | Contribution rate |
|---|---|
| 2012 to 2017 | 7.0 |
| 2018 to 2035 | 9.2 |
| 2036 to 2053 | 12.3 |
| 2054 to 2071 | 15.6 |

Contribution rate increases by steps of 2 and 3 per cent are not generally well accepted by stakeholders. Gradual increases are normally implemented. Table 3.13 shows an example of a gradual increase in contribution rates for the period 2018−35. This schedule respects the criteria regarding the assets/expenditures ratio.

**Table 3.13. Illustration of gradual increase from 2018 to 2035, all branches combined**

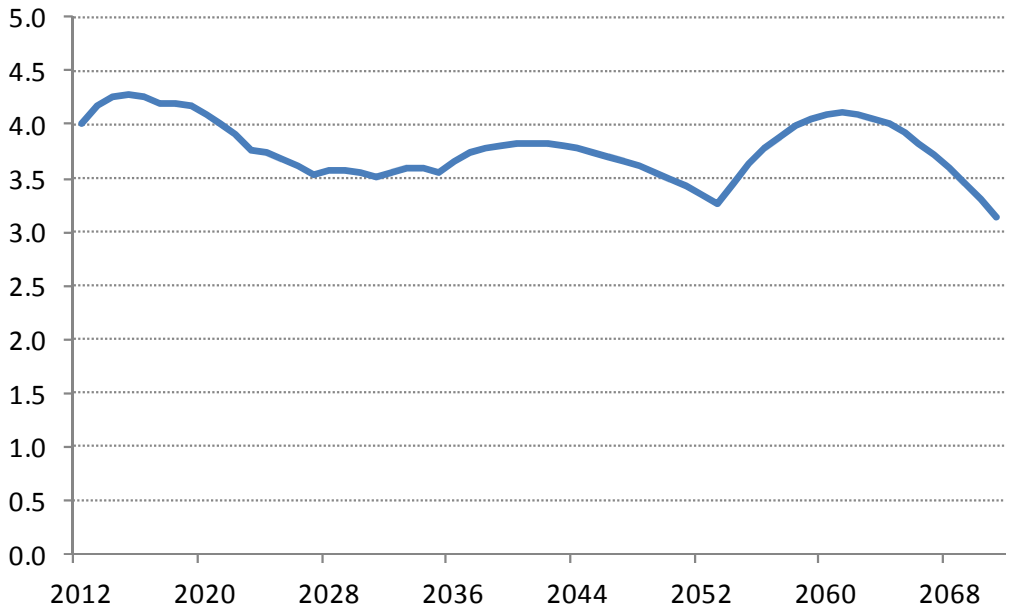
| Period | Contribution rate |
|---|---|
| 2018-2023 | 8.0 |
| 2024-2027 | 9.0 |
| 2028-2031 | 10.0 |
| 2032-2035 | 11.0 |

Figure 3.4 shows the assets/expenditures ratio resulting from the application of the rates in tables 3.12 (2012 to 2017 and after 2035) and 3.13 (2018 to 2035). Under these

schedules of contribution rate, the fund would increase and the net cash flow would be positive over the 60-year projection period. Because of uncertainty in the database and high volatility in short-term results, recommendations regarding increases in contribution rates five to ten years from now should be contingent on the extent of deviations between projections in this valuation and the experience.

The distribution of contribution rates by branch will be discussed in Section 4.

**Figure 3.4. Funding ratio, 2012−71, impact of possible rate increases**



# 4. Policy issues

This section addresses different policy issues. Some of them are related to the findings of this valuation, while others have been raised by the NSSI.

## 4.1. Branch accounting

This section discusses the determination of certain elements mainly related to the tracking of financial results by branch. The financing of the social and health actions is not covered in this section as it will be addressed separately (Section 4.5) for the sake of simplicity.

### *4.1.1. Discussion*

Background

Chapter VIII of Decree No. 53/2007 deals with the financial set-up of compulsory social security. It stipulates the key elements regarding accounting practices and the budgetary process. This section will focus on accounting by benefit branch which, in theory, affects the allocation of contributions, investment returns and administrative expenditures.

For the purpose of the discussion, the most relevant provisions of Chapter VIII are summarized below:

- The reserve funds including their returns are reported separately by system (salaried or self-employed workers); in each system, there are three benefit branches and a general fund.
- Should any benefit reserve fall below the level set in the regulation, the Ministers of Finance and Labour should determine new contribution rates in order to reinstate the financial equilibrium.
- A valuation of the financial situation of the system must be made every five years with a view to recommending adjustments to the contribution rate.
- The total of administrative expenditures and social and health actions are limited to 15 per cent of budgetary income in the projection period.
- The reserves for the short-term and death benefits branches are defined in terms of a minimum benchmark, which is the one-year average of benefits paid in last three years.
- The reserve for the long-term branch is constituted from the annual excess of income over expenses and it must be at least equal to the benefits paid in the last three years.
- Any excess of income over expenditures that is not used to replenish the benefit reserves is allocated to the general reserve. The total of these four reserves constitutes the technical reserve.[6]

[6] Another reserve is constituted to absorb the increase in the valuation of real estate and its amount is relatively small. It is excluded from the present discussion.

According to prevailing accounting practices, the excess of income over expenditures of a given year is first reported as such on the balance sheet (*Resultados Liquidos de Exercicio*), but a proposal regarding its allocation by fund appears in the notes to financial statements. The *Resultados Liquidos de Exercicio* will migrate to the Transitory Results (*Resultados Transitados*) on the balance sheet of the next exercise. The Transitory Results consist of the excess of income over expenditures of the previous year. In the next year, the Transitory Results move to the reserves. The consequence of this process is a two-year lag in the update of reserves by branch. Table 4.1 illustrates the process in the most recent years for which relevant data are available. The excess of income over expenditures of 2008 (MT 628,955 in shaded cells) is reported in 2009 in the Transitory Results and allocated to the reserve funds in 2010.

**Table 4.1. Balance sheet: Excess of assets over liabilities, 2008−10** (MT thousands)

| | 2008 | 2009 | 2010 |
|---|---|---|---|
| Technical reserves | 1 863 589 | 2 348 238 | 2 977 194 |
| Capital reserve | 43 491 | 43 491 | 43 491 |
| Transitory results | 484 649 | 628 955 | 945 186 |
| Excess of income over expenditures | 628 955 | 945 186 | 1 465 420 |
| Total | 3 020 685 | 3 965 871 | 5 431 291 |
| *Annual variation of technical reserves* | | *484 649* | *628 955* |

## Fundamentals

Branch accounting is useful to monitor the cost of each branch of social security. It supports the management and the governance of those social security systems that are administered by a unique body. In certain large countries, each branch of social security is run by a separate entity and the financial information is readily available for analysis and decision-making. Each branch is given proper attention and its specific characteristics are taken into consideration to ensure that the resources are used to meet specific objectives. Branch accounting attempts to meet the same objectives and, to attain that objective, it has to target the same financial reporting details as in the theoretical scenario of a stand-alone administration for each branch. A balance must be made between the sophistication of the accounting system necessary to reach that objective and the cost of implementing and operating it.

The allocation of contribution income between branches is one of the key factors in successful branch accounting. Such allocation should respect the funding method of each branch. Otherwise, the financial results will have little or no meaning to users of the financial statements. Investment income and administrative expenditures should be allocated by branch according to appropriate bases. The size of reserve funds generally serves as a basis for allocation of investment income, while the contribution income, the benefits paid, the number of claims processed or a combination of these factors can be used for the allocation of administrative expenditures.[7]

The reserve required for each fund must be calculated according to the rules normally established in the funding policy. Such rules specify the action to be taken when the annual excess of income over expenditures is lower or larger than the variation of reserve dictated

[7] It is also possible to conduct functional expense analysis that would earmark the administrative expenditures right from the front-line staff. Expenditures related to investment activities are generally deducted from investment returns.

by the funding policy. A general reserve can be used to meet that purpose. Positive or negative transfers from branch reserves may flow to or from that general reserve. This is the apparent intention of the general reserve of the NSSS. Transfers between branches can also be processed directly without use of a general reserve.

### Comments on current practices

Branch accounting is only partial in the NSSI financial statements, as the balance sheet shows the allocation of reserves by branches but there is no statement of income and expenditures by branch. Information necessary to monitor the adequacy of contributions by branch as well as the total contribution is not readily available.

The determination of technical reserves by the NSSI deserves attention. For the short-term and death benefits branches, the annual variation of reserves corresponds to what is defined as the minimum target set at a given date in the legislation, namely the average benefits paid in last three years. The assets/benefits ratio for those branches are estimated at 1.3 (short-term benefits) and 4.5 (death benefits) at 31 December 2011. Considering the 2010 and 2011 amounts still to be allocated to those reserves, those ratios increase to 1.9 and 5.7. The reserves are therefore well above the legislated minimum.

The annual variation in the pensions reserve increases according to the average excess of income over expenses of last three years, while the legislation apparently stipulates the excess of the last year. The condition regarding the minimum reserve (total benefits paid in the last three years) is apparently not considered. The estimated reserve at 31 December of 2011 of MT 2,002,656 thousands is smaller than the benefits payments of the last three years (MT 2,683,370 thousands), but should the 2010 and 2011 amounts still to be allocated to the reserve be taken into consideration, the required level would be met at MT 3,407,451 thousands.

Table 4.2 presents the estimated technical reserves by branch at 31 December 2011, including the impact of pending amounts. Benefits paid are presented in table A4.2.

**Table 4.2. Estimated technical reserves at 31 December 2011** (MT thousands)

| | Balance sheet presentation | Considering pending allocations |
|---|---|---|
| Short-term benefits | 82 075 | 137 813 |
| Death benefits | 439 209 | 560 786 |
| Pensions | 2 002 656 | 3 407 451 |
| General | 1 398 439 | 3 276 750 |
| Total | 3 922 379 | 7 382 800 |

As no documentation on the rationale behind the legal provisions has been made available, it is not possible to comment on the divergence between the calculation of reserves for financial reporting and the related legislation. Although comments on the divergence of reporting between the legislation and its application fall under the scope of accounting responsibility, accountants usually seek advice from actuaries for this kind of issue. The rest of this section will present proposals on branch accounting that go beyond the mere technique of reserve calculations.

## Nature of funding systems

Each branch of benefits has its own characteristics in terms of development of expenditures and the period in which rights of beneficiaries are acquired. Governance principles militate in favour of defining financing rules that enable monitoring of the financial situation of each branch according to its characteristics. We know that the pension branch is the major cost component and drives the total contribution rate. However sophisticated the funding of short-term and death benefits would be, the acceptance of the NSSI contribution rate will depend upon the decisions made with respect to the funding of long-term benefits.

Projections indicate that the cost of short-term benefits is stable in term of insurable salaries: the benefits-to-earnings ratio is low and stable during the projection period. However, it should be recognized that the maternity benefits programme may not yet have reached its maturity at the valuation date and that the possibility of cost increases still exists. Nevertheless, it seems that the current allocation of the contribution rate is too high at 1 per cent. This branch is generally funded under the PAYG system. A contingency reserve to cover the payments for a short period of time and yearly fluctuations is usually maintained. By setting the minimum reserve at three times the one-year average of pensions paid in the last three years, the legislation is consistent with those funding principles. However, the calculation technique of the reserve overestimates the target and should be revised.

Death benefits, even if paid as lump sums, are usually considered part of the pension branch alongside the pensions paid to survivors. There may be historical or cultural reasons to consider those benefits as a separate branch in Mozambique. The benefit-to-earnings ratio of this branch is stable during the projection period and fluctuates around 0.45 per cent. Because of that stability, the current legislative provisions regarding the reserve are technically justifiable and the PAYG system is acceptable. The remarks regarding the inconsistency of the calculation technique of reserves with the legislative provisions for the short term also apply in this branch and the calculation should be modified. The current contribution allocation is on the high side and should be reviewed. Finally, simplicity and alignment with international practices would militate in favour of merging this branch with the pension branch.

The benefits-to-earnings ratio of the pension branch follows the typical curve of a system in its maturing phase, namely a steady increase. It must be said that the system can still benefit for a few decades from a favourable demographic development and the benefits-to-earnings ratio remains at a reasonable level throughout the projection period. Indeed, the population is increasing and ageing only slowly. Thus the PAYG rate increases moderately and reaches 15 per cent at the end of the projection period. There is no doubt that future rate increases will be necessary and that the current contribution of 3.25 per cent is insufficient. The financing system for this branch is partial funding, as the legislation stipulates that the reserve should never fall below approximately the benefits paid in the last three years. Given the financial needs of this branch, all excess of income over expenditures that is not needed to maintain the reserve of the two other benefits branches at the target set in the legislation could be allocated to this branch.

The allocation of the contribution rate for the three benefit branches totals 5.25 per cent. The apparent intention is to have the difference at 7 per cent, namely 1.75 per cent available for administrative expenditures. The relationship between the contribution allocation and the actual expenses influences the level of the general fund. The level of administrative expenditures is now limited to 15 per cent of total income. It is understood that major components of total income are the contributions and the investment returns. The general fund should not be used or perceived as a reserve for administrative expenditures, as it interfaces with the behaviour of administrative expenditures as

compared to its income allocation and the benefit reserves. The PAYG method is the usual funding method for administrative expenditures; the use of a reserve as protection against swings is not common. The level of administrative expenditures and their legislated maximum will be discussed in Section 4.7.

### *4.1.2. Recommendations*

Two series of recommendations are presented. The first includes the modifications which are considered desirable and would require legislation changes, whereas the second limits itself to a different set of modifications that, in our opinion, would not require legislation changes.

#### Sophistication of branch accounting

On the grounds of transparency improvement, it would be justifiable to proceed to a change in the branch accounting. This would also better reflect the dynamics of the funding of the social security system, as the cost of the pension branch is the determinant of the long-term evolution of the contribution rate. It would be a change affecting the presentation of the financial statements, because the income and expenditure statement should be broken down by every branch. The main elements of the method are presented below and an illustration is shown in Appendix 5.

1. The current three benefit branches would be maintained and the allocation of contribution income would be as follows: 0.25 per cent for the short-term branch, 0.60 per cent for the death benefit branch and 6.15 per cent for the pension branch. The allocation for administrative expenditures would be abolished and the administrative expenditures would be charged by branch according to the criteria in the next recommendation.

2. The investment returns should be reduced by the direct and indirect cost incurred to generate them. The rest of administrative expenditures (including the amortization costs) would be allocated by branch in proportion to the contributions allocated.

3. The investment return would be allocated by branch in proportion to the branch fund at the beginning of the year.

4. The general reserve would be abolished. All excess of income and expenditure would be allocated to the benefits branches. The Transitory Results and the Excess of Income over Expenditure of the Year would be abolished.

5. The reserve would be set as follows for the short-term and death benefits branches: it would be equal to the benefits paid in the current year. If the difference between income and expenditures of the branch is less or more than the annual variation of the reserve, a transfer would be made from or to the pension reserve.

6. The annual variation of the pension reserve would be composed of the difference between its allocated income and expenditures and the transfer to or from other funds. Its minimum level should be three times the benefits of the current year. Action should be taken, such as contribution increases, when this target is not met.

7. Stakeholders should undertake discussions to determine their preference on the desirable assets/benefits ratio for long-term financial purposes. It should be understood that the higher the ratio, the smaller the required future contribution income, but this requires solid investment expertise and discipline in administrative expenditures containment as well as in resisting pressures for benefits increases due to potential misunderstanding of the purpose of a large fund.

### Status quo in branch accounting

Should there be no willingness to move in the direction described above, the following changes are recommended. No change would be required in the current regulation, but certain practices should be changed. Explanations will follow the description of these recommendations:

1. Set the allocation of contribution income as follows: 0.20 per cent for short-term benefits, 0.50 per cent for death benefits, 5.25 per cent for pensions and 1.05 per cent for administrative expenditures.

2. The reserves for short-term and death benefits should be set at the minimum stipulated in the regulation. Any difference between contribution income and benefit expenditure should flow to or from the general fund.

3. The annual variation of the reserve of the pension branch should be equal to a maximum between (1) the excess of contribution income over benefits expenditures and (2) the amount needed to attain the minimum described in the regulation.

This limited set of changes does not eliminate the major flaws of the current situation where the investment returns flow to the general fund unless they are needed to maintain the benefit reserves at their minimum level. Investment returns should be allocated to the branch funds.

Practically, investment returns would flow almost entirely to the pension fund. The rationale behind the allocation of contributions is the following. For short-term and death benefits, the objective is to cover benefit expenditures and provide for the amount needed to increase the reserve. The allocation for administrative expenditures is set at 15 per cent of the contribution rate, which is the legislated maximum. The legislated maximum also considers 15 per cent of other income, but it would not be fair to include this charge in the contribution income. The allocation to the pension branch is the residual item as that branch needs to accumulate funds to cover increasing benefit expenditures.

## 4.2. Extension of coverage to self-employed persons (SEP)

### Background

Provisions regarding the social protection system of self-employed workers are described in Chapter II of Decree No. 53/2007. Benefits are the same as for salaried workers with one major exception: the waiting period for payment of sickness benefits is 30 days instead of three days. Despite this material difference, the NSSI has expressed fears about potential abuses and doubts about efficient ways of containing the costs of that branch. It is noteworthy that registration is not mandatory for those starting their self-employment activity after age 50 for women and age 55 for men. The earnings base will be defined in terms of multiples of the highest minimum salary; the multiples vary from 1 to 25. There is an implicit maximum insurable earning.

The regulation specifies that the self-employed will be integrated in a gradual way and by categories, taking into account the capacity of the administrative structure of the NSSI and of the workers registering in the system.

Detailed statistical data on self-employed workers are scarce. The determination of assumptions is therefore subject to uncertainty, and sensitivity tests are useful for estimating the range of reasonable results.

## Profile of self-employed persons

In the 2004/2005 labour force survey, the proportion of SEP was estimated at 86.7 per cent of the labour force for both sexes and at 62.1 per cent if family workers without remuneration were excluded. The paid SEP thus represented 71.6 per cent of total SEP (88.3 per cent for males and 59.9 for females). Another significant characteristic of the self-employed population is its distribution between agricultural (85.6 per cent) and non-agricultural workers (14.4 per cent). It is expected that the participation of non-agricultural workers should be easier to manage at the start of implementation. Table 4.3 presents the distribution by age and sex of the self-employed in 2011.

Information on the earnings of SEP is very limited but available data indicates that their average earnings are about half the level of salaried workers. However, it is reasonable to expect that earnings of the first cohorts of registrants will be higher than the average earnings for all self-employed workers and potentially close to those of salaried workers.

**Table 4.3. Number of self-employed persons, by age and sex, 2011**

| Age group | Male | Female |
|---|---|---|
| 15-19 | 390 789 | 803 978 |
| 20-24 | 490 603 | 773 946 |
| 25-29 | 484 066 | 707 130 |
| 30-34 | 440 870 | 590 533 |
| 35-39 | 379 632 | 516 333 |
| 40-44 | 318 908 | 421 219 |
| 45-49 | 256 636 | 309 094 |
| 50-54 | 202 808 | 264 227 |
| 55-59 | 152 251 | 224 575 |
| 60-64 | 117 147 | 167 374 |
| 65-69 | 88 805 | 124 117 |
| **Total** | **3 322 516** | **4 902 527** |

## Specific assumptions applying to self-employed persons

The registration of SEP will be made gradually. The NSSI has identified the first three categories that should be included in the first phase: people performing their work at a professional site, people involved in a retainer relationship and people working in the artistic or cultural sector.

Assumptions regarding the pace of registration were developed by taking into consideration the statistical data available together with a prudent estimate of the administrative capacity development of the NSSI in registering SEP and of the financial capacity of SEP to join the system. International experience has also been considered. Assumptions should not be considered a forecast or a target, but a valuable base for the financial projections. Coverage rates are assumed to increase significantly over the first five years and to slowly reach their maturity level over the rest of the projection period. The rates are the same at all ages, but a downward adjustment is made at advanced ages for which registration is not mandatory. Table 4.4 presents the coverage rates assumed for self-employed persons.

**Table 4.4. Assumed coverage rates for self-employed persons**

| Age group | Male (%) | Female (%) |
|---|---|---|
| 2012-2013 | 0.0 | 0.0 |
| 2014 | 1.0 | 0.8 |
| 2015 | 3.0 | 1.7 |
| 2016 | 4.0 | 2.6 |
| 2017 | 6.0 | 3.4 |
| 2018 | 7.0 | 4.3 |
| - - - | Linear increase | Linear increase |
| 2071 | 56.0 | 29.2 |

The 2071 coverage rates were obtained by assuming that 80 per cent of males and 75 per cent of females in the non-agricultural sector would register, while the corresponding values in the agricultural sector would be 60 per cent and 50 per cent.

As stated above, according to the labour survey the average earnings of SEP would be slightly less than half of those of salaried workers. This information is consistent with the data on income components of GDP. The present projections must consider that the earnings of SEP are probably very different by category of worker. It is reasonable to assume that earnings of those SEP who will register in the first years will be higher than the average and probably close to the salaries of salaried workers. Unfortunately, no statistical data on earnings by category of SEP are available. The determination of assumptions has relied on judgement and comparable international experience. The assumptions have been determined also by considering that SEP may be reluctant to declare their full earnings. For the base scenario, it has been assumed that SEP earnings would be 80 per cent and 60 per cent of those of salaried workers for males and females respectively. Table 4.5 presents the assumed earnings by age group.

**Table 4.5. Assumed average earnings for self-employed persons in 2011 (MT)**

| Age group | Male | Female |
|---|---|---|
| 15-19 | 4 146 | 4 079 |
| 20-24 | 4 822 | 4 639 |
| 25-29 | 6 180 | 5 294 |
| 30-34 | 7 852 | 6 514 |
| 35-39 | 9 410 | 8 001 |
| 40-44 | 10 520 | 9 398 |
| 45-49 | 11 007 | 10 462 |
| 50-54 | 10 827 | 10 893 |
| 55-59 | 10 078 | 10 445 |
| 60-64 | 9 650 | 9 980 |

There will be a pressure on administrative expenditures during the implementation years. It has been assumed that they will respect the legislated limit of 15 per cent of income in 2018 and after, but in previous years the nominal amount of administrative expenditures is assumed to equal the level in 2018. This assumption seems realistic and is based on the premise that a special budget will be planned for the implementation. Table 4.6 presents administrative expenditures as a ratio of contribution income and insurable earnings. The financial projections also assume that administrative expenditures

incurred in 2013, the year in which the preparatory phase will begin, will remain constant until 2018.

**Table 4.6. Projected administrative expenditures for self-employed persons**

| | Administrative expenditures/ Insurable earnings | Administrative expenditures/ Contribution income |
|---|---|---|
| 2014 | 10.8 | 153.9 |
| 2015 | 3.8 | 54.6 |
| 2016 | 2.4 | 33.8 |
| 2017 | 1.5 | 20.7 |
| 2018 and after | 1.1 | 15.0 |

Though the waiting period for the sickness benefits will be 30 days instead of three days, the same assumptions as for the salaried workers have used. Obviously, the components of costs, incidence and severity of claims will be different for SEP, but it seems prudent to assume that the greater complexity of claims management for SEP will make pressure on costs and that the aggregate experience will be the same.

Finally, it has also been assumed that the 20-year registration condition will not be applied for eligibility to retirement in the first decades.

## Demographic and financial projections

The number of SEP pensioners will slowly increase through the projection period (table 4.7). At the end of the period the ratio of contributors to pensioners will reach a level of 3.4, which is comparable to the ratio observed 50 years earlier in the case of salaried workers.

**Table 4.7. Projected number of self-employed contributors and pensioners: Long-term benefits, 2012−71**

| Year | Number of contributors | Number of pensioners | | | | Ratio of contributors to pensioners |
|---|---|---|---|---|---|---|
| | | Retirement | Invalidity | Survivors | Total | |
| Until 2013 | 0 | 0 | 0 | 0 | 0 | - |
| 2014 | 77 498 | 0 | 0 | 0 | 0 | - |
| 2015 | 194 054 | 0 | 0 | 0 | 0 | - |
| 2016 | 284 670 | 0 | 0 | 0 | 0 | - |
| 2017 | 417 150 | 0 | 30 | 0 | 30 | 14 113.9 |
| 2018 | 522 520 | 0 | 117 | 0 | 117 | 4 453.3 |
| 2019 | 607 704 | 0 | 268 | 3 | 270 | 2 248.0 |
| 2020 | 698 541 | 0 | 486 | 104 | 590 | 1 184.0 |
| 2021 | 795 152 | 0 | 767 | 497 | 1 264 | 629.2 |
| 2026 | 1 369 529 | 977 | 2 957 | 11 943 | 15 877 | 86.3 |
| 2031 | 2 109 940 | 15 815 | 6 580 | 44 866 | 67 260 | 31.4 |
| 2036 | 3 030 157 | 57 781 | 11 918 | 106 147 | 175 847 | 17.2 |
| 2041 | 4 152 057 | 152 628 | 19 417 | 194 456 | 366 502 | 11.3 |
| 2051 | 7 057 456 | 520 626 | 43 885 | 465 497 | 1 030 008 | 6.9 |
| 2061 | 10 709 811 | 1 223 857 | 87 434 | 919 461 | 2 230 752 | 4.8 |
| 2071 | 14 687 789 | 2 526 152 | 151 712 | 1 697 814 | 4 375 678 | 3.4 |

Table 4.8 presents the projected number of benefit recipients for short-term and death benefits.

**Table 4.8. Projected number of self-employed benefit recipients: Short-term benefits, 2012−71**

| Year | Sickness benefits | | Maternity benefits | | Funeral grants and subsidy | |
|---|---|---|---|---|---|---|
| | Number of beneficiaries | Ratio of contributors to beneficiaries | Number of beneficiaries | Ratio of contributors to beneficiaries | Number of beneficiaries | Ratio of contributors to beneficiaries |
| Until 2013 | - | - | - | - | - | - |
| 2014 | 1 739 | 45 | 618 | 125 | 0 | |
| 2015 | 4 175 | 46 | 1 254 | 155 | 257 | 755 |
| 2016 | 6 218 | 46 | 1 906 | 149 | 678 | 420 |
| 2017 | 9 000 | 46 | 2 574 | 162 | 976 | 427 |
| 2018 | 11 373 | 46 | 3 259 | 160 | 1 449 | 361 |
| 2019 | 13 207 | 46 | 3 650 | 166 | 1 798 | 338 |
| 2020 | 15 161 | 46 | 4 051 | 172 | 2 109 | 331 |
| 2021 | 17 242 | 46 | 4 462 | 178 | 2 443 | 326 |
| 2026 | 29 746 | 46 | 6 639 | 206 | 4 650 | 295 |
| 2031 | 46 006 | 46 | 8 987 | 235 | 7 279 | 290 |
| 2036 | 66 699 | 45 | 11 412 | 266 | 11 041 | 274 |
| 2041 | 92 691 | 45 | 13 807 | 301 | 16 468 | 252 |
| 2051 | 162 022 | 44 | 18 168 | 388 | 34 510 | 205 |
| 2061 | 249 858 | 43 | 21 876 | 490 | 67 058 | 160 |
| 2071 | 347 677 | 42 | 25 335 | 580 | 122 428 | 120 |

Benefits expenditures are presented in table 4.9.

**Table 4.9. Projected benefit expenditures, self-employed persons, 2012−71**

| Year | Benefit expenditure | | | | | Admin. expenses | Total expenditure | Expenditure as % of | |
|---|---|---|---|---|---|---|---|---|---|
| | Long-term | | | Funeral grant and subsidy | Short-term | | | | |
| | Retirement | Invalidity | Survivors | | | | | Ins. earnings | GDP |
| 2013 | 0 | 0 | 0 | 0 | 0 | 934 | 934 | - | 0.2 |
| 2014 | 0 | 0 | 0 | 0 | 19 | 934 | 953 | 11.0 | 0.2 |
| 2015 | 0 | 0 | 0 | 20 | 46 | 934 | 1 000 | 4.1 | 0.2 |
| 2016 | 0 | 0 | 4 | 60 | 76 | 934 | 1 074 | 2.7 | 0.2 |
| 2017 | 0 | 1 | 8 | 96 | 118 | 934 | 1 157 | 1.8 | 0.1 |
| 2018 | 0 | 5 | 17 | 160 | 165 | 934 | 1 281 | 1.4 | 0.1 |
| 2019 | 0 | 14 | 28 | 220 | 209 | 1 203 | 1 674 | 1.5 | 0.2 |
| 2020 | 0 | 28 | 42 | 287 | 261 | 1 532 | 2 149 | 1.5 | 0.2 |
| 2021 | 23 | 48 | 63 | 370 | 324 | 1 931 | 2 758 | 1.5 | 0.2 |
| 2026 | 562 | 299 | 669 | 1 188 | 869 | 5 520 | 9 107 | 1.7 | 0.4 |
| 2031 | 4 666 | 1 082 | 3 780 | 2 981 | 2 098 | 14 072 | 28 679 | 2.1 | 0.6 |
| 2036 | 23 237 | 3 196 | 14 385 | 7 082 | 4 759 | 33 526 | 86 186 | 2.7 | 0.9 |
| 2041 | 91 160 | 8 504 | 43 253 | 16 131 | 10 417 | 76 479 | 245 944 | 3.4 | 1.4 |
| 2051 | 807 630 | 51 432 | 281 351 | 77 888 | 46 119 | 361 847 | 1 626 268 | 4.7 | 2.7 |
| 2061 | 5 168 580 | 274 823 | 1 510 447 | 359 245 | 185 062 | 1 516 105 | 9 014 262 | 6.2 | 4.5 |
| 2071 | 29 254 114 | 1 277 821 | 7 566 141 | 1 576 849 | 682 683 | 5 702 008 | 46 059 617 | 8.5 | 7.4 |

Table 4.10 presents dates of key events for the SEP fund after the implementation phase (2013−18). This period is not considered, as the expenditures exceed income because of implementation costs. In tables 4.10 and 4.11, the assumed contribution rate is 7.0 per cent.

**Table 4.10. Key moments in the future evolution of SEP assets after the implementation phase, 2019 and later**

| | Year |
|---|---|
| Scheme's expenditure first exceeds contributions | 2065 |
| Scheme's expenditure first exceeds contributions plus investment income | After 2071 |
| (assets start to decrease) | |
| Assets are exhausted | After 2071 |

Table 4.11 presents the projected SEP fund. Good governance implies that the implementation costs be properly identified and adequately reported in the financial statements.

**Table 4.11. Projected revenue, expenditure and assets, self-employed persons, 2012−71 (MT thousands)**

| Year | Revenue | | | Expenditure | | | Assets | |
|---|---|---|---|---|---|---|---|---|
| | Contribution income | Investment income | Total | Benefits | Administrative expenses | Total | Year-end | Number of times current year's expenditure |
| 2013 | 0 | -41 | -41 | 0 | 934 | 934 | -975 | -1.0 |
| 2014 | 607 | -103 | 504 | 19 | 934 | 953 | -1 424 | -1.5 |
| 2015 | 1 711 | -98 | 1 613 | 66 | 934 | 1 000 | -810 | -0.8 |
| 2016 | 2 765 | 2 | 2 767 | 141 | 934 | 1 074 | 882 | 0.8 |
| 2017 | 4 503 | 232 | 4 735 | 224 | 934 | 1 157 | 4 459 | 3.9 |
| 2018 | 6 225 | 640 | 6 864 | 347 | 934 | 1 281 | 10 043 | 7.8 |
| 2019 | 8 023 | 1 236 | 9 259 | 470 | 1 203 | 1 674 | 17 628 | 10.5 |
| 2020 | 10 213 | 2 028 | 12 241 | 617 | 1 532 | 2 149 | 27 719 | 12.9 |
| 2021 | 12 871 | 3 103 | 15 974 | 827 | 1 931 | 2 758 | 40 935 | 14.8 |
| 2026 | 36 800 | 14 728 | 51 528 | 3 587 | 5 520 | 9 107 | 183 926 | 20.2 |
| 2031 | 93 814 | 47 725 | 141 539 | 14 607 | 14 072 | 28 679 | 583 403 | 20.3 |
| 2036 | 223 510 | 129 611 | 353 121 | 52 659 | 33 526 | 86 186 | 1 564 159 | 18.1 |
| 2041 | 509 863 | 313 426 | 823 289 | 169 465 | 76 479 | 245 944 | 3 747 603 | 15.2 |
| 2051 | 2 412 315 | 1 446 687 | 3 859 002 | 1 264 420 | 361 847 | 1 626 268 | 17 076 907 | 10.5 |
| 2061 | 10 107 364 | 5 123 928 | 15 231 291 | 7 498 157 | 1 516 105 | 9 014 262 | 59 618 956 | 6.6 |
| 2071 | 38 013 390 | 11 115 799 | 49 129 189 | 40 357 608 | 5 702 008 | 46 059 617 | 124 009 837 | 2.7 |

## SEP proposed contribution rate

In the establishment of a contribution rate specific to SEP, it is necessary to ensure that it will be sufficient to cover the financial needs of the system. If the rates are expected to evolve significantly in the future, it would be advisable to develop a plan of subsequent increases and to communicate the long-term perspectives to stakeholders. Equity among the various stakeholders must be preserved.

As the protection offered in the pension branch and in the death benefits branch is the same as the one that is available to salaried workers, equity suggests using the same contribution rate for both salaried workers and SEP. However, the long-term financial sustainability of the fund does not necessarily require a rate that is as high as the rate for salaried workers at the onset. Indeed, the benefits-to-earnings ratio increases very slowly in the first two decades. SEP may switch during their career from one status to another. Fairness suggests that these workers should pay the same amount for the same benefits, irrespective of their status.

Concerning short-term benefits, the estimated cost is stable throughout the projection period, but is subject to substantial uncertainty. Hence, the contribution rate determined at the onset could be subject to structural changes. Nevertheless, the rate for short-term benefits should be in line with the expected cost.

On the above basis, the following recommendations are made:

– The contribution rate for SEP should be identical to that for salaried workers.

– The allocation of the contribution rate by benefit branch should be identical to that for salaried workers.

## 4.3. Design topics

This section discusses certain legislative provisions and administrative practices.

### *4.3.1. Indexing of pensions*

The annual indexing of pensions is an administrative practice that relies on Articles 30, 36 and 119 of Decree No. 53/2007. Article 119 stipulates that pensions are increased after agreement by the Minister of Finance and the Minister of Labour by considering the variation in cost of living and the financial capability of the system. Articles 30 and 36 stipulate that the retirement and invalidity pensions should never be less than 60 per cent of the highest minimum salary. It is understood that such practice is extended to survivors' pensions with the appropriate adjustments. Articles 30 and 36 are included in those parts of the Decree that are apparently dedicated to the calculation of the initial pension, but they have been interpreted as conditions applicable during the lifetime of pensions.

The current administrative practice consists in increasing all pensions by a flat amount corresponding to the increase of the minimum pension, with the relevant adjustment for survivors' pensions. The consequence is that protection against loss of purchasing power decreases with the level of the pension, which may be considered unfair in a contributory system.

The NSSI has faced a problem in the application of the current legal provisions because the minimum salary legislation has changed after adoption of Decree No. 53/2007. Minimum salaries are now defined for several economic sectors, as opposed to two sectors only when the Decree was adopted. The range of minimum salaries is so wide that 60 per cent of the highest minimum salary would be higher than the lowest minimum salary. The issue has been analysed by NSSI technical staff and a pragmatic approach has been applied since 2010. It consists in using the median minimum salary as the basis for the determination of the minimum pension. Though this practice is not consistent with the legislation, it relies on sound principles. However, a change in the Decree must be contemplated in order to develop a solution that is consistent with the letter of the law as well as its spirit. This would be a good opportunity to include in the regulation a provision regarding automatic annual indexing of pensions. A possible solution to the current issue regarding the minimum pension would consist in determining its value in a base year and make it evolve over time according to a reliable salary index.

In the current system, the impact of the minimum pension is material. According to the data available, the minimum pension is paid to more than 70 per cent of pensioners at the valuation date. This proportion will decrease towards 32 per cent in the long term, as newly awarded pensions tend to be higher over time. In terms of financial impact, the cost of the minimum is about 1.9 per cent of insurable earnings. In other words, the GAP would be 10.0 per cent in the absence of minimum pension instead of 11.9 per cent. The projections indicate that the current importance of the minimum pension in demographic and financial terms will reduce significantly in the long term. Should this not happen, the system would lose its relevance, because it would be perceived more as a flat benefit system than an earnings-related one. The most efficient way to eliminate this potential flaw is to put in place a universal pension as a first pillar and eliminate the minimum pension, but this avenue is not considered in the present discussion.

It is recommended that protection against the loss of purchasing power be improved for pensions above the minimum pension. All pensions should be increased by the same percentage. Indexing should be automatic every year and based on a reliable indicator of change in purchasing power. No pension should ever be smaller than the minimum pension. As the annual increase in the minimum pension is linked to an indicator based on salaries growth rather than inflation, it can be expected that pensioners whose initial pension is slightly higher than the minimum pension would eventually receive the minimum pension.

Sensitivity tests have been made to estimate the impact of a change in the indexing method as described above. If indexing were to be based on price inflation, the GAP would decrease from 11.9 per cent to 11.7 per cent and the fund would be depleted in the same year as under the current contribution rate of 7 per cent. The choice of indicator for pension indexing is of great importance. For example, if pension indexing were based on earnings, the GAP would increase from 11.9 per cent to 14.9 per cent and the fund would be depleted in 2029 rather than 2035 under the current contribution rate. Such a scenario would be costly and unsustainable. The PAYG rate in the last projection year would be 20.9 per cent.

The above recommendation to index pensions according to inflation may raise some concerns among the stakeholders, as the salary increases are expected to be larger than price increases in the next decades because of productivity gains. Thus, stakeholders may wish to consider a pension indexing formula relying on a combination of both price and wage indexes, while preserving long-term financial sustainability. Further investigation would be necessary to determine a suitable scenario.

### *4.3.2. Revaluation of career earnings*

The number of years used in the determination of average earnings for the calculation of the pension is increasing gradually, from 10 in 2008 to 20 in 2017. The average salary according to this formula is close to a career average earnings. However, it should be said that the calculation of the average will be made by considering the effective number of contribution years for those retiring with less than 20 years of service. Revaluation of past earnings in the formula is necessary to keep the reference earnings relevant. Though the regulation is silent on revaluing salaries until retirement, such a revaluation is made in practice according to price inflation. The NSSI uses an approximate revaluation technique for the sake of simplicity; this relies on the calculation of an average indexing factor that is used for the calculation of all pensions in a given year.[8] The reference salary is obtained by applying this factor to the average of unadjusted earnings in the corresponding period.

The correct formula consists in revaluing each salary from its year up to the appropriate year. The approximation used by the NSSI introduces distortions. Generally speaking, the reference earnings will be higher under the approximate formula for those with a steep curve of earnings during their career than for those with a flat curve of earnings. Another distortion happens to the reference salary when the earnings used in the calculation of the average are distributed over a number of years that differs from the number of years used in the calculation of the average indexing factor.

In this valuation, the base scenario uses the exact formula, as it was understood that the NSSI's intention is to enhance the adequacy of the procedure for the calculation of the

[8] For pensions awarded in 2011, the factor is 1.78 and corresponds to the average of 13 indexing factors ranging from 2.81 (revaluation of 1998 earnings up to 2009) to 1 (no revaluation of 2009 and 2010 earnings). It seems that the procedure presumes there is no earning in 2011.

reference earnings. As the financial impact distortions mentioned above offset each other, robustness tests indicate that the results of this valuation would remain meaningful even if no change is made soon in the procedure used in the calculation of the career average indexed earnings. For equity considerations, it is recommended to modify the current procedure to make it consistent with basic principles.

Another feature of the calculation of the reference salary that should be revisited is the revaluation period. Presently, the indexing of earnings does not cover the full period from the year of earnings to the year of retirement. This generates a reference salary in monetary units of the second year before the retirement year. There may be policy or practical reasons behind this approach, such as the lag in publication of the Consumer Price Index (CPI). However, the pensions would be more relevant with a full revaluation of career earnings. The financial impact of full revaluation would not be material, as the GAP would increase from 11.9 to 12.1 per cent. It is recommended to revalue all earnings up to the year preceding the retirement year.

### *4.3.3. Maximum insurable earnings*

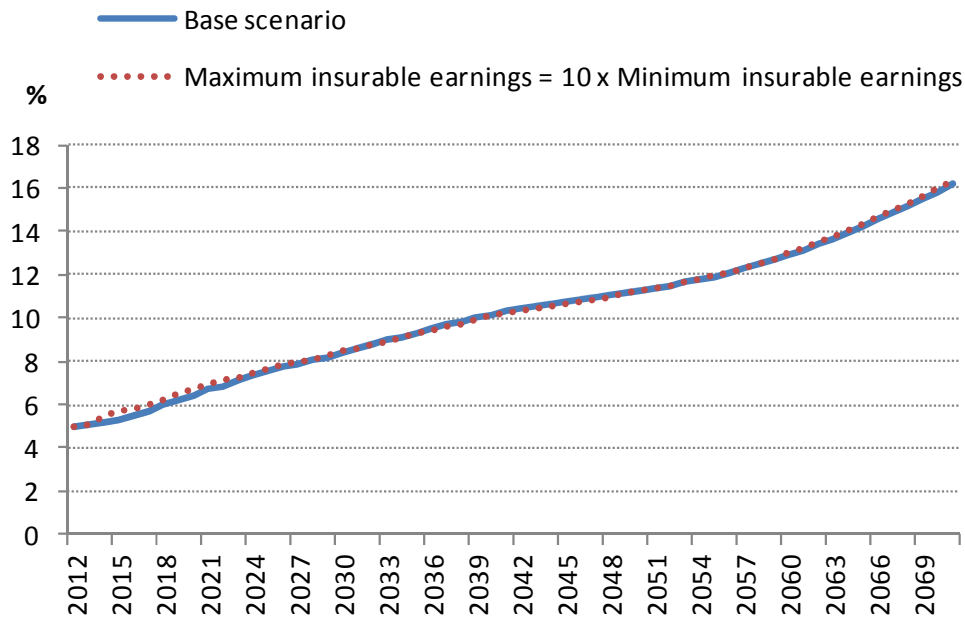
The scheme presently covers the totality of earnings (without ceiling). This is unusual for a national insurance scheme. The absence of a maximum can have a redistributive effect towards participants with high earnings because of their higher life expectancy. In periods when the rate of contribution is lower than the GAP, the redistribution towards participants with high earnings participants is aggravated. The objective of a contributory pension system is to cover a large part of the needs of a significant proportion of the population, while leaving enough room to allow collective or personal initiative to improve the protection by means of other mechanisms under state supervision. The question is then the definition of that significant proportion of the population.

The ILO Social Security (Minimum Standards) Convention, 1952 (No. 102) is a recognized guide on the subject. It proposes at least three references at which the maximum insurable earnings can be fixed: the earnings of a skilled manual male worker, the earnings covering the full earnings of at least 75 per cent of all covered workers, and 125 per cent of the average earnings of covered workers.

Given the limitations of the NSSI database, the determination of maximum insurable earnings based on the earnings of participants is subject to uncertainty. Further investigations should be made to ensure that discussions on this issue are based on reliable information. The determination of appropriate maximum insurable earnings has to consider various economic, social and financial criteria. This discussion is beyond the scope of this valuation and the issue must be discussed between stakeholders.

A test has been conducted to indicate the financial impact of implementing a maximum on insurable earnings. The test has set the monthly maximum insurable earnings at MT 28,500. This level represents 10 times the minimum insurable earnings used in determining the minimum pension. It is about 2.5 times the average earnings of participants and would cover full earnings for more than 75 per cent of participants. The decrease in total insurable earnings would be estimated at around 7 per cent, but this result is subject to uncertainty given the limitations of the contributors' database. The financial impact on key indicators is not expected to be material. Figure 4.1 shows that implementing the above maximum insurable earnings would slightly increase the PAYG cost rate except for about 25 years in the middle of the projection period.

**Figure 4.1. Projected cost rates as a percentage of insurable earnings, 2012−71**




### *4.3.4. Retirement and survivors' grants*

In Chapter X of Decree No. 53/2007 dealing with transitional and final provisions, Article 124 stipulates that retirement and survivors' grants can be awarded until 2017 to participants meeting all criteria to receive pensions except for the number of months of contributions. The grant benefit is relatively modest as it consists in 60 per cent of the last five-year average monthly salary times the number of years of contributions. It seems that the eventual elimination of this provision has raised concerns and the ILO has been asked to analyse the issue in the context of the present valuation.

The purpose of a contributory social security system is to provide an adequate income at retirement based on income during the working lifetime. The adequacy of the retirement benefit is proportional to the length of the career. In terms of social protection, there are good reasons to provide incentives for participation in the workforce during at least a certain period. Short careers cannot provide adequate protection at retirement. Minimum pensions provide a significant incentive for participation in the workforce during the period needed to obtain a pension, but the incentive to remain in the workforce beyond this period may be small or inexistent for certain workers with low earnings.

Eliminating the grants would mean significant losses of benefits to participants who cannot meet the minimum eligibility requirements. As they have paid contributions during a certain number of years, fairness would demand that they receive some benefit. Considerations of administration costs are sometimes raised to justify the relevance of paying grants rather than pensions to those with very short contribution periods. The ILO recommends maintaining the grant provisions beyond 2017.

The cost of maintaining the grant provision indefinitely is not material and would not jeopardize financial sustainability. The base scenario has assumed that the grant provision would be maintained indefinitely. The GAP for this benefit extension is about 0.2 per cent.

### 4.3.5. Accrual rate

Compared with international standards, the current pension formula is generous as participants accumulate for each contribution year 2.5 per cent of the reference earnings. This is well above the implicit minimum accrual rate in ILO Convention No. 102 (40 per cent after 30 years of contribution or 1.33 per cent per year of service). Projections of the present actuarial valuation indicate that the estimated long-term PAYG rate will be above 16 per cent. Whether this level is acceptable or not is an indicator to whether the current system can be considered sustainable. Because of data limitations, the uncertainty is high regarding the estimated long-term PAYG rate, but this uncertainty should be reduced in future valuations with improvements in the database. The long-term cost estimate is also subject to future deviations of key cost drivers from assumed values that future actuarial valuations will assess. The cost of the scheme needs to be monitored closely to keep the required contribution rate within an acceptable level, which may call for a change in the pension formula.

In order to provide a guideline on the impact of a change in the benefit formula, the financial impact of an alternative pension formula has been estimated. An accrual rate of 1.5 per cent per year of contribution for retirement pensions has been used. This is probably the lower bound of a possible range of acceptable rates in an environment where private pension systems are not expected to play a major role. The same accrual rate of 1.5 per cent has been used for invalidity pensions. Projections indicate that the PAYG rate in the last projection year would decrease from 16.1 per cent to 13.8 per cent with the lower accrual rate. For this simulation, the formula for the minimum pension has been left unchanged. More than 60 per cent of the new retirement pensioners would then be entitled to the minimum pension. This proportion is too high, which means that reduction of the accrual rate would require recalibration of other parameters in order to maintain the earnings-related feature of the scheme.

### 4.3.6. Retirement age

Retirement age is an important provision of a pension system. As compared to the trends in developed countries, the retirement age is low in Mozambique and the discrimination by gender is not consistent with socially acceptable practices. However, the financial projections do not indicate an urgent need to rush for a change in the retirement age, as it is a very sensitive issue in a social security system, especially when weaknesses in administration and governance of the change may damage the perception of the system by the public. Besides, the elimination of gender discrimination should be implemented at a pace that is consistent with the social and cultural development. This topic will have to be addressed by stakeholders shortly.

An increase in the retirement age is unavoidable in the long term. Despite our limitations in assessing the readiness of the population to accept changes based on gender equality, discussions should start now regarding this change. It could be combined or not with the unavoidable increase in retirement ages of both sexes. Changes in retirement ages must be planned long time in advance. It is recommended to start analysing the possible scenarios for retirement age increases as the NSSI reinforces its institutional capabilities.

### 4.3.7. Maternity benefits

The count of maternity benefits recipients has been low as compared to that expected, based on the population fertility rate. As the programme is still recent, it is not certain whether the experience reveals the maternity behaviour of the insured female population or denotes the underutilization of the programme for reasons such as lack of awareness of its

existence. It is advisable for the NSSI to undertake an analysis of the situation and ensure that the programme is properly advertised.

## 4.4. Actuarial bases for transfer of liabilities

For the determination of the value of liabilities in case of transfer from another scheme or from an individual, it is necessary to target the greatest equity between all the stakeholders while avoiding administrative complexity. A certain level of complexity can be acceptable when the amounts involved are large and the number of cases is small, provided the administrative body has qualified personnel capable of applying procedures efficiently. The following sub-sections discuss transfers regarding pensioners and people who have not liquidated their rights.

### *4.4.1. Transfer of pension payments*

Certain employers are paying pensions to their retired workers and may wish to transfer their obligations to the NSSI according to Article 123 of Decree No. 53/2007. This provision stipulates that the transfer is made according to a table. It is understood that this table must comply with equity principles and its values should be fair. A fair value is cost-neutral to the NSSI, meaning that no surplus or deficit will result from the transfer of liabilities. To achieve this objective, the table of factors should be based on the actuarial bases of the current valuation and should be revised at each actuarial valuation. It is understood that retirement pensions transferred to the NSSI would benefit from the annual indexation and death benefits (survivors' pensions and lump sums) provided in the Decree.

At present, the NSSI uses factors that are applicable to an annual pension in order to determine the value of assets to be transferred. These factors represent the present value of amounts to be paid in the future. For example, given the factor 11.75853 at age 60 and an annual pension of MT 25,000, the amount to be transferred to the NSSI would be MT 293,963 (25,000 x 11.75853).

The key assumptions in determining present values are the mortality rates and the relationship between the rate of increase of pensions and the interest rate used in discounting future payments. Under the current pension indexing formula, the rate of increase in pensions varies with the amount of pensions, and this suggests that present value factors should vary according to the amount of the monthly pension. The smaller the monthly pension, the larger the factor should be. Factors have been calculated for selected ages, assuming that the pensions transferred are twice and four times the minimum pension (see table 4.12).

**Table 4.12. Present values per unit of annual pension for selected ages**

| Age | 2 x minimum pension | 4 x minimum pension |
|---|---|---|
| 55 | 21.87 | 15.73 |
| 60 | 18.55 | 13.80 |
| 65 | 15.32 | 11.79 |
| 70 | 12.17 | 9.67 |

An alternative approach could also be possible. It would consist in determining (1) a set of present values for the part of the pension that corresponds to the minimum pension; and (2) another set for the part of the pension above the minimum pension. At age 65, those factors would be respectively 22.58 and 8.31. Application of the alternative is

simpler. Any change in the pension indexing formula would necessitate the process for the calculation of transfer values to be revisited.

### 4.4.2. Pre-retirement liabilities

In the context of this valuation, the ILO's guidance has been requested on three types of situation regarding the transfer of liabilities or the buying of rights before retirement.

The first situation is related to Article 126 of Decree No. 53/2007. It stipulates that people unable to comply with the eligibility requirements for a retirement pension because of their age at date of enforcement of the Decree may, upon request, pay a sum of money to the NSSI reserve in order to become eligible.

The second situation is related to certain newly registered employers who are willing to pay contributions for past years of service so that their workers acquire rights for those years. There is an issue regarding the determination of insurable earnings in past years, as the information may be unavailable in employers' records. The employers' proposal is to pay contributions based on current salaries. No interest would be charged on the arrears, as it is assumed that the use of current salaries would compensate for the loss of interest earnings on past contributions.

The last situation is related to migrant workers coming back to Mozambique after receiving a material lump sum from a pension system in a foreign country. This issue is mainly related to miners having worked in South Africa. The ILO has sponsored an exhaustive report on the issue.[9]

Each situation calls for a different financing technique, but they should all respect the basic principles described in the introduction to Section 4.4 above regarding equity and simplicity of administration. Potential procedures and administrative practices are discussed separately for each situation.

**Article 126 of Decree No. 53/2007**. The NSSI has started to develop an approach for the determination of the reserve that seems based on the rationale that the minimum number of years of contributions should be 20. It seems that it would not be possible for those meeting the minimum number of contribution years but not the maximum number of registration years to pay an amount of money to the reserve. This may correspond to the spirit of the law, but it seems appropriate to discuss the topic through a wider range of possibilities that the letter of the law would suggest.

It seems important to distinguish two categories of cases. They are: (1) those unable to meet the requirement regarding the minimum number of contribution years (10 years) by normal retirement age; and (2) those meeting the minimum number of contribution years, but unable to meet the number of registration years (20 years).

An important premise is that retirement is not compulsory at 60 for male and 55 for female. Therefore, the acquisition of rights through contributions is possible after those ages through (1) participation in the workforce and payment of contributions if the number

[9] International Institute for Social Law and Policy (IISLP): *Final report: Reflections on the social security position of Mozambican workers in and returning from South Africa with specific reference to the extensions of retirement provision to Mozambican migrant workers, in particular Mozambican mineworkers in and returning from South Africa, and their survivors* (Clarkson, Western Australia, 2010).

of contribution years are less than 10; and/or (2) maintenance of registration and retirement deferral until the 20 registration years are attained.

For example, a male worker registering at age 53 in 2009 would attain age 60 in 2016. Let us suppose that by then he would have contributed seven years, which is below the required minimum (10) and well below the minimum number of registration years (18) in that year. The following scenarios are possible:

1. To comply with the minimum number of contribution years, he keeps working and contributing for three years and becomes eligible for a pension at age 73.

2. To comply with the minimum number of contribution years, he buys back three past years through payment of a reserve and becomes eligible for a retirement pension at age 70.

3. To comply with the minimum number of contribution years, he keeps working and contributing for three years, and he also pays a reserve to be eligible for a pension at age 63 to cancel the deferral of the pension to age 73.

4. To comply with the full requirements, in terms of contribution and registration years, he pays an appropriate reserve for both the buy-back of three past years and cancellation of deferral of the pension to age 70 and becomes eligible to a pension at age 60.

5. He retires at age 60 and receives a grant.

Scenarios 1 and 2 are not consistent with the purpose of the pension system to provide an adequate income at the normal retirement age. Scenario 5 is already covered by the Decree but an amendment would be necessary to keep the provision in force beyond 2017.

Scenarios 3 and 4 are addressed by Article 126 of the Decree, which stipulates that a reserve should be paid on behalf of the worker at the date of registration. Such reserve could be interpreted as the actuarial value of the acquired rights for the missing years of service and registration. Should the reserve for buy-back in Scenario 4 mean the contributions that should have been paid in the past for the missing years, the following issues need to be addressed. Which earnings should be considered for those virtual years of contributions, what is the appropriate contribution rate and how should the time value of money be considered? Both scenarios require calculation of a pension payable at age 63 (Scenario 3) or 60 (Scenario 4) that is equivalent to the deferred pension payable at age 73 (Scenario 1) or 70 (Scenario 2).

In theory, earnings in the missing contribution years (Scenario 4) should be those earned or presumed to be earned by workers during the years for which contributions and rights are attributed. In the example presented above, earnings should be those of ages 50 to 52. This is not practical, however, and a simple and acceptable approach would be to use the insurable earnings in the first actual contribution year, at age 53. For a typical worker, such earnings would be higher than previous earnings because of general salary increases and the increase in productivity due to experience. This approach should be reflected in the time value of money for calculation of the contribution to be paid and in the revaluation of career earnings for pension calculation. The presumed earnings for ages 50 to 52 should be indexed from age 63 to retirement, while no interest should be charged for the payment of contributions corresponding to ages 50 to 52. Payment of interest would start to run at age 53 and, if the payment is made when the worker is aged 55, two years of interest would be charged.

The contribution rate should be the historical total contribution rate applicable in the years in which the earnings are assumed to be earned, which is 7 per cent. It may be argued

that 7 per cent is excessive, as part of this has been allocated in the past to short-term benefits that the workers could not benefit from. But this argument does not hold, as this valuation indicates that 7 per cent is well below the GAP for long-term benefits. Besides, the cost for years of service at advanced ages is higher than the average cost. In using the current contribution rate of 7 per cent, users of Article 126 would still benefit from the same intergenerational subsidy as the other participants. Based on the above, the formula would be the product of annual earnings in the first contribution year by the number of years to be contributed and 7 per cent.

Regarding the time value of money, the rationale is the following: the amount calculated above should be accumulated with interest from the first contribution year to the year the payment is made. In the example above, if the worker elects to make the payment at the registration date, there is no accumulation factor. If the payment is made at age 54, the amount would be accumulated for one year and so on. The interest rate used should be the highest of (1) the increase in the CPI in the period plus 4 per cent; and (2) an indicator from the banking system reflecting the interest on personal loans to consumers.

There is no doubt that the users of this provision would benefit from a subsidy in relation to the wording of Article 126. However, they would not be treated much differently from other participants registering at advanced ages.

Practically, participants may not have the amount of money available and an alternative could consist in applying coefficient reductions to the pension, in the same way as this is done in pension systems with provisions regarding early retirement. This option would be available to those complying with the minimum number of contribution years (10) through participation in the workforce or payment of contributions as described above. An estimation of the factor applicable to Scenario 3 has been made. A factor of around 78 per cent should be applied to the pension that would be payable at age 63. This factor should be applied to any amount of pension, including the minimum pension, and including the annual pension adjustments to protect the purchasing power of pensions. This may not be considered acceptable by stakeholders and would probably cause some administrative complexity.

Table 4.13 summarizes the scenarios described above and the recommended actions for each of them.

**Table 4.13. Summary of possible career and retirement profiles for registration at age 53**

| Scenario | Theoretical retirement age | Retirement benefits | 10 years of contribution | | 20 years of registration | |
|---|---|---|---|---|---|---|
| | | | Working period | Buy-back service | Retirement deferral | Action |
| 1 | 73 | Pension | Age 53 to 63 | None | age 63 to 73 | Unavailable option |
| 2 | 70 | Pension | Age 53 to 60 | 3 years | age 60 to 70 | Unavailable option |
| 3 | 63 | Pension | Age 53 to 63 | None | None | Anticipate retirement from age 73 to 63 * |
| 4 | 60 | Pension | Age 53 to 60 | 3 years | None | Anticipate retirement from age 70 to 60 * |
| 5 | 60 | Grant | Age 53 to 60 | None | None | None |

* Payment of a sum of money to the fund or a reduced pension is paid.

**Employers willing to start contributing and pay arrears**. The issues raised by the proposal from employers regarding the payment of past contributions have been discussed above. An approximation is made regarding the evolution of past salaries and interest rates

and their offsetting feature in the calculations. It would be difficult to argue that arrangements available to individuals would not be available to groups.

It may happen however that employers have more capabilities of abusing the system than single individuals. Thus, the verification of the number of past years of service by NSSI should be addressed carefully. The number of registration years should correspond exactly to the period of service. For example, the number of registration years allocated to an employee having worked 10 effective years over a period of 20 years should be 20. The ILO recommends going forward with this approach over a short window period of two years. Otherwise this procedure might be considered merely an option and employers might wish to choose the appropriate timing to register with the NSSI.

**Migrant workers wishing to deposit a lump sum**. The IISLP report for the ILO on miners coming back from South Africa examines exhaustively all potential solutions to the problems of those workers in both the short and the long term. The ideal solution, which would be to make an agreement between the social security systems of Mozambique and South Africa, is not possible as there is no social security system in South Africa providing retirement pensions. Miners have contributed to provident funds. Converting their lump sum into an annuity after returning to Mozambique is only one of the several options analysed in the IISLP study. Should conversion be offered by NSSI, it may be anticipated that few workers will prefer to convert their lump sum into an annuity rather than keeping control over it unless they have financial incentives to do so. It would not be justified for NSSI to develop a costly procedure to provide the service.

In Section 4.4.1, we have discussed the problems related to the determination of present values for the transfer of pensions resulting from the impact of the indexing formula partially based on the increase in the minimum earnings. For the conversion of lump sums into annuities, there are two ways to avoid this problem. One of them consists in determining fixed annuities not subject to indexing, but this is not acceptable due to lack of protection against the loss of purchasing power. The other option would be to provide indexation according to an index or a predetermined percentage that the worker may select. The actuarial bases used to calculate such factors should be consistent with those of the present actuarial valuation. Table 4.14 presents factors for selected ages. It is recommended to use unisex factors, although it is well-known that users of the provisions would be mainly males. The determination of factors takes this into consideration.

**Table 4.14. Initial annual pension per MT 1,000 of cash for selected ages**

| Age | CPI indexing | 4 % annual increase |
|---|---|---|
| 55 | 57.92 | 70.39 |
| 60 | 65.40 | 77.98 |
| 65 | 76.49 | 89.54 |

Should a mining worker be willing to defer the buying of the annuity and deposit his money at the NSSI, this should be made possible and the NSSI should guarantee a rate of return based on fixed income and riskless investment.

## 4.5. Health and social actions

The health and social action programme is described in Article 102 of the Decree. Specific activities are determined by the NSSI Board of Directors and include:

- the granting of non-monetary benefits to beneficiaries;

- the repair of calamities and endemic occurrences; and
- financial assistance or participation in public or private institutions in the health and social area where activities benefit the population covered by the NSSI.

According to Article 109 of the Decree, expenses for social and health actions must be reported under a specific category in the financial statements. Article 110 stipulates that the expenses of this programme must be added to the administrative expenditures for the purpose of determining the limit of non-technical expenses (15 per cent of contributions).

Until 2010, the accounting practice was to allocate certain specific income items (interest on late payments, penalties and write-off of prescribed pension payments) to the social and health actions programme, and plan the budget according to the expectations of those sources of income. The practice is unclear for the income in 2011, as the preliminary financial statements indicate that income from the items mentioned would be reported under another heading, namely supplementary receipts.

Table 4.15 presents income and expenditures of the intervaluation period for the programme as well their ratio to total income and expenditures.

**Table 4.15. Health and social action programme financial data, 2007−11**

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| Income (MT millions) | 6.7 | 8.1 | 8.3 | 12.1 | 0.0 |
| Expenditure (MT millions) | 11.2 | 6.1 | 6.9 | 9.5 | 3.0 |
| Income as % of total income | 0.5 | 0.5 | 0.4 | 0.5 | 0.0 |
| Expenditures as % of total expenditures | 1.3 | 0.6 | 0.6 | 0.6 | 0.2 |

Income and expenditures have been less than 1 per cent of total income or expenditures in the intervaluation period and have little impact on the long-term financial sustainability of the system. As the financial scope of this programme is rather vague in the law and its costs are part of the aggregate limit of non-technical costs subject to the limit of 15 per cent of income, it does not seem that the intent was to make it extensive. It may be a useful tool for NSSI to intervene in specific but limited circumstances.

It would probably help the financial planning process if a specific proportion of the non-technical expenditures for this programme were determined in advance for a certain number of years. This could be done through an internal administrative policy. As the social security system is contributory, the resources dedicated to this programme should remain limited because of its discretionary nature. Contributions to the social security system should not become substitutes for other sources of government revenues to provide non-cash benefits to people in need.

## 4.6. Investment policy

Article 106 of Decree No. 53/2007 stipulates that an investment policy should be adopted by the NSSI Board of Directors and approved by the Minister of Labour. So far, no investment policy has been adopted. A funding policy was recommended in the context of the previous valuation. However its irrelevance has not helped the NSSI to progress significantly in the matter. The NSSI has kept on investing in fixed income assets and monitoring closely the performance of its investments. The internal staff, further to a detailed analysis of the performance of assets by category in 2009 and 2010, has produced

a set of technical recommendations regarding the management of funds. The absence of investment policy remains a major obstacle to improving the assets management, as there are no guidelines or benchmarks available especially regarding target asset class mix.

For this valuation, the determination of investment yields on NSSI invested assets implicitly assumes that an investment policy will be put in place in the coming years and explicitly assumes that a modest change in the asset mix will eventually take place with a slightly greater weight given to equities. This change will not happen unless people make decisions in that direction, either in a formal framework of an investment policy or otherwise. Past unsatisfactory returns on equities may suggest that such a move will not happen unless an investment policy is put in place and means are taken to implement it and make it work properly.

Investing in asset classes other than fixed income, such as stocks, private placements and real estate, requires specialized expertise and a strong governance framework. The still limited investment market in Mozambique and the modest size of the NSSI fund raise questions regarding expanding the NSSI investment activities. Will the expected gains reward NSSI efforts of developing new expertise within a reasonable time frame? Will the size of the NSSI fund evolve significantly enough to support and profit from the capacity building in the investment area? From the public policy point of view, should the NSSI be attributed a role in the economic and financial development of the country? One of the key orientations that would have to be defined is the balance between outsourcing and the development of internal expertise. The extensive use of outsourcing does not mean that internal capacity building becomes unnecessary. It would just be different.

Another element to be considered is the potential evolution of the pension scheme covering civil servants. So far, no fund has been accumulated in the civil servants system as pensions are paid from contributions, but the desirability of changing the situation is currently under scrutiny. Should a fund for the civil servants system start to accumulate, there would be opportunity for both systems to combine their efforts in the matter of assets management. This could be achieved in various ways, one of them being the creation of a separate body for assets management.

The ILO is well aware of the need to reinforce NSSI performance in the investment area and recommends a plan of action, to be taken in the following four steps:

1. Define the long-term strategy regarding the balance between the increase in contribution rates and the change in benefits, in order to assess the evolution of the fund in a long-term horizon.

2. Develop a preliminary investment policy based on technical considerations, such as yield, risk and liquidity, and the current and future investment markets in Mozambique.

3. Identify the conditions required for the implementation of the preliminary investment policy and assess its feasibility.

4. Based on the findings of no. 3, determine the investment policy and the governance and administrative structure required for its application.

These recommendations are consistent with recommendations 26 to 30 included in the ILO diagnosis report[10] regarding fund investments. The report exhaustively describes

[10] OIT, Projecto STEP Portugal: *Diagnóstico do Instituto Nacional da Segurança Social de Moçambique* (Agosto 2010).

the measures to be taken regarding the governance and the administrative structure, including the creation of investment and risk management committees.

## 4.7. Administrative expenditures

In this valuation, the long-term assumption regarding administrative expenditures is that they are equal to 15 per cent of the contribution income. Article 110 of the Decree stipulates that the non-technical expenses should never be larger than 15 per cent of income. The approach used in sensitivity tests presumes that the level of administrative expenditures would decrease below 15 per cent should the contribution rate be increased, in order to maintain the amount of expenditures at the same level as under the current conditions.

It should be noticed that the 15 per cent is not applied to investment income in the projection as would suggest the wording of Article 110. This is because the interest rate used is assumed to be net of investment expenses. Besides, in the first few years of the projection period, the assumption that the administrative expenditures would follow the pattern of price inflation and salary growth in equal proportions, as used in the long-term assumption, would generate results that underestimate the short-term trend.

Table 4.16 present ratios of administrative expenditures to certain elements in the intervaluation period.

**Table 4.16. Administrative expenditure ratios, 2007−11**

| Administrative expenditures as % of | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| Contribution income | 36.3 | 39.0 | 34.1 | 30.6 | 24.1 |
| Contribution and investment income | 30.9 | 32.5 | 26.5 | 24.4 | 18.4 |
| Benefits expenditures | 92.3 | 94.9 | 80.5 | 75.9 | 65.3 |
| Insurable payroll | 2.5 | 2.7 | 2.4 | 2.1 | 1.7 |

All ratios present a decreasing trend since 2008. The NSSI seems on the right track to respect the limit of administrative expenditures stipulated in the Decree.

For any social security system, assessment of the appropriate level of administrative expenditures must be based on several criteria that rely necessarily, at least in part, on judgement. Sufficient resources are necessary to provide the appropriate level of service while maintaining a reasonable cost. The type of benefits, the level of maturity of the system, and the level of contributions in relation to benefits must all be considered when establishing indicators for the analysis of administrative expenditures. There is no reliable unique benchmark valuable in all circumstances. Guidelines can be inspired by comparison with other systems and genuine consideration of the differences between them.

The limit of 15 per cent of income stipulated in the Decree is in line with the recommendations of the accounting plan of the *Conférence interafricaine de la prévoyance sociale* (CIPRES), but it is still well above the experience observed in developed countries. For example, for the Canada Pension Plan, the ratios of administrative expenditures as a percentage of benefit expenditures and insurable earnings were respectively 2.2 and 0.15 per cent in 2010. Although such ratios are not short-term realistic benchmarks for the NSSI, they can still be used as a long-term target for the identification of potential future efficiency gains. The ultimate objective in the search of efficiency is to ensure that the largest proportion of income be spent on benefits. As the NSSI also covers short-term benefits (maternity and sickness) that are generally more demanding to administer, the long-term target would be slightly higher than the ratios of the Canadian system.

# Conclusion

The results of actuarial valuations are subject to uncertainty because it is impossible to forecast all variables influencing the cost of pension systems. According to Article 105.2 of Decree No. 53/2007, actuarial valuations must be updated at least every five years. The results of the present valuation are even more uncertain because of incompleteness of the databases, and it would be advisable to update them sooner than at December 31, 2016 if the data situation improves further to the implementation of a new operational system. In the meantime, a close monitoring of the observed results compared with the projections should be made every year in order to identify the sources of deviations. This would help the internal staff to master the basics of actuarial valuations and their data requirements.

The results of this actuarial valuation show that the PAYG rate will increase steadily during the projection period from 4.2 per cent in 2011 to 16.1 per cent of insurable earnings in 2071 under the base scenario. This in itself does not raise concerns. However, contribution rate increases or a combination of contribution rate increases and decreases in benefits are unavoidable in the future. This report provides guidelines for orderly actions. Certain changes, such as the retirement age, must be planned far in advance and it is advisable to develop a strategy to ensure the long-term financial sustainability of the system and its relevance as a social protection mechanism.

Several policy issues have been analysed in this report. The extension of coverage to independent workers would be a significant improvement in the social protection system of Mozambique. Certain issues are technical, and the report provides basic principles as well as quantitative illustrations of factors necessary for their application when needed. Once the orientations are decided, the detailed processes and tools necessary for their implementation could be produced by the ILO.

# Appendix I

# Overview of the legal provisions of the compulsory social security system

This appendix provides a general description of the coverage, and of the provisions for the regulation[11] of the compulsory social insurance system, stipulated in the Social Protection Act No. 4/2007. The compulsory social insurance system is administered by the National Institute of Social Security (NSSI),[12] which is an autonomous institution.

## *A1.1. Contingencies covered*

The compulsory system covers the following contingencies:

- Sickness: subsidy for sickness or hospitalization
- Maternity: subsidy for maternity
- Old-age: pension
- Invalidity: pension
- Death: funeral subsidy, death subsidy and survivor's pension

## *A1.2. Coverage*

The compulsory system covers all salaried workers resident in Mozambique except those who are covered by the system of government employees. The definition of "worker" is wide and includes, for example, foreigners, administrators of companies, seasonal workers and the owners of a business having workers or with a stable establishment.

The incorporation of domestic employees, athletes, artists and workers in the agricultural and similar sectors will be covered by decree of the Secretary of Labour, in a gradual way and by category, taking into account the capacity of the administrative structure of the NSSI.

The participation of independent workers is compulsory, but their inclusion will also be ruled by decree of the Secretary of Labour, in a gradual way and by category, taking into account the capacity of the administrative structure of the NSSI and of those workers registering in the system.

Those workers who stop exercising their professional activities can continue to participate in the system if they meet certain conditions of months of contribution.

[11] Decree No. 53/2007 on the System of Compulsory Social Security for Workers, 3 December 2007.

[12] NSSI is the acronym for Instituto Nacional de Segurança Social and was created by Decree No. 17/88.

## A1.3. Contribution base

The contribution base includes the basic salary, bonuses, commissions, other items of similar nature regularly attributed and allowances for management duties. There is no maximum.

## A1.4. Financing

The contribution rates are fixed by a decree of the Ministers of Finance and Labour. The rate of this contribution fixed at 7 per cent of insurable earnings (4 per cent contributed by employers and 3 per cent by workers).

## A1.5. Benefit provisions

### A1.5.1. Long-term benefits

*Retirement pension*

*Eligibility*: To be 55 years old, being a woman, or 60, being a man, and to meet the following conditions: a) was registered in the system for at least 20 years; and b) has contributed for at least 10 years (120 months)

or, at any age, if a) was registered in the system for at least 30 years; and b) has contributed at least 25 years (300 months).

*Amount of benefit*: The monthly pension is equal to the ratio of the total number of months of contributions (maximum of 432) over 240 multiplied by 50 per cent of the average monthly insurable earnings calculated according to the following formula:

The average monthly insurable earnings are the sum of the earnings of 10 years previous to the date of the beginning of the pension divided by 120. On the First of January of every year from 2009, an additional year will be considered in the calculation of the average salary (maximum of 20 years). The wages are indexed up to the retirement year.

*Minimum basic pension:* Sixty per cent of the national minimum wage.

*Retirement grant*

*Eligibility:* From 2008 to 2018, the NSSI can award a grant to the participant of 55 years of age, being a woman, or 60, being a man, and who does not meet the requirements of contribution and registration years.

*Amount of benefit:* Sixty per cent of the average monthly earnings of the last five years multiplied by the number of years of contribution.

### *Invalidity pension*

*Definition:* The worker is considered an invalid when, as a result of a non-work-related disease or accident, he/she suffers a loss of his/her capacities physical or mental, appropriately certified by the Health Committee, that makes him/her totally incapable for work.

*Eligibility:* Registered in the system for at least five years at the date of disability; b) has paid contributions in the last five years previous to disability during at least two years and a half (30 months).

The beneficiary who reaches the maximum duration of sickness subsidy and satisfies the described conditions has the right to the invalidity pension.

*Amount of benefit:* The pension is equal to 60 per cent of the old-age pension to which the participant would have the right.

*Minimum pension:* Sixty per cent of the national minimum wage.

*Duration of pension:* It is paid up to retirement age or recovery. At the age of eligibility to the old-age pension, the old-age pension is determined using the amounts of invalidity pension for the purpose of determining the average salary. The invalidity is checked every six months by the Health Committee unless it has been determined totally and permanently.

### *Survivors' pension*

*Eligibility:* Death of a retirement or invalidity pensioner or of an active worker if, at the date of death, he/she has five years of contributions.

- The spouse who is not separated and the children under 18 and under 21 or 25 if they are registered in a course of respectively average or top level, or without condition of age if they are totally disabled for work.
- The spouse who is not separated.
- Children under 18 and under 21 or 25 if they are registered in a course of respectively average or top level, or without condition of age if they are totally incapacitated for work.

*Amount of benefit:* The pension is equal to the old-age pension calculated according to the conditions at the date of death and is distributed in the following way:

- 50 per cent to the spouse
- 50 per cent to children

*Duration of benefit:* Spouse: the pension is for life. If he/she dies, his/her part is distributed to the orphans.

Orphan: up to 18, 21 or 25 years according to the school situation or up to the end of invalidity.

*Survivors' grant*

*Eligibility:* From 2008 to 2018, the NSSI can award a grant to the survivor of a participant if, at the date of death, the participant does not have right to an old-age pension and has less than five years of contributions.

*Amount of benefit*: Equal to the retirement grant that the participant would have if he/she had retired at the date of death.

*Death subsidy*

*Eligibility:* Death of a pensioner or of an insured person if at the date of the death he/she has been registered in the system for at least three years and has paid at least six months of contribution in the last 12 months immediately previous to the date of death.

*Amount of benefit:* The subsidy is equal to six (plus the number of minor children of the deceased) times:

- in case of an insured person: the average monthly salary of the six months before death
- in case of a pensioner: the pension payable in the month of death

In the absence of a spouse, children with right and of ascendancies, the subsidy is paid to the health action programme.

*Funeral subsidy*

*Eligibility:* Death of a pensioner or of an insured person if at date of death he/she has been registered in the system at least three months and has paid at least three months of contributions.

*Amount of benefit:* The subsidy is determined by the Minister of Labour and adjusted from time to time according to the capacities of the system (MT 3,000).

### A1.5.2. Short-term benefits

*Sickness benefit*

*Contribution requirement:* Six months of contributions in the year previous to the incidence of sickness including two months immediately before the sickness.

*Eligibility:* The subsidy is granted in the following circumstances:

- Disease or accident not resulting from work
- Absence from work to accompany a hospitalized minor child
- Convalescence of a minor child

*Amount of benefit:* The daily subsidy is equal to 65 per cent of the ratio of the wages during

| | |
|---|---|
| | the six months before the beginning of the disability to 180. |
| *Waiting period:* | Three days except in case of hospitalization of the worker, of contagious disease or of the impediment to work certified by a doctor. |
| *Duration of benefit*: | Maximum of 365 days. If the disability persists, the beneficiary starts receiving an invalidity pension. |
| *Internment subsidy*: | In case of disease or accident not resulting from work or accompaniment of a hospitalized minor child, the subsidy is equal to the daily rate of the National Health Service and is paid to the establishment under presentation of the invoice by the beneficiary. |

*Maternity benefit*

| | |
|---|---|
| *Contribution requirement*: | Six months of contributions in the year previous to the incidence of sickness including two months immediately before the sickness. |
| *Eligibility:* | The subsidy is granted in case of childbirth. It can start to be paid 20 days before the date foreseen for the birth. |
| *Amount of benefit:* | The daily subsidy is equal to 100 per cent of the ratio of the wages during the six months before the beginning of the disability to 180. |
| *Duration of benefit:* | 60 days. |

## *A1.6. Benefit indexing*

The revaluation of the minimum pension is applied to all pensions in absolute amounts. The minimum pension cannot be higher than the lowest minimum wage in all sectors. The increase is distributed between the recipients of the survivors' pension.

# Appendix II

# Methodology of the actuarial valuation

This actuarial review makes use of the comprehensive methodology developed at the ILO Financial and Actuarial Service for reviewing the long-term actuarial and financial status of national pension schemes. These modelling tools include a population model, an economic model, a labour force model, a wage model, a long-term benefits model, a short-term benefits model and an employment injury model. The review has been undertaken by modifying the generic version of the ILO modelling tools to fit the specific case of the NSSI.

The actuarial valuation starts with a projection of the future demographic and economic environment of Mozambique. Next, projection factors specifically related to the NSSI are determined and used in combination with the demographic/economic framework.

## *A2.1. Modelling the demographic and economic environment*

The use of the ILO actuarial projection model requires the development of demographic and economic assumptions related to the general population, the economic growth, the labour market and the increase and distribution of wages. Other economic assumptions relate to the future rate of return on investments, the indexation of benefits and the adjustment of parameters such as the maximum insurable earnings and the future level of flat-rate benefits.

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

### General population

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

### Economic growth

Increases in the productivity of labour, wage share of GDP and inflation rates are exogenous inputs to the economic model. The long-term GDP growth assumption is the result of assumptions on the future evolution of the labour force, wage share of GDP and labour productivity.

### Labour force, employment and insured population

The projection of the labour force, i.e. the number of persons available for work, is obtained by applying assumed labour force participation rates to the projected number of persons in the general population. Employment rates are assumed for the future and unemployment is calculated as the difference between labour force and employment. This exercise is performed separately for salaried and self-employed persons.

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

### Wages

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

In the medium term, real wage development is checked against the labour productivity growth. In specific labour market situations, wages might grow at a pace faster or slower than productivity. However, due to the long-term perspective of the present review, the real wage increase is assumed to gradually converge with real labour productivity. It is expected that wages will adjust to efficiency levels over time.

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 within age and sex groups.

## *A2.2. Modelling the financial development of the NSSI*

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

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

Projections for pensions are made for each sex separately. Groups of insured are separated between salaried and self-employed persons.

### 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 expenditure 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; and

– testing how the system reacts to changing economic and demographic conditions.

### Pension data and assumptions

Pension projections require the demographic and macroeconomic frame already described and, in addition, a set of assumptions specific to the NSSI.

The database as of the valuation date includes the insured population for the active status, the distribution of insurable wages among contributors, the density of contributions and pensions in payment. Data are disaggregated by age and sex.

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

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

### Pension projection approach

Pension projections are performed following a year-by-year cohort methodology. The existing population is aged and gradually replaced by the successive cohorts of participants on an annual basis according to the demographic and coverage assumptions. The projection of insurable earnings and benefit expenditures are then performed according to the economic assumptions and the scheme's provisions.

Pensions are long-term benefits. Hence the financial obligations that a society accepts when adopting benefit provisions and financing 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. It is not the objective of pension projections to forecast the exact development of income and expenditures of the scheme, but to check its financial viability. This entails evaluating the scheme with regard to the relative balance between future revenue and expenditure.

# Appendix III

# NSSI specific data and assumptions

In addition to the demographic and economic assumptions presented in Section 2, the projection of the future financial development of the National Social Security System requires a database specific to the scheme (characteristics of insured persons and pensions in payment) and some particular actuarial assumptions. The data used can essentially be grouped in two broad categories. First, there are the data that concern the contributions received and benefits paid and that are used to formulate a number of assumptions. Second, there are the data that allow for identification of the current contributors and benefit recipients and their characteristics, namely the initial data. For this valuation, the data collection system was not sufficiently developed to gather the full set of data. For that reason, the results of this valuation are subject to material uncertainty. Measures such as calibration of initial data with financial statements results and sensitivity tests have been taken to mitigate the impact of data incompleteness.

## *A3.1. Data and assumptions on the insured population*

Aggregate data on the insured population rely on operational reports of the statistical division and contribution income results reported in the financial statements. Detailed data by gender and age have been obtained from individual data files for the years 2007 to 2011. These files do not include all insured persons, but only those from delegations that are computerized (about two-thirds of the total). Despite their limitations, they are considered the best available source of information for the present purpose.

### Number of insured persons

Table A3.1 shows the average number of insured persons by gender and age. This average number of contributors is used in the ILO model in combination with density factors (see table A3.4) in order to determine the number of participants who contribute at least once a year. The combination of the average number of contributors and the density factors by age reveals that 437,450 males and 120,901 females would have contributed in 2011.

The ILO model refers to these as the active contributors. The data processing also shows that the contribution pattern of workers during their career is irregular. Some people who in their working ages having contributed in the past, but not in 2011, may have acquired some rights to benefits. They are considered as the inactive at the valuation date in the ILO model. It has not been possible to quantify those people with sufficient accuracy to consider including an estimation in the base scenario. The financial impact of that group has been assessed in a sensitivity test.

**Table A3.1. Insured persons, by age and sex, 2011**

| Age | Average number of contributors | | |
|---|---|---|---|
| | Male | Female | Total |
| 15-19 | 1 756 | 421 | 2 177 |
| 20-24 | 23 624 | 6 298 | 29 922 |
| 25-29 | 45 769 | 13 963 | 59 732 |
| 30-34 | 44 668 | 14 351 | 59 019 |
| 35-39 | 34 178 | 9 797 | 43 975 |
| 40-44 | 26 653 | 6 986 | 33 639 |
| 45-49 | 25 003 | 5 710 | 30 713 |
| 50-54 | 19 536 | 3 713 | 23 249 |
| 55-59 | 12 264 | 1 483 | 13 747 |
| 60-64 | 4 805 | 356 | 5 161 |
| 65-69 | 1 331 | 99 | 1 430 |
| **Total** | **239 587** | **63 177** | **302 764** |

The projection of the insured population is calculated by applying coverage rates (by age and sex) to the employed salaried population as determined under the economic framework below the first retirement age (55 for females and 60 for males). The pattern of coverage rates in the base year shows irregularities in the mid-working ages. They have been smoothed out from 2012 to 2028. Age-specific coverage rates of 2028 are assumed constant for the rest of the projection period. After the first retirement age, the coverage rate is driven by assumptions on retirement age presented in table A3.8. The coverage rates appearing in table A3.2 are calculated as the ratio of insured persons to the employed salaried people in the labour force at the corresponding age.

**Table A3.2. NSSI coverage rates, by age and sex** (percentages)

| Age | 2011 | | 2028 and after | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| 17 | 1 | 0 | 1 | 0 |
| 22 | 17 | 13 | 17 | 13 |
| 27 | 34 | 34 | 34 | 34 |
| 32 | 36 | 41 | 36 | 41 |
| 37 | 31 | 30 | 36 | 38 |
| 42 | 29 | 27 | 36 | 35 |
| 47 | 35 | 32 | 35 | 32 |
| 52 | 34 | 24 | 34 | 24 |
| 57 | 29 | 10 | 29 | 10 |
| 62 | 14 | 3 | 14 | 3 |
| **Total** | **25** | **21** | **28** | **23** |

## Insurable earnings

Table A3.3 shows the average insurable earnings of active contributors in 2011 on a monthly basis, by age and sex. Average earnings of the insured population have been separated into three subgroups of earnings: the lowest 30 per cent, a medium range of 40 per cent and the highest 30 per cent, in order to capture the effect of the minimum pension. It is noteworthy that salaries of females are larger than those of males.

**Table A3.3. Average monthly insurable earnings of active contributors, 2011** (MT)

| Age | Male | Female |
|---|---|---|
| 15-19 | 5 347 | 7 063 |
| 20-24 | 6 139 | 7 801 |
| 25-29 | 7 766 | 8 887 |
| 30-34 | 9 806 | 10 853 |
| 35-39 | 11 742 | 13 271 |
| 40-44 | 13 154 | 15 669 |
| 45-49 | 13 761 | 17 438 |
| 50-54 | 13 538 | 18 155 |
| 55-59 | 12 633 | 17 524 |
| 60-64 | 12 062 | 16 634 |
| **Total** | **10 590** | **12 219** |

## Density of contributions

Density of contribution represents the proportion of the year during which the average contributor pays contributions. Density factors by age and sex were obtained from the individual data. The statistical data presented significant irregularities at young ages because of the small volume of data. Smoothing techniques could not reproduce a satisfactory pattern and a uniform factor of 0.50 was applied at ages below 33 for both sexes. Density factors for selected ages are presented in table A3.4.

**Table A3.4. Density factors, by age and sex**

| Age | Male | Female |
|---|---|---|
| 17 | 0.50 | 0.50 |
| 22 | 0.50 | 0.50 |
| 27 | 0.50 | 0.50 |
| 32 | 0.50 | 0.50 |
| 37 | 0.55 | 0.52 |
| 42 | 0.59 | 0.55 |
| 47 | 0.62 | 0.58 |
| 52 | 0.64 | 0.60 |
| 57 | 0.66 | 0.61 |
| 62 | 0.68 | 0.62 |
| **Total** | **0.62** | **0.58** |

### Accrued past credits

No information was available regarding the past credits of insured people. A theoretical pattern based on 2011 density factors and on assumptions regarding entry age has been developed. Average data are shown in table A3.5. The results for the first projection years are highly sensitive to these assumptions. Sensitivity tests have been conducted and the pattern is considered reasonable on the grounds of continuity with the previous experience in the first projection years.

**Table A3.5. Average past contribution years of insured persons, as of 31 December 2011**

| Age | Male | Female |
|---|---|---|
| 17 | 1.0 | 1.0 |
| 22 | 1.9 | 1.9 |
| 27 | 3.3 | 3.3 |
| 32 | 5.0 | 5.0 |
| 37 | 6.6 | 6.6 |
| 42 | 8.2 | 8.2 |
| 47 | 9.5 | 9.5 |
| 52 | 10.4 | 10.4 |
| 57 | 10.7 | 10.7 |
| 62 | 10.4 | 10.4 |

## *A3.2. Demographic assumptions related to the scheme*

### Mortality of insured persons

There is no reliable data information to accurately determine the level of mortality of contributors and pensioners. However, it seems clear from the NSSI set of data that it is materially lower than that of the general population mortality. It can be expected that it is closer to the urban population mortality. As the urban mortality rates are not readily available, estimates have been developed from their projected life expectancies. Urban life expectancies are approximately equal to those of the general population five years earlier. However, this set of mortality rates would materially overestimate the number of deaths. Take-up rates of survivors could explain part of the gap, but not all. Numerous attempts have been made to match the expected deaths with reasonable short-term forecasts. Satisfactory results have been obtained when using the projected mortality of the total population in 2051. Therefore, mortality rates of the general population have been used with a 40-year set-back. Sample mortality rates are presented in table A3.6.

Mortality rates are assumed to decline continuously during the projection period in line with the assumed increase in average life expectancy. This mortality pattern is also used to project survivors' benefits payable on the death of insured persons or pensioners. For invalidity pensioners, it is assumed that mortality rates are equal to five times those of the general population at age 20 years, decreasing gradually to two times at age 60 years.

As the mortality of the insured population seems to be very different from that of the urban population, sensitivity tests have been made in order to estimate the impact of alternative mortality patterns.

**Table A3.6. Sample mortality rates, by age and sex** (per 100)

| Age | Male | | Female | |
|---|---|---|---|---|
| | 2011 | 2071 | 2011 | 2071 |
| 0 | 4.426 | 3.630 | 0.482 | 0.498 |
| 5 | 0.112 | 0.088 | 0.026 | 0.026 |
| 10 | 0.060 | 0.041 | 0.004 | 0.006 |
| 15 | 0.081 | 0.044 | 0.033 | 0.020 |
| 20 | 0.121 | 0.067 | 0.076 | 0.030 |
| 25 | 0.153 | 0.091 | 0.100 | 0.037 |
| 30 | 0.184 | 0.115 | 0.094 | 0.044 |
| 35 | 0.236 | 0.148 | 0.100 | 0.060 |
| 40 | 0.330 | 0.207 | 0.149 | 0.092 |
| 45 | 0.489 | 0.307 | 0.226 | 0.142 |
| 50 | 0.750 | 0.476 | 0.413 | 0.229 |
| 55 | 1.164 | 0.755 | 0.614 | 0.336 |
| 60 | 1.814 | 1.205 | 0.955 | 0.521 |
| 65 | 2.823 | 1.926 | 1.513 | 0.810 |
| 70 | 4.373 | 3.071 | 2.396 | 1.388 |
| 75 | 6.715 | 4.867 | 4.290 | 2.616 |
| 80 | 10.181 | 7.632 | 7.478 | 5.092 |
| 85 | 15.146 | 11.775 | 12.311 | 9.324 |
| 90 | 21.942 | 17.736 | 19.211 | 15.886 |
| 95 | 30.685 | 25.833 | 28.071 | 24.738 |
| 100 | 100.000 | 100.000 | 100.000 | 100.000 |

## Invalidity incidence

The number of new invalidity cases in each year is smaller than 100 in the available partial database, which makes difficult the development of a consistent set of assumptions. Therefore, the establishment of the assumptions must rely on a combination of an external source and the available data from the scheme. Table A3.7 shows the incidence rates for selected ages determined based on the 2007−11 experience. The age-specific incidence rates have been determined by applying a coefficient to those of an incidence table of another country while respecting the aggregate level of incidence and its pattern by gender and age group with the NSSI experience in the period 2007−11.

**Table A3.7. Rates of entry into invalidity** (per 1,000 insured)

| Age | Male | Female |
|---|---|---|
| 27 | 0.05 | 0.08 |
| 32 | 0.11 | 0.16 |
| 37 | 0.23 | 0.30 |
| 42 | 0.48 | 0.57 |
| 47 | 0.99 | 1.08 |
| 52 | 2.06 | 0.52 |
| 57 | 2.76 | 0.00 |

## Retirement behaviour

The first possible age of retirement under the scheme is 55 years for females and 60 for females. The actuarial model generally considers retirement as the residual element of a series of factors. The macroeconomic framework described in the previous section provides the number of people employed each year. For a given age (at which retirement is possible under the NSSI), the difference between the number of insured in two consecutive years (for two consecutive years of age) is considered to be new retirees. An exception to this rule is the first age at which retirement is possible, when all inactive contributors who have left the workforce at any time in their career are assumed to apply for retirement. The number of new retired can then be much larger than the difference between the working populations at two consecutive ages.

For the present actuarial valuation, the model has been adjusted in order to better map the retirement pattern with the experience data. Decrement rates have been applied to active contributors in order to generate the new retirement pensioners. These rates reflect the experience observed in the period 2007−11. This information was obtained from individual files on pensioners in which the date of first month of retirement was available. Checks are performed to verify consistency with the aggregate coverage rates.

The resulting retirement rates appear in table A3.8. People are assumed to retire the first day they attain the indicated age in the table. As there are active female and male contributors respectively above age 60 and 65 at the valuation date, decrement rates have been established at those ages. Decrement rates converge towards the ultimate ones applicable in 2026 and 2021 respectively for females and males.

**Table A3.8. Retirement rates**

| Male | | | Female | | |
|---|---|---|---|---|---|
| Age | 2012 | 2021 and after | Age | 2012 | 2026 and after |
| 55 | N/A | N/A | 55 | 0.25 | 0.20 |
| 56 | N/A | N/A | 56 | 0.15 | 0.30 |
| 57 | N/A | N/A | 57 | 0.15 | 0.30 |
| 58 | N/A | N/A | 58 | 0.15 | 0.25 |
| 59 | N/A | N/A | 59 | 0.15 | 0.25 |
| 60 | 0.20 | 0.20 | 60 | 0.15 | 0.25 |
| 61 | 0.20 | 0.30 | 61 | 0.10 | 1.00 |
| 62 | 0.10 | 0.15 | 62 | 0.10 | |
| 63 | 0.10 | 0.15 | 63 | 0.10 | |
| 64 | 0.10 | 0.15 | 64 | 0.10 | |
| 65 | 0.10 | 0.15 | 65 | 0.10 | |
| 66 | 0.10 | 1.00 | 66 | 0.10 | |
| 67 | 0.10 | | 67 | 0.10 | |
| 68 | 0.10 | | 68 | 0.10 | |
| 69 | 0.10 | | 69 | 0.10 | |
| 70 | 1.00 | | 70 | 1.00 | |

## Family structure

Information on the family structure of the insured is necessary for the projection of survivors' benefits. Assumptions have to be established on the probability of being married at death, the average age of the spouse, the average number of children possibly eligible to an orphan's benefit and the average age of the orphans. Sample assumptions are shown in table A3.9.

**Table A3.9. Family statistics**

| Age | Male | | | | Female | | | |
|---|---|---|---|---|---|---|---|---|
| | Probability of having an eligible spouse (%) | Average age of spouse | Average number of eligible children | Average age of children | Probability of having an eligible spouse (%) | Average age of spouse | Average number of eligible children | Average age of children |
| 17 | 16 | 17 | 0 | 0 | 16 | 17 | 0 | 0 |
| 22 | 24 | 22 | 0.3 | 4 | 24 | 22 | 0.1 | 4 |
| 27 | 37 | 25 | 0.7 | 6 | 45 | 30 | 0.3 | 7 |
| 32 | 49 | 28 | 0.9 | 8 | 60 | 38 | 0.5 | 9 |
| 37 | 59 | 31 | 1.2 | 9 | 69 | 46 | 0.6 | 11 |
| 42 | 67 | 35 | 1.4 | 10 | 69 | 53 | 0.7 | 13 |
| 47 | 70 | 38 | 1.6 | 11 | 69 | 59 | 0.7 | 13 |
| 52 | 73 | 42 | 1.7 | 12 | 69 | 65 | 0.8 | 14 |
| 57 | 75 | 45 | 1.8 | 13 | 69 | 71 | 0.8 | 14 |
| 62 | 77 | 49 | 1.8 | 14 | 69 | 77 | 0.8 | 14 |
| 67 | 79 | 53 | 1.9 | 14 | 69 | 82 | 0 | 0 |
| 72 | 80 | 58 | 0 | 0 | 69 | 88 | 0 | 0 |
| 77 | 82 | 62 | 0 | 0 | 69 | 93 | 0 | 0 |
| 82 | 83 | 67 | 0 | 0 | 69 | 98 | 0 | 0 |
| 87 | 83 | 71 | 0 | 0 | 69 | 99 | 0 | 0 |

## Maternity benefits

The age-specific incidence rates of maternity benefits correspond to the age-specific fertility rates multiplied by a calibration factor determined to match the experience. Earnings of benefit recipients are those of the insured female population adjusted by a calibration factor to match the experience.

## Sickness benefits

Table A3.10 presents for selected ages the incidence rate and the duration used for the projection of sickness benefits. The NSSI incidence rate and average duration were available by sex but not by age. The age-specific rates were developed by using the pattern of Trinidad and Tobago, a country with comparable experience.

**Table A3.10. Sickness benefits**

| Age | Male | | Female | |
|---|---|---|---|---|
| | Incidence rate (per 100) | Average duration (days) | Incidence rate (per cent) | Average duration (days) |
| 17 | 0.64 | 6.9 | 0.18 | 6.1 |
| 22 | 1.12 | 9.4 | 2.41 | 7.5 |
| 27 | 1.62 | 9.8 | 3.68 | 9.6 |
| 32 | 2.10 | 9.8 | 4.23 | 10.6 |
| 37 | 2.49 | 11.1 | 4.29 | 12.0 |
| 42 | 2.77 | 14.2 | 4.08 | 13.2 |
| 47 | 2.88 | 15.6 | 3.83 | 15.6 |
| 52 | 2.78 | 17.1 | 3.77 | 17.7 |
| 57 | 2.42 | 18.5 | 4.14 | 22.6 |
| 62 | 1.75 | 16.0 | 5.14 | 19.4 |

## *A3.4. Other assumptions*

### Indexing of the scheme's parameters and pensions in payment

The minimum insurable earning is increased annually by a percentage equal to the general salary increase. The minimum pension maintains a constant relationship with the minimum salary. Pensions in payment are increased annually by the nominal increase of the minimum pension.

### Administrative expenses

Administrative expenses are determined as the amount paid in 2011 increasing annually in line with the average of the wage increase and the inflation rate, but would never be lower than 15 per cent of the current contribution rate of 7 per cent.

## *A3.5. Pensions in payment in December 2011*

Aggregate data on the pensions in payment rely on operational reports of the statistical division and benefits payments reported in the financial statements. Detailed data by age and sex have been obtained from individual data files for pensions in payment in December 2011. Individual data are available for about 60 per cent of pensioners. The numbers of pensioners and their average monthly pension have been calibrated to match respectively with the aggregate numbers produced by the statistical department and the benefits payments in the financial statements. Retirement and invalidity pension data seem reasonable tables A3.11 and 12), but survivors' pensions are known to be flawed, as the identity of benefit recipients is not reported consistently (tables A3.13 and 14). For that reason, all pensioners above age 19 have been considered widows while those under 20 are considered orphans. Female retirement pensions at age group 50−54 seem abnormally high.

## Table A3.11. Retirement pensions, December 2011

| Age | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | Number | Average monthly pension | Number | Average monthly pension | Number | Average monthly pension |
| 55-59 | - | - | 1 051 | 4 636 | 1 051 | 4 636 |
| 60-64 | 4 403 | 3 415 | 1 073 | 2 950 | 5 476 | 3 324 |
| 65-69 | 4 007 | 2 837 | 695 | 2 284 | 4 702 | 2 755 |
| 70-74 | 3 101 | 2 367 | 482 | 2 053 | 3 583 | 2 324 |
| 75-79 | 1 504 | 2 247 | 218 | 2 137 | 1 722 | 2 233 |
| 80-84 | 429 | 2 114 | 85 | 2 019 | 514 | 2 098 |
| 85-89 | 97 | 2 170 | 18 | 1 918 | 115 | 2 130 |
| 90-94 | 46 | 1 900 | 12 | 2 047 | 58 | 1 930 |
| 95-99 | 3 | 2 047 | 5 | 1 638 | 8 | 1 791 |
| **Total** | **13 590** | **2 821** | **3 639** | **3 111** | **17 229** | **2 882** |

## Table A3.12. Invalidity pensions, December 2011

| Age | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | Number | Average monthly pension | Number | Average monthly pension | Number | Average monthly pension |
| <25 | 2 | 0 | 2 | 2 081 | 4 | 2 081 |
| 25-29 | 6 | 2 373 | 2 | 2 519 | 8 | 2 409 |
| 30-34 | 19 | 2 165 | 5 | 2 081 | 24 | 2 148 |
| 35-39 | 44 | 2 185 | 10 | 2 614 | 54 | 2 264 |
| 40-44 | 90 | 2 769 | 13 | 2 128 | 103 | 2 688 |
| 45-49 | 162 | 2 366 | 49 | 2 182 | 211 | 2 323 |
| 50-54 | 287 | 2 455 | 67 | 3 433 | 354 | 2 640 |
| 55-59 | 407 | 2 299 | 22 | 2 174 | 429 | 2 293 |
| >=60 | 117 | 2 472 | 11 | 2 160 | 128 | 2 446 |
| **Total** | **1 134** | **2 397** | **181** | **2 663** | **1 315** | **2 437** |

**Table A3.13. Widows' and widowers' pensions, December 2011** (according to sex of deceased)

| Age | Male | |
|---|---|---|
| | Number | Average monthly pension |
| <25 | 235 | 1 370 |
| 25-29 | 625 | 1 413 |
| 30-34 | 1 152 | 1 448 |
| 35-39 | 1 888 | 1 560 |
| 40-44 | 2 214 | 1 708 |
| 45-49 | 2 692 | 1 707 |
| 50-54 | 2 397 | 1 617 |
| 55-59 | 2 238 | 1 536 |
| 60-64 | 1 893 | 1 415 |
| 65-69 | 1 405 | 1 244 |
| 70-74 | 1 208 | 1 125 |
| 75-79 | 711 | 1 049 |
| 80-84 | 223 | 1 071 |
| 85-89 | 59 | 1 206 |
| 90-94 | 49 | 1 003 |
| 95-99 | 13 | 1 256 |
| **Total** | **19 002** | **1 495** |

The number of initial orphans is underestimated while the number of widows is overestimated.

**Table A3.14. Children's pensions, December 2011**

| Age | Number | Average monthly pension |
|---|---|---|
| 0-4 | 14 | 1 157 |
| 5-9 | 11 | 1 987 |
| 10-14 | 16 | 1 254 |
| 15-19 | 15 | 2 228 |
| **Total** | **56** | **1 634** |

# Appendix IV

# Detailed information on NSSI results for the period 2007 to 2010

This appendix presents more detailed information related to the experience analysis.

## *A4.1. Financial results*

Table A4.1 presents more detailed information on revenues and expenditures.

**Table A4.1. Revenue and expenditure, 2007−11** (MT millions)

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2007−11 |
|---|---|---|---|---|---|---|
| **Expected** | | | | | | |
| Revenues | | | | | | |
| Contribution income | 1 201 | 1 296 | 1 400 | 1 511 | 1 631 | 7 039 |
| Investment income | 196 | 222 | 236 | 229 | 191 | 1 074 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 1 397 | 1 518 | 1 636 | 1 740 | 1 822 | 8 113 |
| Expenditures | | | | | | |
| Benefits | 850 | 1 072 | 1 341 | 1 675 | 2 082 | 7 020 |
| Administrative | 305 | 330 | 356 | 384 | 415 | 1 790 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 1 155 | 1 402 | 1 697 | 2 059 | 2 497 | 8 810 |
| Surplus (deficit) | 242 | 116 | -61 | -319 | -675 | -697 |
| **Observed** | | | | | | |
| Revenues | | | | | | |
| Contribution income | 1 094 | 1 312 | 1 624 | 2 111 | 3 127 | 9 268 |
| Investment income | 192 | 164 | 464 | 542 | 945 | 2 308 |
| Other | 26 | 105 | 99 | 310 | 3 | 543 |
| Total | 1 313 | 1 580 | 2 187 | 2 964 | 4 075 | 12 119 |
| Expenditures | | | | | | |
| Benefits | 431 | 539 | 688 | 852 | 1 143 | 3 652 |
| Administrative | 397 | 403 | 535 | 647 | 746 | 2 728 |
| Other | 0 | 9 | 19 | 0 | 0 | 28 |
| Total | 828 | 951 | 1 242 | 1 498 | 1 888 | 6 408 |
| Surplus (deficit) | 485 | 629 | 945 | 1 465 | 2 187 | 5 711 |
| **Difference (observed – expected)** | | | | | | |
| Revenues | | | | | | |
| Contribution income | -107 | 16 | 224 | 600 | 1 496 | 2 229 |
| Investment income | -4 | -58 | 228 | 313 | 754 | 1 234 |
| Other | 26 | 105 | 99 | 310 | 3 | 543 |
| Total | -84 | 62 | 551 | 1 224 | 2 253 | 4 006 |
| Expenditures | | | | | | |
| Benefits | -419 | -533 | -653 | -823 | -939 | -3 368 |
| Administrative | 92 | 73 | 179 | 263 | 331 | 938 |
| Other | 0 | 9 | 19 | 0 | 0 | 28 |
| Total | -327 | -451 | -455 | -561 | -609 | -2 402 |
| Surplus (deficit) | 243 | 513 | 1 006 | 1 784 | 2 862 | 6 408 |

Source:

– Actuarial valuation of the National Institute of Social Security Fund as at 31 December 2006, phase B report, p. 44

– NSSI 2007 to 2009 audited financial statements for 2007 to 2009, NSSI 2010 preliminary financial statements, 2011 NSSI budget realization and calculation by author.

**Table A4.2. Benefits by branch, 2007−11** (MT millions)

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2007-2011 |
|---|---|---|---|---|---|---|
| Sickness | 15 | 18 | 27 | 62 | 61 | 183 |
| Death | 59 | 56 | 61 | 72 | 97 | 345 |
| Pensions | 345 | 459 | 593 | 709 | 982 | 3 088 |
| Health actions | 11 | 6 | 7 | 10 | 3 | 37 |
| **Total** | **431** | **539** | **688** | **852** | **1 143** | **3 652** |

## *A4.2. Demographic data on benefit recipients*

**Table A4.3. Number of pensioners, 2000−11**

| | Old-age | Invalidity | Survivors |
|---|---|---|---|
| 2000 | 5 487 | 587 | 1 864 |
| 2001 | 6 366 | 700 | 2 734 |
| 2002 | 7 280 | 797 | 3 672 |
| 2003 | 7 858 | 887 | 4 649 |
| 2004 | 8 484 | 940 | 5 878 |
| 2005 | 9 075 | 1 052 | 7 239 |
| 2006 | 10 484 | 1 197 | 9 056 |
| 2007 | 11 798 | 1 359 | 10 708 |
| 2008 | 12 861 | 1 434 | 12 142 |
| 2009 | 13 773 | 1 293 | 13 296 |
| 2010 | 15 085 | 1 378 | 14 794 |
| 2011 | 16 125 | 1 235 | 16 086 |

**Table A4.4. Number of short-term benefits recipients, 2000−11**

| | Sickness | Hospital Internment | Maternity | Death grant | Funeral grant |
|---|---|---|---|---|---|
| 2000 | 4 513 | 140 | | 1 007 | 974 |
| 2001 | 5 301 | 101 | | 1 296 | 1 288 |
| 2002 | 5 089 | 96 | | 1 298 | 1 306 |
| 2003 | 5 367 | 82 | | 1 552 | 1 545 |
| 2004 | 5 262 | 98 | | 1 747 | 1 780 |
| 2005 | 7 061 | 67 | | 1 960 | 1 961 |
| 2006 | 7 207 | 53 | | 2 254 | 2 371 |
| 2007 | 7 261 | 47 | | 2 303 | 2 237 |
| 2008 | 6 021 | 33 | 94 | 1 989 | 1 916 |
| 2009 | 5 510 | 32 | 552 | 1 832 | 2 047 |
| 2010 | 8 120 | 24 | 1 204 | 1 966 | 2 236 |
| 2011 | 7 582 | 16 | 871 | 1 985 | 2 110 |

# Appendix V

## Illustration of branch accounting

Table 5.1 presents an illustration of branch accounting for 2009 under the premises discussed in Section 4.1 in the recommendations. In the first step, reserves would be allocated by branch on 1 January 2009. For the sake of simplicity, other income has been allocated by branch according to contribution rate, and other expenditures according to benefits paid. Short-term and death reserves on 1 January have been set once the benefits have been paid in 2008, and the rest of the surplus is allocated to the pension branch. The health and social actions results are excluded from benefits and other income has been reduced by the same amount.

**Table A5.1. Illustration of branch accounting, 2009**

| | Short-term | Death | Pensions | Capital | Total |
|---|---|---|---|---|---|
| **Reserve on 1 January 2009** | 18 118 | 55 908 | 2 903 168 | 43 491 | **3 020 685** |
| **Income** | | | | | |
| Contributions | 64 971 | 146 184 | 1 413 112 | | 1 624 266 |
| Investment | 2 822 | 8 708 | 452 183 | | 463 713 |
| Other | 3 964 | 8 919 | 86 222 | | 92 181 |
| Total | 71 757 | 163 811 | 1 951 516 | | 2 180 161 |
| **Expenditure** | | | | | |
| Benefits | 27 051 | 60 898 | 593 048 | | 680 998 |
| Administration | 21 406 | 48 164 | 465 588 | | 535 159 |
| Other | 753 | 1 694 | 16 371 | | 18 817 |
| Total | 49 210 | 110 756 | 1 075 008 | | 1 234 974 |
| Excess of income over expenditures | 22 546 | 53 055 | 876 509 | | 945 186 |
| **Use of excess of income over expenditures** | | | | | |
| Normal increase of reserve | 8 933 | 4 991 | 876 509 | | 884 409 |
| Transfer between branches | -13 613 | -48 064 | +61 677 | | 0 |
| **Reserve on 31 December 2009** | 27 051 | 60 898 | 3 841 354 | 43 491 | 3 965 871 |
| Allocation of contribution income | 0.04 | 0.09 | 0.87 | | 1.00 |