Zimbabwe

Report to the Government

Actuarial study on the National Pension Scheme

ILO Financial and Actuarial Service (ILO/FACTS)
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Foreword

This report has been prepared based on the request of the Zimbabwe Government for an actuarial study of the National Pension Scheme (NPS) and recommendations on the coexistence of the National Pension Scheme (NPS) and occupational pension schemes (OPS). The purpose of the study is to check the financial sustainability of the NPS, to provide recommendations of the reforms of the NPS and on the sustainable coexistence of the NPS and the OPS in Zimbabwe.

The report presents the results of the ILO actuarial study. It is structured as follows:

– Chapter 1 presents a brief overview of the National Social Security Authority (NSSA).

– Chapter 2 presents the experience and a performance analysis of the NPS for the period since the last actuarial review.

– Chapter 3 presents the general demographic and macro-economic environment of Zimbabwe.

– Chapter 4 presents demographic and financial projections specific to the NPS for the period 2011-2060.

– Chapter 5 presents the recommendations.

This actuarial study is in line with standard actuarial practices for social security schemes, social security principles as embodied in ILO social security standards and international best practices.

Actuarial valuations and studies of public social security schemes play a central role in the improvement of the design and governance of national social security schemes. The ILO makes its demographic and financial projection models available to actuaries in public social security schemes through the advisory services of its Financial and Actuarial Service (ILO-FACTS) located within the Social Security Department. It also provides quantitative training and promotes and directly implements peer reviews with a view to assisting in the development of national actuarial practice in strengthening public financial governance.

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Acknowledgements

The Government of Zimbabwe requested the ILO to carry out the actuarial study on the coexistence of the National Pension Scheme (NPS) and occupational pension schemes (OPS). The Director-General of the ILO designated the ILO Financial and Actuarial Service (ILO/FACTS) of the Social Security Department (SEC/SOC) to carry out the actuarial review of the NPS.

The ILO/FACTS team, composed of Mr A. Acuna-Ulate and Ms C. Lloret Cora, undertook this work on behalf of the ILO under the general and technical supervision of Mr H. Yamabana, Acting Chief of ILO/FACTS. The ILO team worked in collaboration with Mr H. Chikova, Director for Benefits, Schemes Planning and Research of the National Social Security Authority (NSSA) for data collection and discussions on various aspects of the study.

The Director-General of the ILO extends his sincere gratitude to the General Manager and the Chief Executive Officer of the National Social Security Authority (NSSA), Mr J.M. Matiza, for his collaboration and assistance throughout the review. The ILO project team is grateful to Mr H. Chikova and the NSSA staff who assisted throughout this study.

Executive summary

The National Pension Scheme (NPS) administered by the National Social Security Authority (NSSA) provides old-age, invalidity and survivors' pensions; old-age, invalidity and survivors' grants in case pensions cannot be provided; and funeral grants to those insured who are wage earners, in both the private and public sectors, as well as to the family members of insured members of the scheme. The employee and the employer each pay 3 per cent of insurable earnings, with an earnings ceiling of US$200 per month.

The ceiling is substantially low compared to the estimated average wage of US$350 per month. This leads to the problems of adequacy of benefits and future financial sustainability; the contributions made and the benefits paid are too small due to the low wage ceiling.

It is therefore recommended that the current ceiling of US$200 should be swiftly increased to US$700, twice as much as the average wage, to make the benefit provision meaningful and maintain long-term financial sustainability for the future. **The ceiling should be increased systematically in line with the average wage increase thereafter.**

In addition, **it is recommended that the current contribution rate of 6 per cent should be increased to 7 per cent** to guarantee long-term future financial sustainability

As a result of these reforms, it is projected that the scheme reserves will not be depleted till 2060 instead of 2037, the year projected for the depletion of the fund in the status quo case.

In light of the low coverage of the population, estimated at less than 20 per cent of the working-age population, and the modest pension level of the NPS estimated due to low contribution density, **it is recommended that a multi-pillar pension scheme should be established, the base and first tier as a tax-based universal pension with a modest anti-poverty provision; the second tier as the reformed NPS; and the third and supplementary tier as the occupational pension schemes.** Feasibility studies and research should be carried out in order to establish a proper multi-tier pension system in Zimbabwe.

Several issues require attention in order to improve the governance of the NPS, namely: administrative efficiency and containment of the operating expenses; maximization of investment returns of the fund within accepted risk profiles; improvements in the quality of data required for actuarial valuations; and the tightening up of eligibility conditions for invalidity and survivors' pensions, in order to prevent abuses and not discourage contributors from continuing their payments of contributions. All these are subject to additional studies and further planning of the scheme. Detailed discussions of these recommendations are found in the recommendations (Chapter 5).

Abbreviations and acronyms

CPI	consumer price index
Funding ratio	ratio of end-of-year reserve to annual expenditure (benefits and administration)
GAP	general average premium
GDP	gross domestic product
ILO	International Labour Office/Organization
ILO/FACTS	ILO Financial and Actuarial Service
LTB	long-term benefits
NPS	National Pension Scheme
NSSA	National Social Security Authority
OPS	occupational pension schemes
PAYG	pay-as-you-go
Reserve ratio	*See above*, "Funding ratio"
SEC/SOC	Social Security Department (ILO)
STB	short-term benefits
TFR	total fertility rate
UNSD	United Nations Statistics Division
WCIS	Workers' Compensation Insurance Scheme
ZW	Zimbabwean dollars

1. Overview of the social security schemes under the National Social Security Authority (NSSA)

The NSSA administers two benefit schemes: the National Pension Scheme (NPS) and the Workers' Compensation Insurance Scheme (WCIS). This actuarial valuation focuses only on the NPS.

1.1. Workers' Compensation Insurance Scheme

All employers except government, domestic workers and informal-sector employers contribute on behalf of their employees to this scheme. Employees do not contribute to the scheme. The aim of the scheme is to provide assistance to employees and their families in the event of work-related injury, a work-related disease or death.

The scheme also entails promoting awareness of health and safety at all workplaces and encouraging the implementation of health and safety regulations at workplaces through factory and machinery inspection. It also provides rehabilitation services to disabled employees to reduce invalidity and enable them to return to their former employment, or otherwise prepare them for a useful and meaningful place in society.

If a worker is injured in a work-related accident he or she enjoys benefits; these are classified into short-term benefits and long-term benefits. The short-term benefits are comprised of periodical payments in respect of loss of earnings, funeral grant and lump sums with respect to employment injuries with invalidity degrees of 30 per cent and less. The long-term benefits include a permanent disability pension for injuries over 30 per cent, and a child allowance for children up to the age of 19 years and /or those who are below 25 years, provided they are in full-time education. In summary, the benefits are:

1. Short-term benefits
    - 1.1 Periodic payments
    - 1.2 Medical costs
    - 1.3 Funeral grant
    - 1.4 Lump sum
2. Long-term benefits
    - 2.1 Employee's pension
    - 2.2 Surviving spouse pension
    - 2.2 Child allowance

1.2. National Pension Scheme

1.2.1. Regulatory framework

The National Pension Scheme (NPS) of Zimbabwe was established by the statutory Instrument SI 393 of 1993 which implemented the National Social Security Authority Act (No. 12 of 1989). The NSSA runs a social insurance system which provides for contingencies of retirement, invalidity and death.

1.2.2. Coverage

The scheme is mandatory for all formally employed persons in any profession, trade or occupation between the ages of 16 and 65 who are citizens or residents of Zimbabwe. There is also an established objective of extending coverage to domestic employees, workers in the informal sector and self-employed persons who are currently not covered by the scheme.

1.2.3. Sponsorship and administrative organization

The Government of Zimbabwe is the main guarantor of the scheme. The administrative organization for this scheme is the National Social Security Authority (NSSA) supervised by the Zimbabwe Ministry of Labour and Social Services.

1.2.4. Financing

An insured person contributes 3 per cent and the employer adds 3 per cent of insurable earnings, making a total of 6 per cent to finance the scheme. Contributions are based on a ceiling of maximum insurable earnings of US$200 per month.

1.2.5. Benefits

The National Pension Scheme offers four main types of benefits as follows:

– Retirement pension or grant

– Invalidity pension or grant

– Survivor's pension or grants

– Funeral grant

1.2.5.1. Qualifying conditions

1.2.5.1.1. Old-age pension

To qualify for full pension, one has to be 60 years for normal retirement or 65 years for late retirement pension. Contributors who have attained the age of 55 but are below 60 years and have worked in arduous employment for at least seven of the last ten years immediately prior to attaining age 55 also qualify.

Claim should be requested within 12 months after the date of retirement.

1.2.5.1.2. Retirement grant

A retirement grant is paid as a lump sum to insured persons who have attained the normal retirement age and have contributed for more than 12 months but less than 120 months.

Claims should be lodged within five years after the date of retirement.

1.2.5.1.3. Invalidity pension

An invalidity pension is paid to an insured person who is below 60 years, has contributed for at least six months and has been medically assessed as suffering from a

permanent invalidity and incapable of any gainful employment as a result of physical or mental ill-health.

Claims should be lodged within five years of invalidity.

1.2.5.1.4. Invalidity grant

An invalidity grant is paid to an insured person who is below 60 years, has contributed for less than six months and has been medically assessed as suffering from a permanent invalidity and incapable of any gainful employment as a result of physical or mental ill-health.

Claims should be lodged within five years of invalidity.

1.2.5.1.5. Survivor's pension

A survivor's pension is paid to the surviving claimants of a deceased contributor who at the time of death would have been entitled to an invalidity or retirement pension, in order of priority according to the following:

(i) Widow/widower, provided the marriage was contracted before retirement or invalidity.

(ii) Dependent children of the deceased who are below 18 years and those who are below 25 years provided they are in full-time education.

(iii) Permanently disabled dependent children who are incapable of supporting themselves, irrespective if their age.

(iv) Parents of the deceased contributor.

(v) Any other dependant.

Dependent children are paid through their legal guardian if there is no widow/widower.

Claims should be lodged within 12 months after the death of a contributor.

1.2.5.1.6. Survivor's grant

A lump sum payment is made to the surviving claimants of a deceased contributor who at the time of death would have been entitled to an invalidity or retirement grant, in order of priority according to the same order as for the survivor's pension beneficiaries listed above.

1.2.5.1.7. Funeral grant

A funeral grant is paid in the form of a lump sum upon the death of the contributor or pensioner towards the funeral expenses of the deceased if he/she had contributed to the scheme for at least 12 months. The payment is made to any person who meets funeral expenses for the deceased contributor or pensioner.

Claim should be lodged within five years after the death of contributor or pensioner.

1.2.5.2. Benefit calculation

1.2.5.2.1. Old-age pension

The old-age pension is calculated based on the monthly covered earnings in the last month before retirement and the number of years of contribution.

The pension is calculated as 4/3 per cent of the last monthly earnings multiplied by the number of years of contribution up to 30 years plus 1 per cent of the last monthly earnings multiplied by the number of years of contribution exceeding 30 years.

Late retirement pension is calculated in the same way as the old-age pension. Unlike a country such as Ghana, there is no adjusted formula applied to earnings, even if the last contribution payment was made many years before retirement. A minimum monthly pension is also paid under the scheme (US$40 in January 2011).

1.2.5.2.2. Retirement grant

The retirement grant is calculated as 1/12 per cent of the last annual insurable earnings immediately before retirement multiplied by the number of years of contribution. It is paid as a lump sum to the member.

There is a minimum retirement grant paid under the scheme (US$40 in January 2011).

1.2.5.2.3. Invalidity pension

The pension is calculated as 1 per cent of the average annual covered earnings before the occurrence of the invalidity multiplied by the number of years of contributions up to ten years. For contributions exceeding ten years, it is equal to 4/3 per cent of the monthly covered earnings at the time the invalidity occurred multiplied by the number of years of contribution (including credited periods) up to 30 years plus 1 per cent of monthly covered earnings multiplied by the number of years of monthly contributions exceeding 30 years.

The scheme pays a minimum invalidity pension (US$20 in January 2011).

1.2.5.2.4. Invalidity grant

This lump sum is calculated as 1/12 per cent of the monthly covered earnings before the invalidity occurred multiplied by the number of years of contributions (including credited periods).

A minimum invalidity grant is paid under the scheme (US$20 in January 2011).

1.2.5.2.5. Survivor's pension

A monthly pension of 40 per cent of the deceased's old-age or invalidity pension is paid to the widow/widower; 40 per cent is paid to children up to 18 years of age. Children up to 25 years who are students, and permanently disabled children irrespective of their ages, are also included. In the absence of a surviving widow/widower or child, 12 per cent is paid to the deceased's parents. A surviving parent receives 12 per cent, and 8 per cent is paid to other eligible dependants. If there is more than one eligible widow/widower the benefit is split equally between them.

1.2.5.2.6. Survivor's grant

This lump sum is calculated as 40 per cent of the deceased's old-age or invalidity pension and is paid to the widow/widower; 40 per cent is paid to children up to 18 years of

age. Children up to 25 years who are students, and permanently disabled children irrespective of their ages, are also included. A surviving parent receives 12 per cent, and 8 per cent is paid to other eligible dependants. If there is more than one eligible widow/widower the benefit is split equally between them.

1.2.5.2.7. Funeral grant

A funeral grant of US$200 is paid under this scheme. The deceased should have made contributions for at least 12 months, whether an invalidity or old-age pensioner or a recipient of a retirement grant.

2. Analysis of the NPS experience for the period 2009-10

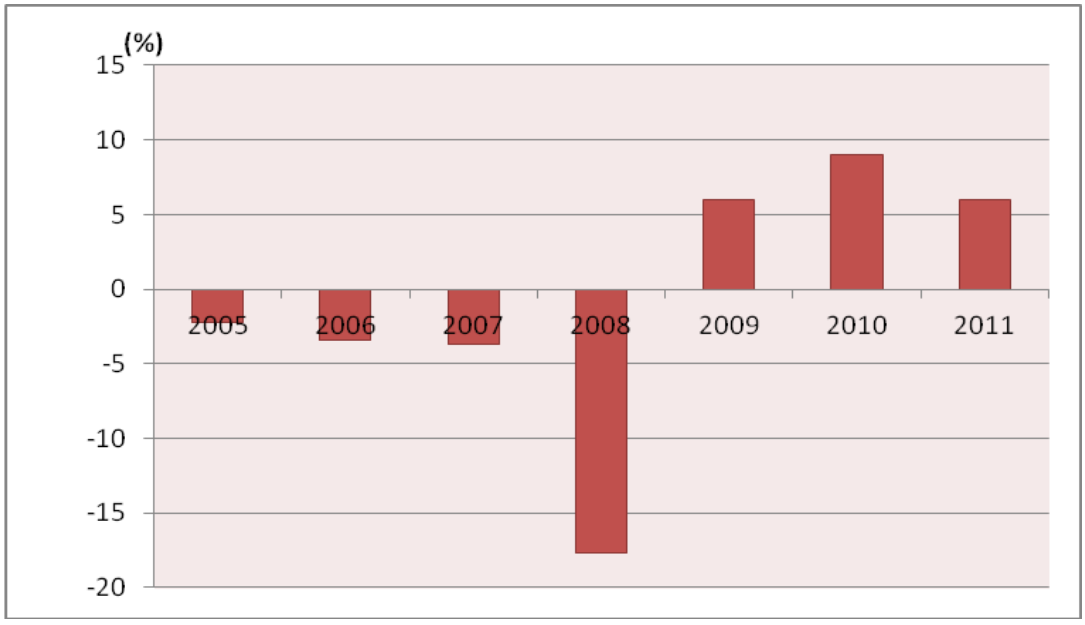
This chapter presents global financial results of the NPS for the past two years, followed by a comparison between the actual results and the projections in the last review. Several legislative changes occurred:

- The ceiling on insurable earnings of ZW 7,000 was removed from 1 August 2008.
- The contribution rate was raised from 6 to 8 per cent on 1 January 2009 because of the economic crisis.
- As a result of the influence of private occupational pension schemes the contribution rate was restored to 6 per cent on 1 May 2010. At the same time, the ceiling was set at US$200 per month.
- The minimum old-age pension and retirement grant were set at US$40 in January 2011.
- The minimum invalidity and survivor', pension and grant were set at US$20 in January 2011.

2.1. Macro-economy

Hyperinflation took place between the years 2000 and 2009. The country started to trade in multicurrency effective on 19 February 2009. The nominal GDP growth of Zimbabwe was negative between the years 2002 and 2008, with fluctuations between –17.66 and –2.24 per cent. Nominal GDP growth was 5.97 per cent in 2009 and 9.01 per cent in 2010.

Figure 2.1. Nominal GDP growth, 2005-11



2.2. Financial results of the NPS for the period 2009-10

Table 2.1 presents financial results of the NPS for the period from 31 December 2009 to 31 December 2010. Further details can be found in Annex table A5.

Total revenue increased slightly from US$135.6 million in 2009 to 153.0 million in 2010. Total expenditure decreased from US$57.8 million in 2009 to 42.9 million in 2010. The operating expenses decreased from US$43.8 million (34 per cent of the contribution income) in 2009 to 22.1 million (16 per cent of the contribution income) in 2010.

The surplus was US$105.9 million in 2009 and 107.6 million in 2010, resulting in an increase of the reserves from US$265 million to 369.5 million.

Table 2.1. Revenue and expenditure of the NPS Fund and evolution of the reserve, 2009 and 2010

	31 Dec. 2009	31 Dec. 2010
Revenue	135 600 055.9	153 030 719.1
Contribution income	128 187 861.0	137 594 965.7
Interest and rental income	5 521 014.0	15 594 430.7
Sundry income	30 964.1	218 018.6
Share of profit/(loss) from associate	1 860 216.7	–376 695.9
Expenditure	57 845 549.3	42 949 998.5
Benefits	14 034 399.8	20 840 154.9
Operating expenses	43 811 149.5	22 109 843.6
Other income/loss	28 179 977.6	–2 447 728.3
Surplus (or deficit)	105 934 485.2	107 632 992.3
Reserve at end of year	265 029 676.8	369 530 206.7

2.3. Comparison between observed experiences and projections of the last actuarial review

Tables 2.2 and 2.3 compare the actual experiences of the NPS with the projections of the actuarial valuation of 31 March 2009.

Table 2.2. Projections and actual experiences, 2009

	2009 projected	2009 actual	Difference (%)
Total revenue	121 154 821.0	135 600 055.9	11.9
Contributions	97 255 402.0	128 187 861.0	31.8
Investment income	23 889 633.0	7 381 230.7	–69.1
Total expenditure	55 258 196.0	57 845 549.3	4.7
Benefits	32 535 943.0	14 034 399.8	–56.9
Operating expenses	22 722 253.0	43 811 149.5	92.8
Reserve	179 968 952.0	265 029 676.8	47.3

Table 2.3. Projections and actual experiences, 2010

	2010 projected	2010 actual	Difference (%)
Total revenue	139 047 741.0	153 030 719.1	10.1
Contributions	113 826 859.0	137 594 965.7	20.9
Investment income	25 209 651.0	15 217 734.8	–39.6
Total expenditure	55 258 196.0	42 949 998.5	–22.3
Benefits	32 535 943.0	20 840 154.9	–35.9
Operating expenses	22 722 253.0	22 109 843.6	–2.7
Reserve at end of year	179 968 952.0	369 530 206.7	105.3

The actual experiences in the last valuation are very different from the projections. The recent period of hyperinflation is the major cause of this imparity. Since 2009 the economy has begun to stabilize, but has taken time to reach a stable state. Investment income was the item most affected.

Recent legislative changes have also contributed to the deviations of the last projections, especially contribution income and benefits.

3. Demographic and macro-economic frames of Zimbabwe

3.1. Projection of the total population of Zimbabwe

3.1.1. Mortality

Life expectancy at birth is estimated at 50.4 years for males and 49.8 years for females in 2010. These are assumed to gradually increase to 72.3 and 75.7 for males and females respectively in 2070 in the demographic projection. Mortality rates by age and sex were estimated by using the United Nations model life tables. Sample mortality rates are found in Annex tables A1 and A2.

3.1.2. Fertility

Currently, the total fertility rate (TFR) is 3.47. The TFR is assumed to gradually decline to 1.85 in 2060 and will remain constant thereafter based on the UN assumptions on fertility. The age-specific fertility rates are shown in table 3.1.

Table 3.1. Fertility rates according to the age of the mother, 2010 and 2060 onwards

Age of mother	Fertility rate	
	2010	2060+
15–19	0.09195	0.04272
20–24	0.16443	0.11036
25–29	0.16518	0.11036
30–34	0.13162	0.05696
35–39	0.08996	0.02848
40–44	0.03886	0.00712
45–49	0.01284	0.00000
Total fertility rate	3.47000	1.85000

3.1.3. Migration

Annual net migration was assumed at –900,000 persons between 2005 and 2010 due to the difficult economic situation under the hyperinflation, gradually decreasing to –5,000 in 2020 and –4,000 in 2070.

3.1.4. Projected population

The total population of Zimbabwe is projected to increase from 12.6 million in 2010 to 17.5 million in 2030 and 26.4 million in 2070. Zimbabwe currently has a very young demographic structure (see figure 3.1).The population growth rate is 1.27 per cent in 2010 and is expected to decrease to 0.54 per cent in 2070 (see figure 3.2). However, the percentage of those aged 69 and more in the total population will increase from 3 per cent in 2010 to 8 per cent in 2070, while the population between 0 and 14 years old is projected to decrease from 39 per cent in 2010 to 20 per cent in 2070.

Figure 3.1. Projected population of Zimbabwe, by age group, selected years

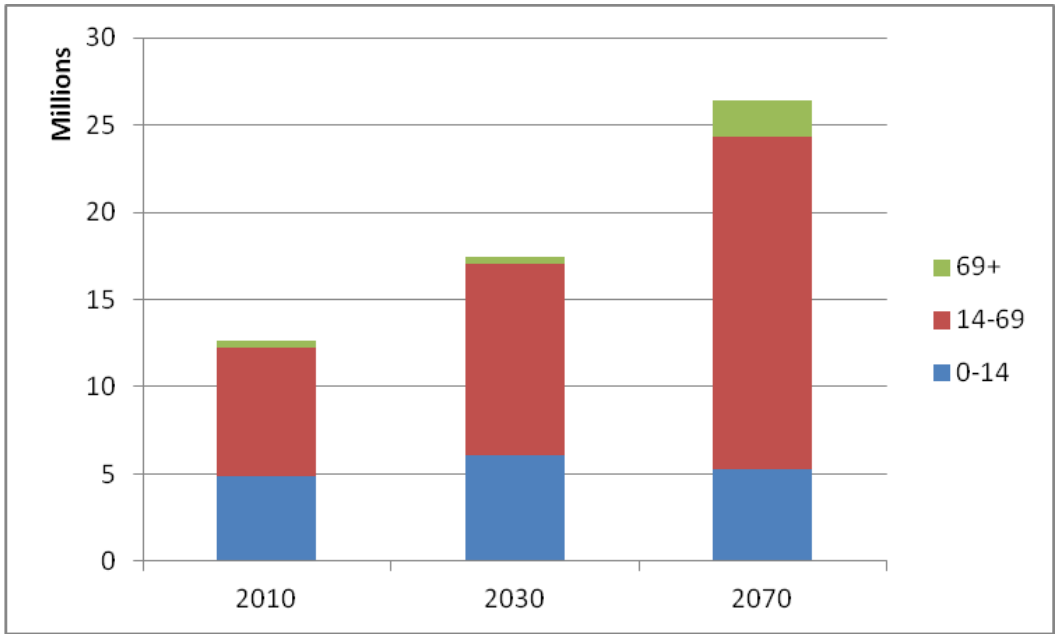
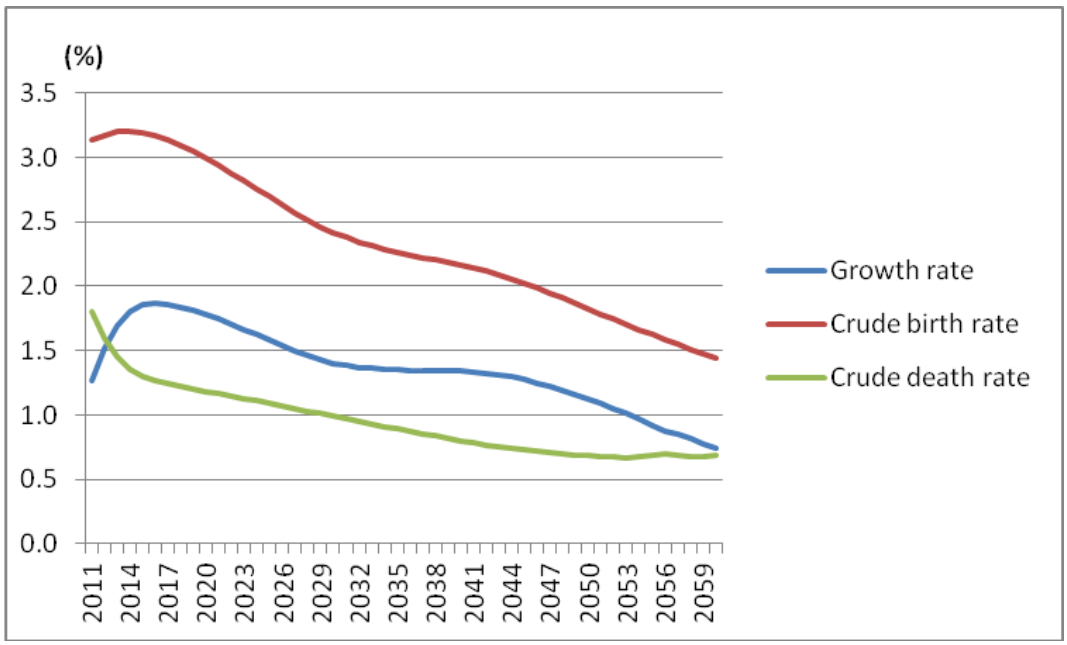


Figure 3.2. Projected population growth rates, 2011–2060



Different factors such as the increase in life expectancy, and the high percentage of current population concentrated between 0 and 14 years old who will have children in 20 years time, will contribute to a steady increase in the population. The demographic structures for the year 2011, 2030 and the target year 2070 are illustrated in figures 3.3, 3.4 and 3.5. In short, the decrease in the fertility rate is compensated by an increase of the population in fertile ages in the next 30 years.

Figure 3.3. Population pyramid, both sexes, 2011

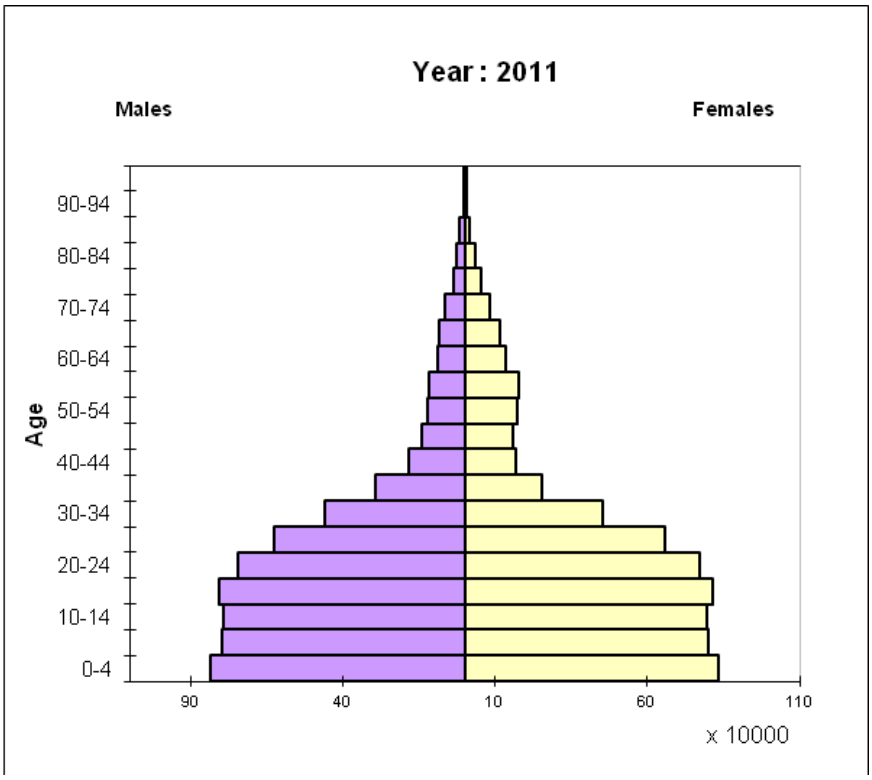


Figure 3.4. Population pyramid, both sexes, 2030

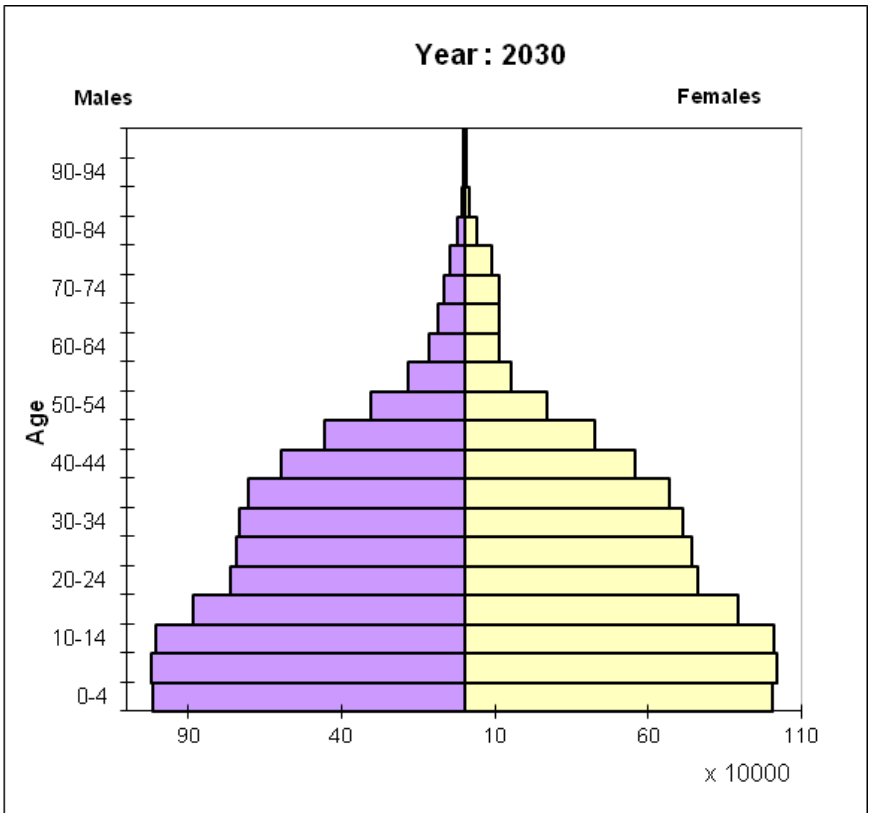
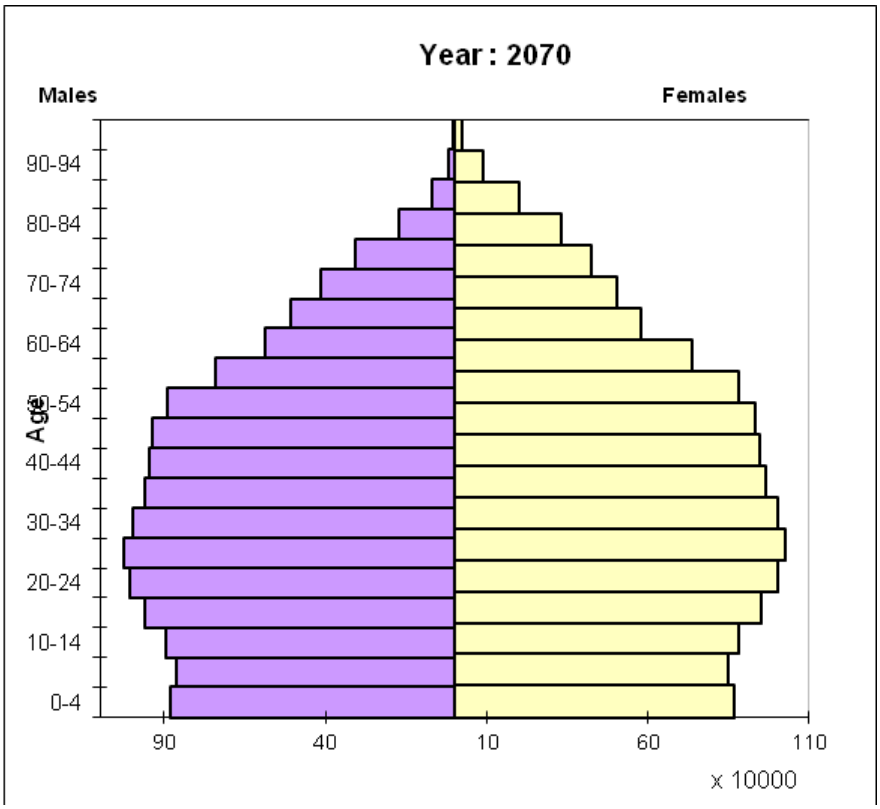
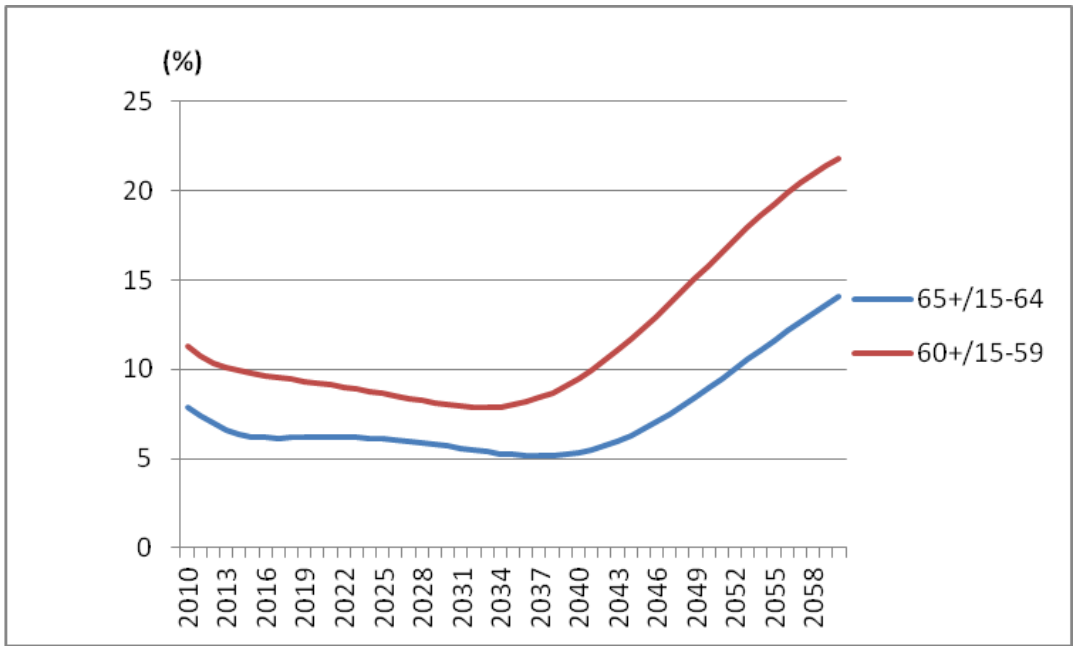


Figure 3.5. Population pyramid, both sexes, 2070



The demographic ratio for the elderly population above 65 years old is projected to increase from 7.8 per cent in 2010 to 14.1 per cent in 2060 and, for the population above 60 years old, from 11.3 per cent in 2010 to 21.8 per cent in 2060, as shown in figure 3.6.

Figure 3.6. Old-age demographic ratios of the population (those aged 60 and above divided by those between 15 and 64 years old, and those aged 65 and above divided by those between 15 and 59 years old)



3.2. Macro-economic frame

It is assumed in the projection that the economy in Zimbabwe will gradually become stable and achieve more stable and sustainable economic growth in the long run.

3.2.1. Economic growth, productivity and employment

As a stabilization of GDP growth is foreseen to follow the recent hyperinflation period, it is assumed that real GDP growth of 7.9 per cent in 2011 will gradually decrease to 5.2 per cent in 2020 and to 3.1 per cent in 2060. The unemployment rate in Zimbabwe, estimated at 5 per cent in 2011, is assumed to remain constant. The combination of these exogenous assumptions on the real GDP growth and the unemployment rate gives the results shown in table 3.2 for future employment growth and productivity growth. Negative employment growth from 2055 is the result of the decreasing labour force due to the decrease in the total fertility rate.

Table 3.2. GDP growth, productivity and growth of employment, 2011–60

Year	Real GDP growth (%)	Increase of productivity (%)	Increase in the number of workers(%)
2011	7.9	3.4	4.4
2012	7.3	3	4.2
2013	7.2	3	4.1
2020	5.2	2	3.1
2030	4.2	2	2.2
2040	3.5	2	1.5
2050	2.4	2	0.4
2060	1.7	2	–0.3
Average 2011–2060	4.7	2	1.4

3.2.2. Labour force

The development of Zimbabwe's total population and labour force is shown in table 3.3. Total participation rates increase continuously for both sexes during the period 2010-70, from 80.4 to 85.7 per cent for males and from 63.9 to 71.0 per cent for females. The employed population increases from 5,170 thousand in 2011 to 14,201 thousands in 2070.

Table 3.3. Labour force balance, 2011–70 (thousands)

	2011	2012	2020	2030	2040	2050	2060	2070
Population total	12 763.9	12 957.3	14 963.0	17 473.9	19 989.6	22 631.4	24 777.9	26 369.0
Male	6 311.4	6 409.6	7 453.4	8 780.0	10 084.8	11 413.8	12 457.6	13 167.0
Female	6 452.5	6 547.7	7 509.5	8 693.9	9 904.8	11 217.5	12 320.3	13 202.0
Population 15–69	7 561.4	7 758.4	9 170.5	10 982.9	13 559.1	15 815.2	17 636.5	19 084.4
Male	3 709.7	3 812.7	4 582.5	5 580.8	6 893.1	8 000.2	8 889.4	9 553.8
Female	3 851.8	3 945.7	4 587.9	5 402.0	6 666.0	7 815.0	8 747.1	9 530.5
Labour force total	5 442.6	5 613.7	6 857.9	8 351.7	10 381.9	12 215.0	13 662.0	14 958.3
Male	2 982.4	3 083.1	3 834.4	4 710.7	5 830.1	6 817.4	7 580.8	8 227.6
Female	2 460.2	2 530.6	3 023.4	3 640.9	4 551.8	5 397.6	6 081.2	6 730.7
Labour force participation rate (%)								
Total	72	72	75	76	77	77	77	78
Male	80	81	84	84	85	85	85	86
Female	64	64	66	67	68	69	70	71
Employed total	5 170.4	5 333.0	6 515.0	7 934.1	9 862.8	11 604.3	12 978.9	14 210.4
Male	2 833.3	2 929.0	3 642.7	4 475.2	5 538.6	6 476.6	7 201.7	7 816.3
Female	2 337.2	2 404.1	2 872.3	3 458.9	4 324.2	5 127.7	5 777.2	6 394.1
Unemployed total	272.1	280.7	342.9	417.6	519.1	610.8	683.1	747.9
Male	149.1	154.2	191.7	235.5	291.5	340.9	379.0	411.4
Female	123.0	126.5	151.2	182.0	227.6	269.9	304.1	336.5

3.2.3. Inflation and salary increases

The inflation rate is assumed to be 3.5 per cent in 2011, 4.0 per cent between 2012 and 2020 and constant at 3.0 per cent for the rest of the projection period. Nominal wage increases are assumed to be 7 per cent between 2011 and 2020 and 4 per cent constant for the rest of the period (see table 3.4).

Table 3.4. Assumed annual inflation and nominal wage increase rates, 2011-60

Year	Inflation rate (%)	Nominal wage increase rate (%)
2011	3.5	7.0
2012	4.0	7.1
2013	4.0	7.1
2020	4.0	6.0
2030	3.0	5.0
2040	3.0	5.0
2050	3.0	5.0
2060	3.0	5.0

3.3. Scheme-specific assumptions

In addition to the demographic and economic assumptions, the projection of the future financial development of the social security system relies on the starting data of the

scheme (e.g. numbers of insured contributors and pensioners; amount of insurable earnings; and pensions classified by age, sex and pension categories) and actuarial assumptions specific to the scheme.

3.3.1. Data and assumptions on the insured population

3.3.1.1. Number of insured persons

The distribution of the insured members by age and sex was derived from data provided by the NSSA. The total number of insured persons was available, but the number of these by age and sex was not available and hence an estimated distribution by age and sex of those insured was applied. This estimated age and sex distribution of insured persons who contributed in 2010, totalling 1,248,060, is shown in table 3.5.

Table 3.5. Insured persons by age and sex (estimated), 2010

Age group	Active contributors		
	Male	Female	Total
15–19	2 270	1 308	3 579
20–24	42 229	19 082	61 310
25–29	120 826	56 921	177 747
30–34	157 963	68 563	226 526
35–39	171 875	64 331	236 205
40–44	151 153	51 475	202 628
45–49	79 243	36 378	115 621
50–54	73 527	23 868	97 395
55–59	51 787	14 813	66 600
60–64	48 126	12 323	60 449
Total	898 997	349 063	1 248 060

3.3.1.2. Insurable and total earnings

As wage data provided by NSSA was found to be unreliable, an average wage of US$350 has been assumed, with a standard lognormal distribution for the calculation of the average wage levels of three separate subgroups: a group with the average salary of the lowest 30 per cent, a group of a middle 40 per cent and a group of the highest 30 per cent of contributors.

3.3.1.3. Density of contribution

The assumption of a density of contribution of 0.76 has been taken for all ages and for the entire projection period.

3.3.1.4. Accrued past credits

A complete age and sex distribution of accrued past credits for the insured was provided by the NSSA, as shown in table 3.6.

Table 3.6. Average past contribution years for active contributors, at 31 December 2010

Age	Active contributors	
	Male	Female
17	1.3	1.3
22	2.1	2.0
27	5.4	5.5
32	9.1	7.9
37	12.1	9.3
42	12.6	9.9
47	12.3	10.4
52	12.5	11.2
57	13.6	11.6
62	13.8	11.2

3.3.2. Demographic assumptions of the scheme

3.3.2.1. Mortality of insured persons and pensioners

Mortality rates of the insured population have been assumed to be equal to those of the general population, as shown in table 3.7. Mortality rates are assumed to decline continuously during the projection period in line with the assumed increase in average life expectancy. Mortality rates of invalidity pensioners are assumed to be also equal to those of the general population.

Table 3.7. Mortality rates by age and sex, 2010, 2030 and 2070

Age	Male			Female		
	2010	2030	2070	2010	2030	2070
0	0.1513879	0.0628586	0.0234945	0.1279728	0.0636940	0.0139144
5	0.0079828	0.0019134	0.0004340	0.0095760	0.0025068	0.0004612
10	0.0036320	0.0009874	0.0002520	0.0039884	0.0011070	0.0001764
15	0.0041181	0.0012660	0.0003575	0.0045672	0.0012277	0.0002800
20	0.0061430	0.0018976	0.0005440	0.0074396	0.0019226	0.0004352
25	0.0078679	0.0024106	0.0006850	0.0096388	0.0025675	0.0005092
30	0.0090784	0.0028664	0.0008460	0.0104560	0.0030289	0.0006260
35	0.0104228	0.0035622	0.0011425	0.0107672	0.0035296	0.0009164
40	0.0125872	0.0047838	0.0016955	0.0115856	0.0043717	0.0013332
45	0.0161099	0.0068312	0.0026850	0.0136700	0.0058945	0.0021432
50	0.0215070	0.0100944	0.0043820	0.0175932	0.0084601	0.0033484
55	0.0293663	0.0151392	0.0072130	0.0239952	0.0125799	0.0051696
60	0.0404778	0.0228170	0.0119125	0.0337104	0.0190239	0.0082048
65	0.0558715	0.0343578	0.0196480	0.0479144	0.0289121	0.0133256
70	0.0768530	0.0514758	0.0322650	0.0681644	0.0438759	0.0230688

Age	Male			Female		
	2010	2030	2070	2010	2030	2070
75	0.1049601	0.0764866	0.0525560	0.0963844	0.0661539	0.0390792
80	0.1418323	0.1122328	0.0845070	0.1347800	0.0986340	0.0751884
85	0.1889569	0.1617698	0.13316050	0.1854352	0.1446492	0.1155224
90	0.2472534	0.2275800	0.2036040	0.2496824	0.2072032	0.1853148
95	0.3165318	0.3102460	0.2984860	0.3272856	0.2877348	0.2754600
100	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
Life expectancy at birth	50.4	63.7	74.5	49.8	64.9	78.1

3.3.2.2. Rates of entry into invalidity

Invalidity rates have been extracted from the invalidity cases of the last three years provided by the NSSA. The invalidity frequencies at different ages have been computed and the Kernel method has been applied for each of these three years. After that an average of the three years has been calculated. The invalidity incidence rates are kept constant for the whole projection period. The assumed rates are presented in table 3.8.

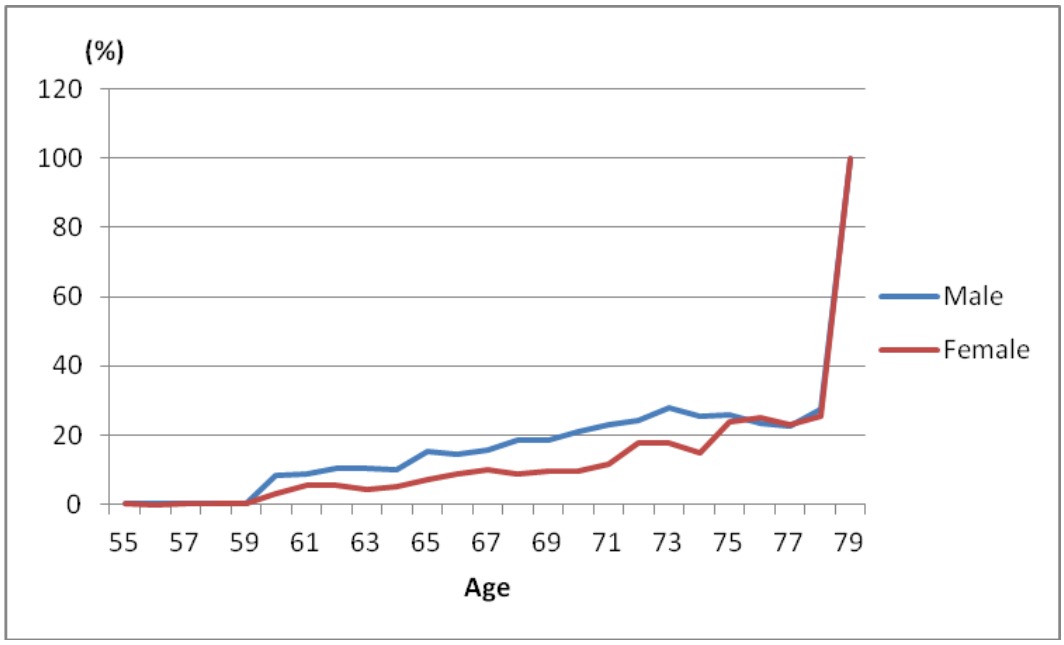
Table 3.8. Assumed rates of entry into invalidity for the projection, 2011-70

Age	Male	Female
17	0.00000	0.00000
22	0.00003	0.00000
27	0.00004	0.00000
32	0.00014	0.00005
37	0.00041	0.00022
42	0.00085	0.00054
47	0.00207	0.00129
52	0.00367	0.00272
57	0.00570	0.00483
62	0.00754	0.00617

3.3.2.3. Retirement

The probability of retirement has been extracted from the data provided by the NSSA. All contributors are assumed to retire by the age of 78. Retirement probabilities by age and sex can be seen in figure 3.7 and in Annex table A4.

Figure 3.7. Assumed retirement probabilities, 2011-60



3.3.2.4. Rates of entry into the scheme

Entry rates into the scheme by age and sex were calculated based on the 2010 NSSA data. Gamma distributions; estimated beta and gamma parameters have been applied separately for males and females, to smooth and approximate the real age-wise distribution; the age-and sex-wise entry rates were assumed accordingly. The same rates have been used for all the future projection years.

Figure 3.8. Entry probabilities for males, by age, for the entire projection period, Gamma distributed

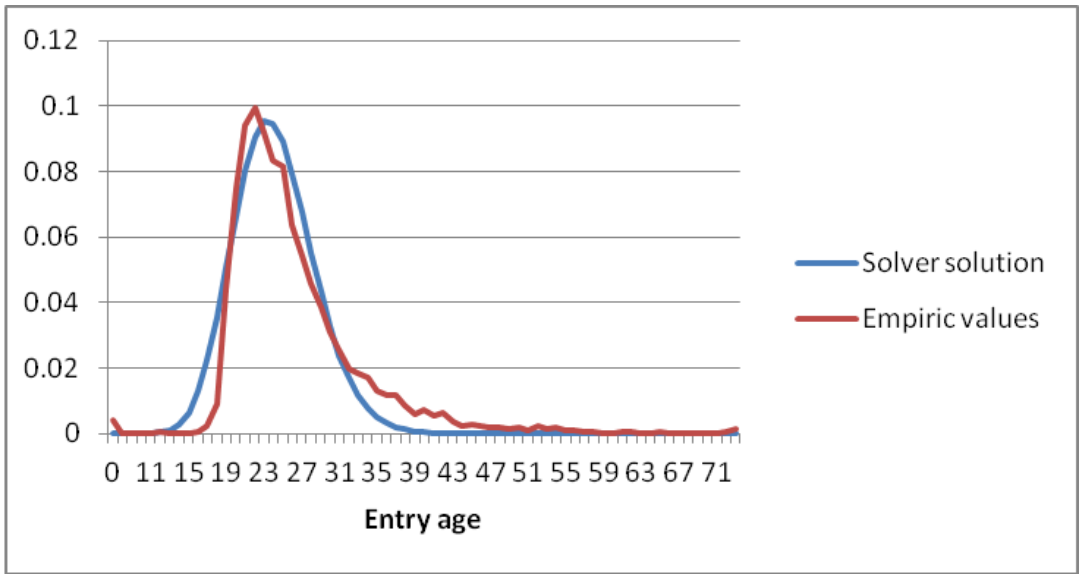
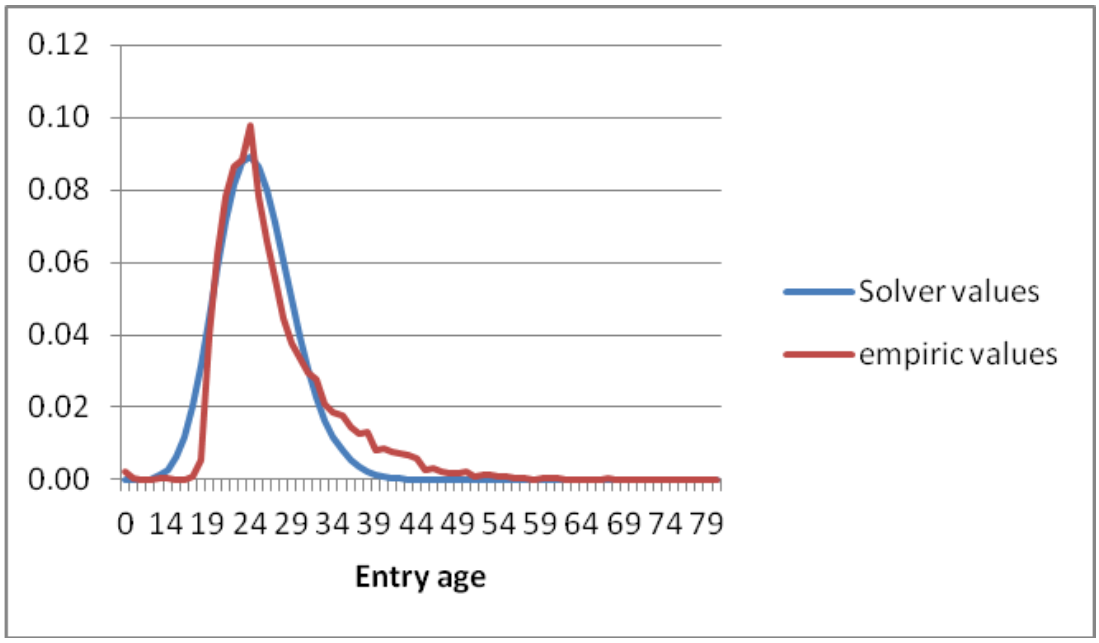


Figure 3.9. Entry probabilities for females, by age, for the entire projection period, Gamma distributed



3.3.2.5. Family structure

Information on the family structure of insured persons is necessary for the projection of survivors' benefits. Assumptions have been made on the probability of being married at death, the average age of the spouses, the average number of children eligible for orphans' benefits, and the average age of orphans eligible for benefits based on the census data provided by United Nations Statistics Division (UNSD).

Table 3.9. Assumed family structure for the projection, 2011-70

Age	Male			Female		
	Probability of being married (%)	Average age of spouse	Average number of children	Probability of being married (%)	Average age of spouse	Average number of children
22	24.4	21	0.82	61.1	27	1.14
27	67	23	1.97	75	32	2.47
32	84	28	3.06	75	37	3.66
37	88	33	3.07	75	42	3.45
42	89	38	2.96	73	47	2.80
47	91	42	2.61	70	52	2.21
52	90	46	1.82	66	57	1.31
57	90	51	1.21	60	62	0.75
62	89	55	0.45	52	67	0.12
67	84	60	0.25	32	72	0.03
72	79	65	0.14	27	75	0.02
77	75	69	0.07	23	78	0.02
82	72	72	0.04	19	79	0.02

3.3.3. Financial assumptions

3.3.3.1. Assumption on the operating expenses

According to the NSSA data, the operating expenses of 2010 were the same order as the benefit expenditure which was 16.1 per cent of the contributions collected in 2010. It is thus assumed that the operating expenses will gradually decrease from 16.2 per cent of contributions in 2011 to 10 per cent of contributions in 2030 and onwards.

3.3.3.2. Assumption on the benefit indexation

The wage ceiling, as well as the minimum pension and the amount of death grant, is adjusted in line with the annual wage growth per employed.

3.3.3.2. Assumption on the rate of return on investment

Investment return plays and will continue to play a significant role for a while in the financing of the NPS, since the demography of the scheme is still young and the scheme is still in the stage of accumulating reserves: US$369.5 million at the end of 2010 or 17.5 times as much as the benefit amount that year. The nominal rate of return noted as *i* was calculated based on the amount of reserves at the beginning of the year 2010 (R_{BoY}), the reserves at the end of the year 2010 (R_{EoY}) and investment income during the year of 2010 (*I*), in the following formula:

$$i = \frac{2I}{R_{BoY} + R_{EoY} - 2I}$$

The nominal rate of return is assumed to be slightly higher than the nominal wage growth, as shown in table 3.10.

Table 3.10. Assumed rates of return, 2010-60

Year	Nominal rate of return on investment	Real rate of return on investment
2010	5.27	1.27
2011	5.0	1.0
2012	5.0	1.0
2013	5.0	1.0
2015	5.0	1.0
2020	5.5	1.5
2030	5.5	2.5
2040	5.5	2.5
2050	5.5	2.5
2060	5.5	2.5

4. Demographic and financial projections of the NPS

4.1. Demographic projections

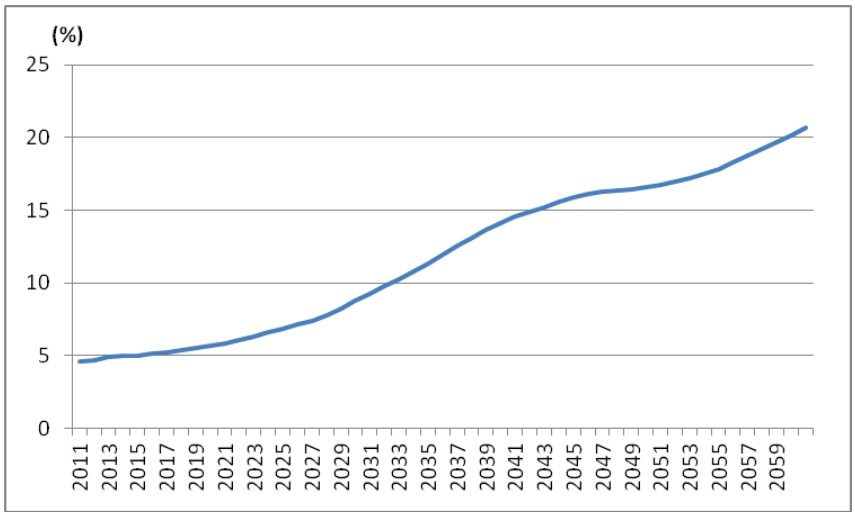
The number of contributors increases gradually from 1,248,060 in 2010 to 3,926,742 in 2060. Total pensioners increase significantly over the projection period. In 2010, there were approximately 5 contributors per pensioner, which is projected to decrease to 3 in 2060. This results from the population aging and the maturing process of the scheme. It will translate into an increasing pension burden to be supported by future generations of contributors. More effective coverage in future years would provide higher numbers of contributors per pensioner.

Table 4.1. Numbers of contributors and pensioners, and dependency ratios, 2010-60

Year	Contributors	Retired	Invalid	Widows	Orphans	Total pensioners	Number of contributors per pensioner (dependency ratio)
2010	1 248 060	57 823	11 250	143 899	50 112	263 084	4.779086596
2011	1 276 992	60 050	10 956	143 411	55 411	269 828	4.732609310
2012	1 304 215	64 488	10 758	143 597	58 451	277 294	4.703361295
2013	1 343 832	67 800	10 655	144 339	61 316	284 110	4.729976319
2015	1 449 304	75 941	10 670	147 936	66 035	300 583	4.821643241
2020	1 705 950	101 269	11 582	165 586	60 111	338 548	5.039025970
2025	1 961 144	140 312	13 547	189 677	45 826	389 363	5.036805582
2030	2 254 558	211 264	16 426	219 071	40 630	487 391	4.625767846
2035	2 594 638	320 924	19 370	258 262	49 988	648 544	4.000712728
2040	2 935 557	450 548	22 394	300 697	53 569	827 208	3.548752036
2045	3 245 073	556 712	26 090	341 796	52 828	977 425	3.320022504
2050	3 502 792	620 164	31 155	380 462	52 192	1 083 973	3.231438918
2055	3 721 976	691 287	37 377	419 867	56 456	1 204 986	3.088812743
2060	3 926 742	797 986	43 829	464 998	65 821	1 372 634	2.860735947

The demographic ratio of old-age pensioners, namely the number of old-age pensioners divided by the number of contributors, was 4.6 per cent in 2010 and is projected to increase to 20.3 per cent in 2060 (figure 4.1).

Figure 4.1. Demographic ratios for old-age pensioners, 2011-60



The number of contributors per old-age pensioner was 21.74 in 2010 and is projected to decrease to 4.92 in 2060 (table 4.2).

Table 4.2. Number of contributors per old-age pensioner, 2010-60

Year	Number of contributors per old-age pensioner
2010	21.74
2011	21.27
2012	20.22
2013	19.82
2015	19.08
2020	16.85
2025	13.98
2030	10.67
2035	8.08
2040	6.52
2045	5.83
2050	5.65
2055	5.38
2060	4.92

4.2. Financial projections

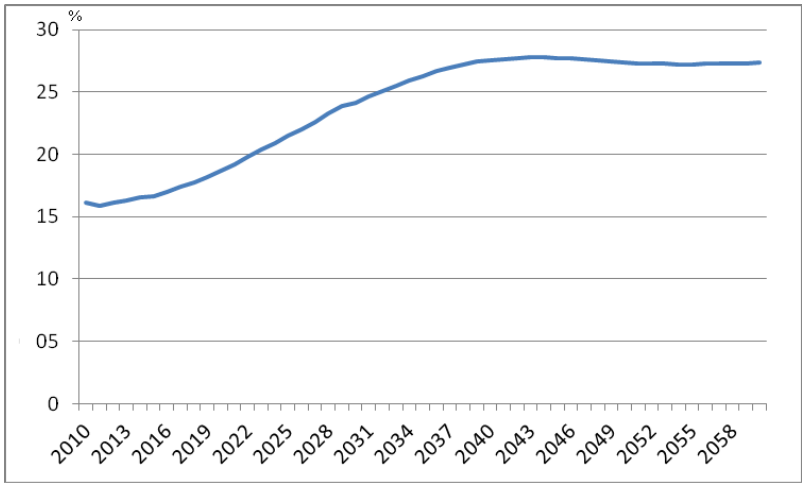
Financial projections follow the demographic projections. The average insurable earnings and the average amount of pension for different pension categories are calculated for future years by indexing the existing average amount of contributions and the existing average pensions and also by calculating the average amount of new pensions based on the pension formulae and estimated parameters in the pension formulae.

With regard to the projection of the status quo situation, it is assumed that the contribution is fixed at the current rate of 6 per cent, the wage ceiling at US$200 in 2010 and the minimum pension amount for old-age pension, survivor's pension (including children) and invalidity pension respectively at US$80, 40 and 40 in 2013. In 2011 these

amounts were US$40, 20 and 20 respectively, while the assumptions for the future are US$60, 30 and 30 respectively, to be adjusted in line with the average wage increase.

The replacement ratio for all pensions, namely average pension amount divided by average insurable earnings, is 16.1 per cent in 2010, and is projected to increase to 27.4 per cent in 2060 (figure 4.2).

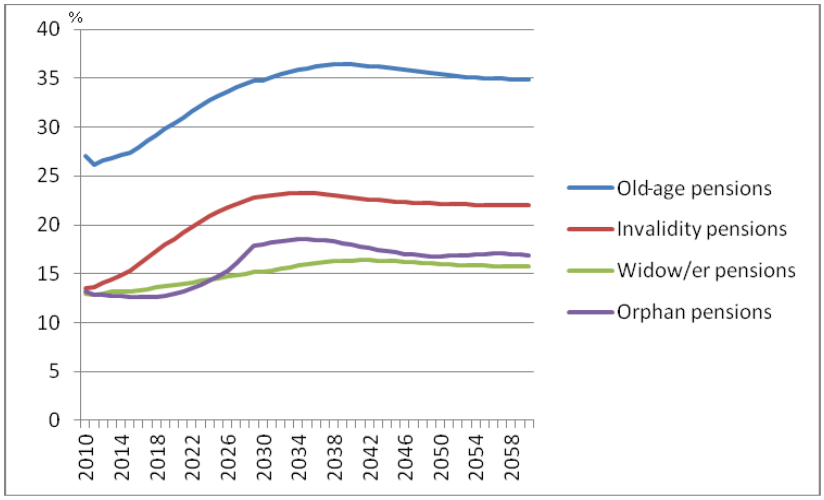
Figure 4.2. Replacement ratios for pensions, 2010-60



The replacement ratio for old-age pensions is the highest one, increasing from 27.0 per cent in 2010 to 34.9 per cent in 2060. The replacement ratio for invalidity pensions is lower than the old-age pensions, increasing from 13.5 per cent in 2010 to 22 per cent in 2055 and then remaining constant. The replacement ratio for widows'/widowers' pensions is projected to increase from 13.2 per cent in 2010 to 16.9 per cent in 2060.

The replacement ratio for orphans' pensions is projected to increase from 13.2 per cent in 2010 to 17.8 per cent in 2029 and remain remains stable afterwards. This growth is mainly due to the facts and assumptions on the minimum orphans' pensions: US$20 per month in 2011, US$30 per month and indexed in line with average wage growth from the year 2012 onwards. As the number of orphans receiving the US$20 minimum pension in 2011 is expected to gradually fade out toward the year 2029, because all the orphan pensioners in 2011 will have reached the age of 18 by 2029, the replacement ratio is projected to increase as the proportion of orphan pensioners receiving US$30 per month replaces those receiving US$20 pensions.

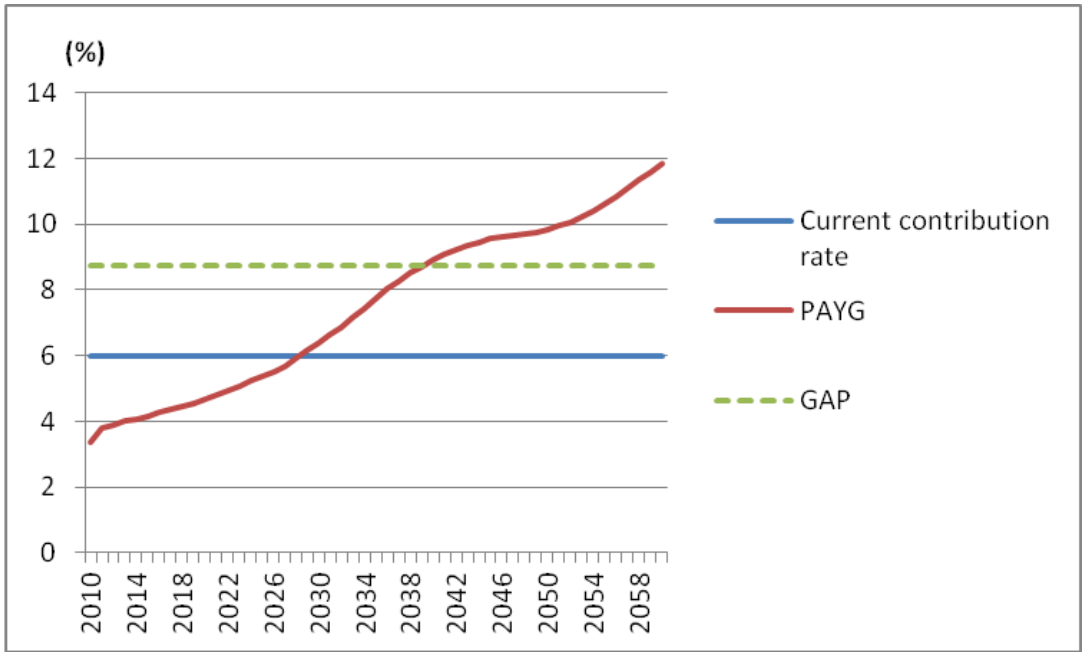
Figure 4.3. Replacement ratios for each pension category, 2010–60



The amount for each pension category is calculated by multiplying the number of pensioners and the average amount of pensions. The administrative expenditure is added to the total benefit expenditure to produce the total expenditure of the scheme. The amount of insurable earnings is projected by multiplying the number of contributors by the average amount of wage.

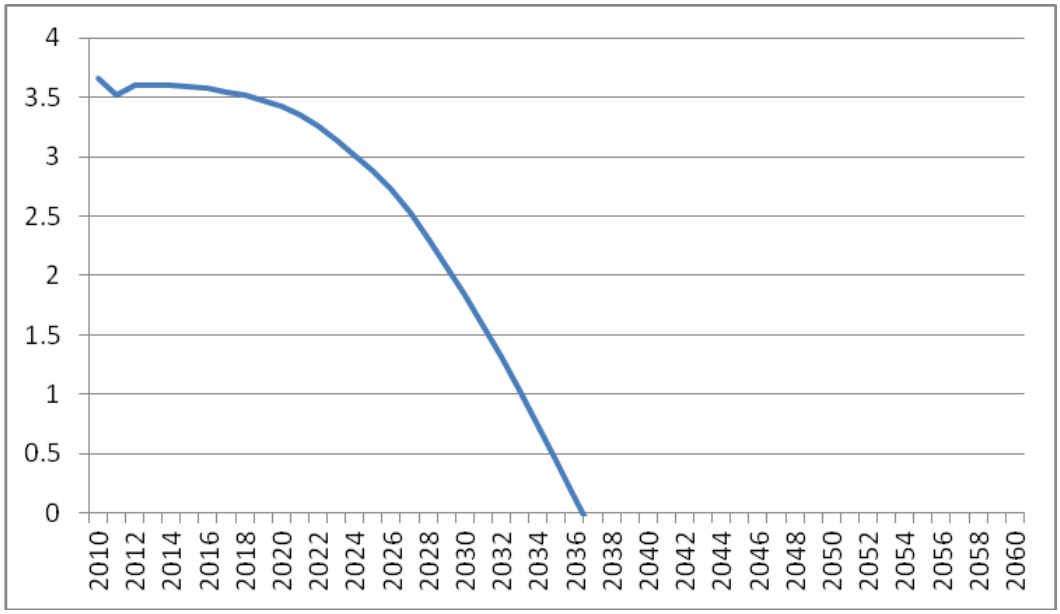
The pay-as-you-go (PAYG) cost rate, expressed as the expenditure divided by the insurable earnings, represents the contribution rate required to balance the annual income and expenditure without relying on investment income. The general average premium (GAP) rate is the constant contribution rate from 2010 till 2060 which keep the scheme reserves non-negative during the period and zero at the end of the period, namely the year 2060. As shown in figure 4.4, the PAYG cost rate is projected to be lower than the current contribution rate of 6 per cent until 2028 but exceed 6 per cent in 2029. This implies that from 2029 the scheme will start to rely not only on contribution income but also on investment return on reserves, and reserves themselves. The GAP rate is estimated at 8.76 per cent, higher than the current contribution rate of 6 per cent. This shows that the scheme reserves will be depleted before 2060 if the contribution rate is fixed at the current 6 per cent.

Figure 4.4. Status quo: PAYG cost rate and GAP rate, 2010–60



Contribution income is estimated by multiplying the amount of insurable earnings and the contribution rate, assumed to be a constant 6 per cent for the status quo projection. The investment income is calculated based on the reserves at the beginning of the year, estimated expenditure and contribution income, and the assumed interest rate in future years. This figure will be used to project the future development of reserves of the scheme. The reserve ratio, defined as the amount of reserves at the end of the year divided by the annual expenditure of the scheme, will gradually decrease and become zero in 2037 (figure 4.5), meaning that the scheme's reserves is projected to be depleted in 2037 based on the current contribution rate of 6 per cent.

Figure 4.5. Status quo: Reserve ratio, 2010–60



4.2. Alternative scenarios

The demographic and financial projections show that the scheme is sustainable in the short term but not in the long term. In addition, the current contribution ceiling is very low and hence benefit amounts as well as the contribution amount is too low, leading to a fundamental question of the adequacy of benefits provided by the NPS. In this section, financial projections of five different options are provided based on variations in the wage ceiling and the contribution rate.

Options for an increase in the wage ceiling include a gradual increase from US$200 in 2010 to US$700 in 2014 and US$750 in 2015, and thereafter in line with the average wage growth (table 4.3).

Table 4.3. Option in the increases in the wage ceiling, 2010–60

Year	New wage ceiling (US$)
2010	200
2011	300
2012	500
2013	600
2014	700
2015	750
2020	1 007
2025	1 353
2030	1 817
2035	2 326
2040	2 977
2045	3 811
2050	4 878
2055	6 243
2060	7 991

Since the 6 per cent contribution rate is unsustainable in the long term, five options for contribution rates, together with two options for the current ceiling (US$200 in 2010 indexed in line with the wage increase thereafter) and the new ceiling (US$700 in 2014 indexed in line with the wage increase thereafter) are presented in table 4.4.

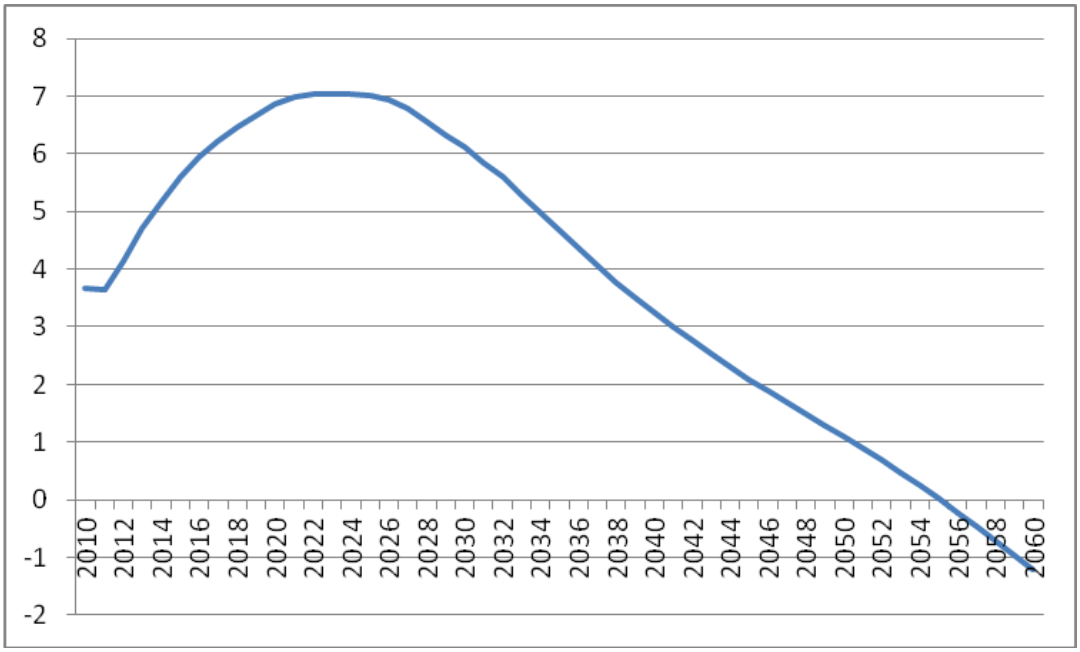
Table 4.4. Five options for wage ceilings and contribution rates

Options	Contribution rate (%)	Ceiling (US$)
1	6	Gradual increase of the ceiling to 700
2	7	Current ceiling (200)
3	7	Gradual increase of the ceiling to 700
4	8	Current ceiling (200)
5	8	Gradual increase of the ceiling to 700

4.2.1. Option 1: Contribution rate 6 per cent, and gradual increase of the wage ceiling to US$700

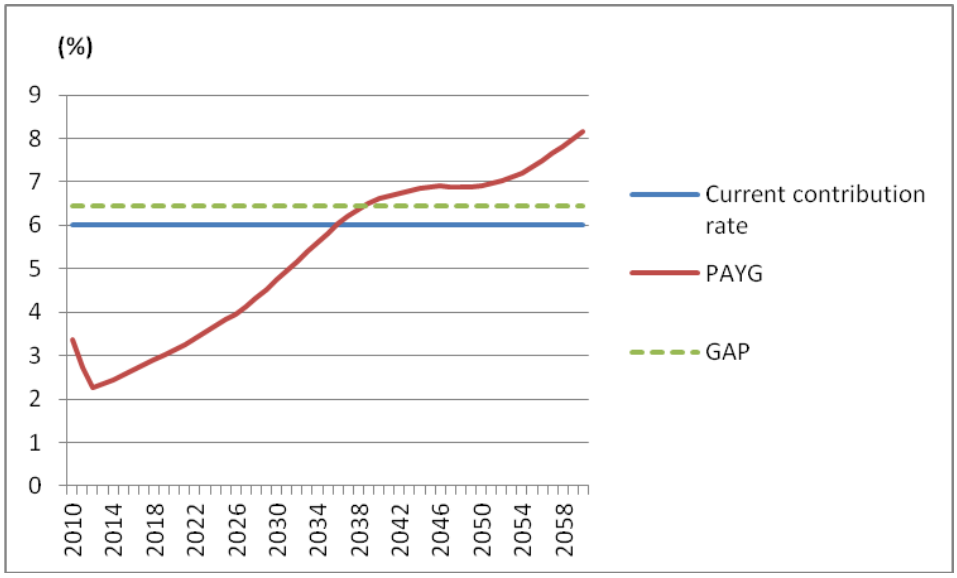
The reserves are projected to increase up to 2041 and become exhausted in 2056, as shown in figure 4.6.

Figure 4.6. Option 1: Reserve ratio, 2010–60



With the contribution rate of 6 per cent and the change in the wage ceiling, the PAYG cost rate is projected to be lower than the status quo projections in all the projection years. It is projected to exceed the contribution rate in 2036. The GAP rate between the years of 2010 and 2060 is estimated at 6.45 per cent.

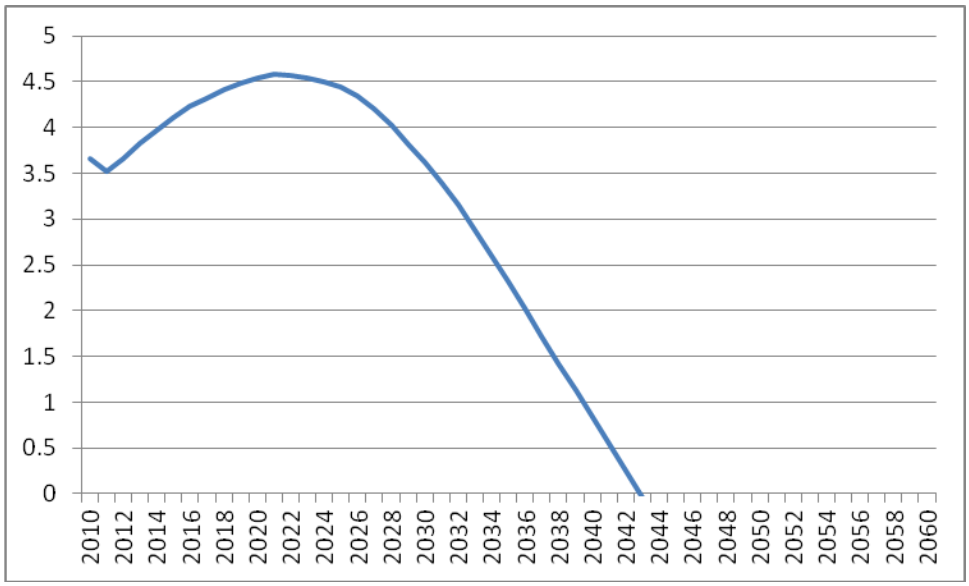
Figure 4.7. Option 1: PAYG cost rate and GAP rate, 2010–60 (percentages)



4.2.2. Option 2: Contribution rate 7 per cent, and maintaining the current US$200 wage ceiling

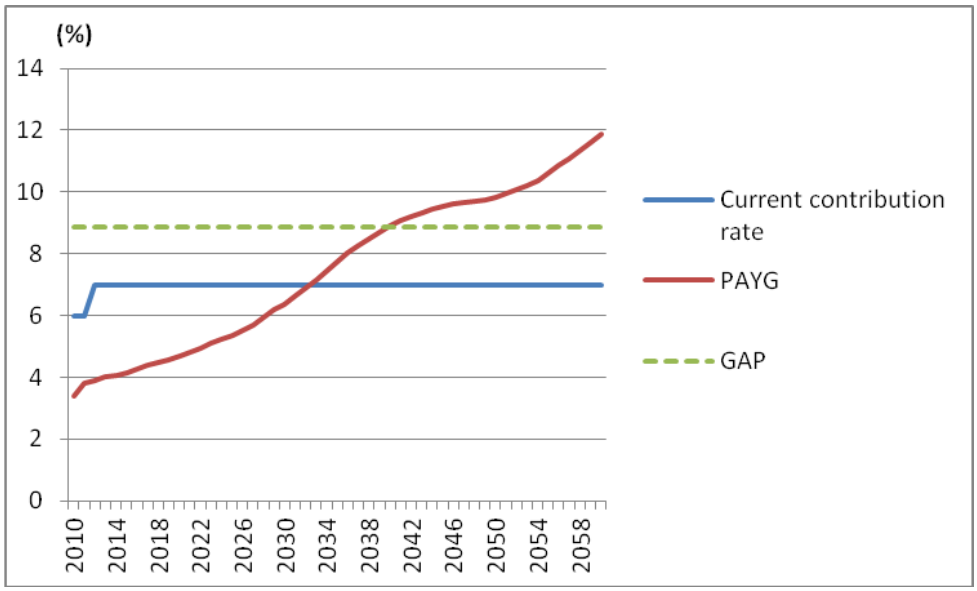
With the current wage ceiling indexed in line with the average wage increase and a contribution rate of 7 per cent, the amount of reserves are expected to decrease in 2034 and be exhausted in 2043, The reserve ratio expressed as the amount of reserves at the end of the year divided by the amount of expenditure during the year, is projected to start to decrease before 2034 and became negative in 2043 as shown in figure 4.8.

Figure 4.8. Option 2: Reserve ratio, 2010–60



The PAYG cost rate is projected to exceed the contribution rate of 7 per cent in 2032. The GAP rate between the years of 2010 and 2060 is estimated at 8.86 per cent.

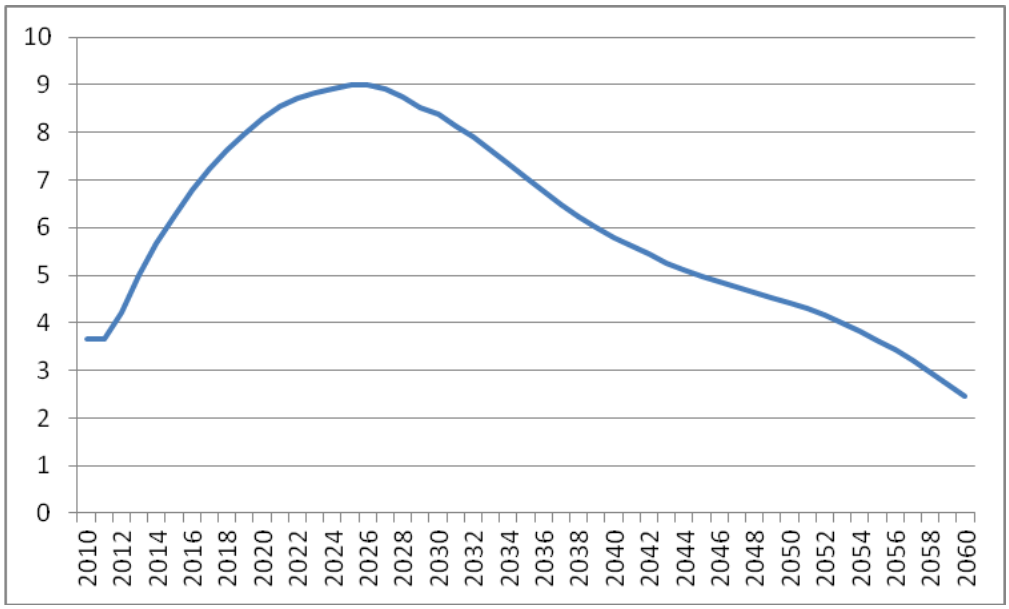
Figure 4.9. Option 2: PAYG cost rate and GAP rate, 2010–60



4.2.3. Option 3: Contribution rate 7 per cent, and gradual increase of the wage ceiling to US$700

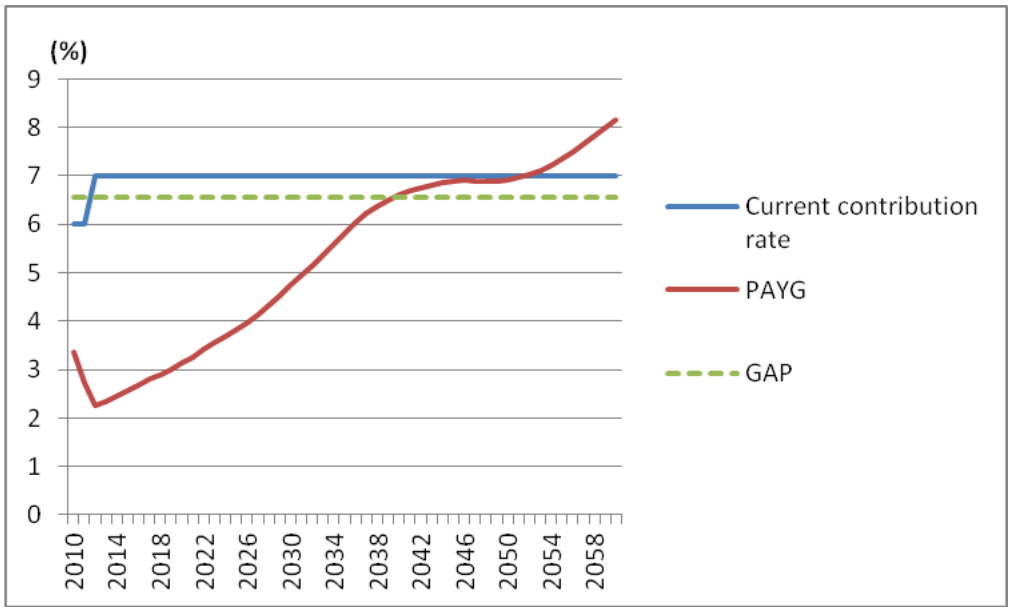
By increasing the wage ceiling to US$700 and the contribution rate to 7 per cent, the amount of reserves are expected to decrease in 2058 but are not expected to be exhausted during the period 2010 to 2060. The reserve ratio is projected to decrease before 2030 and will stay positive during the projection period as shown in figure 4.10.

Figure 4.10. Option 3: Reserve ratio, 2010–60



The PAYG cost rate is projected to exceed the contribution rate in 2052. The GAP rate between the years of 2010 and 2060 is estimated at 6.55 per cent.

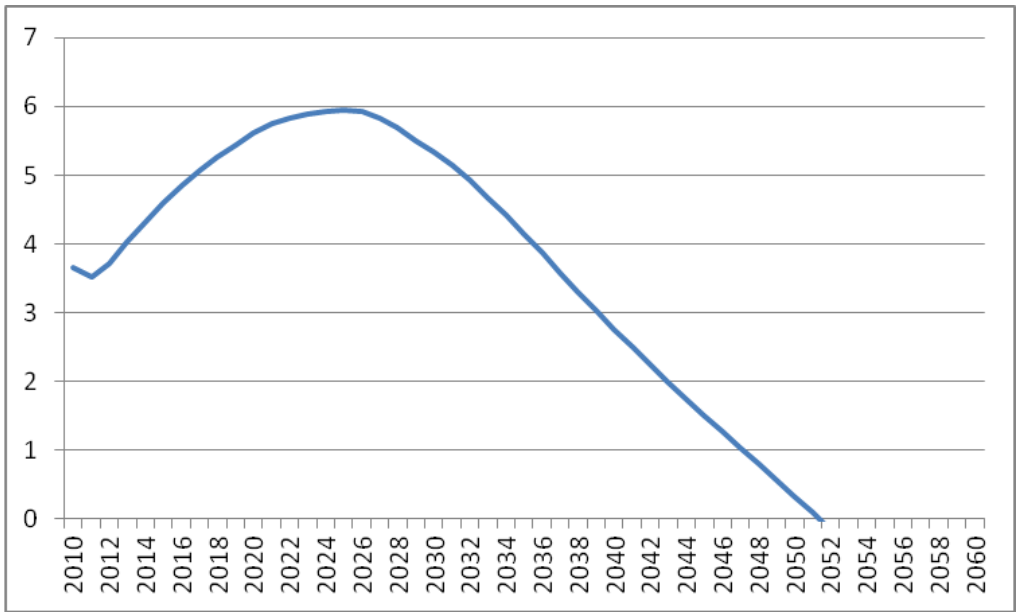
Figure 4.11. Option 3: PAYG cost rate and GAP rate, 2010–60



4.2.4. Option 4: Contribution rate 8 per cent, and maintaining the current US$200 wage ceiling

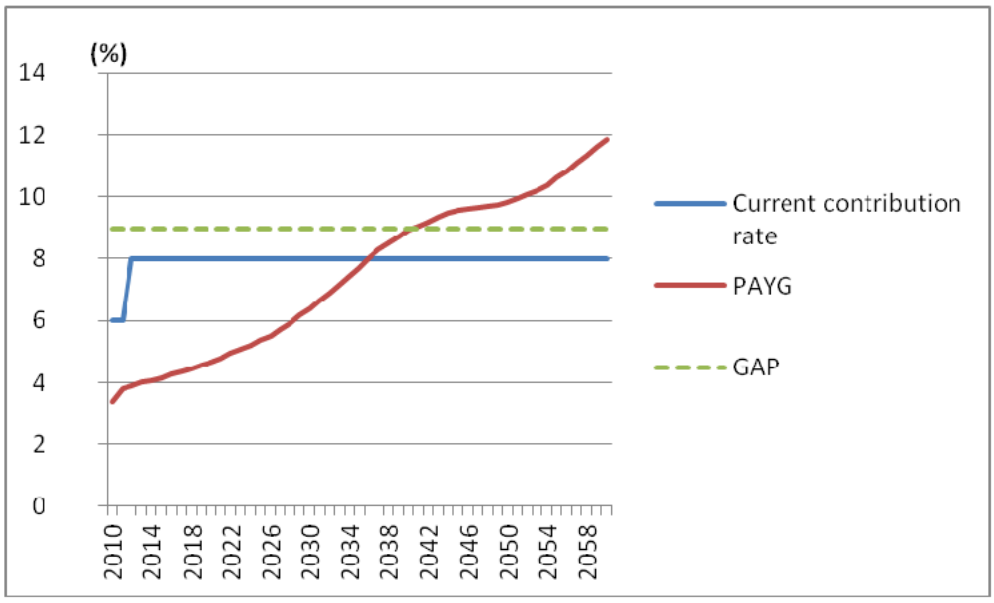
With the current wage ceiling of US$200 indexed in line with the average wage increase and an increased contribution rate of 8 per cent, the amount of reserves are expected to decrease in 2039 and be exhausted in the year 2051. The reserve ratio is projected to decrease before 2030 and become negative in 2051 as shown in figure 4.12.

Figure 4.12. Option 4: Reserve ratio, 2010–60



The PAYG cost rate is projected to exceed the contribution rate in 2035. The GAP rate between the years of 2010 and 2060 is estimated at 8.97 per cent.

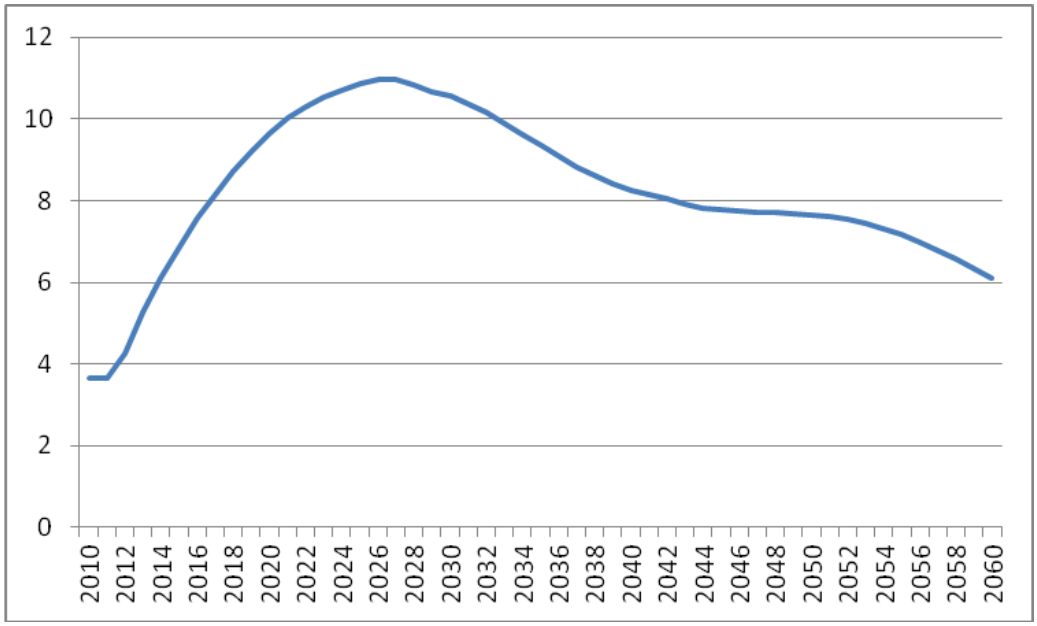
Figure 4.13. Option 4: PAYG cost rate and GAP rate, 2010–60



4.2.5 Option 5: Contribution rate 8 per cent, and gradual increase of the wage ceiling to US$700

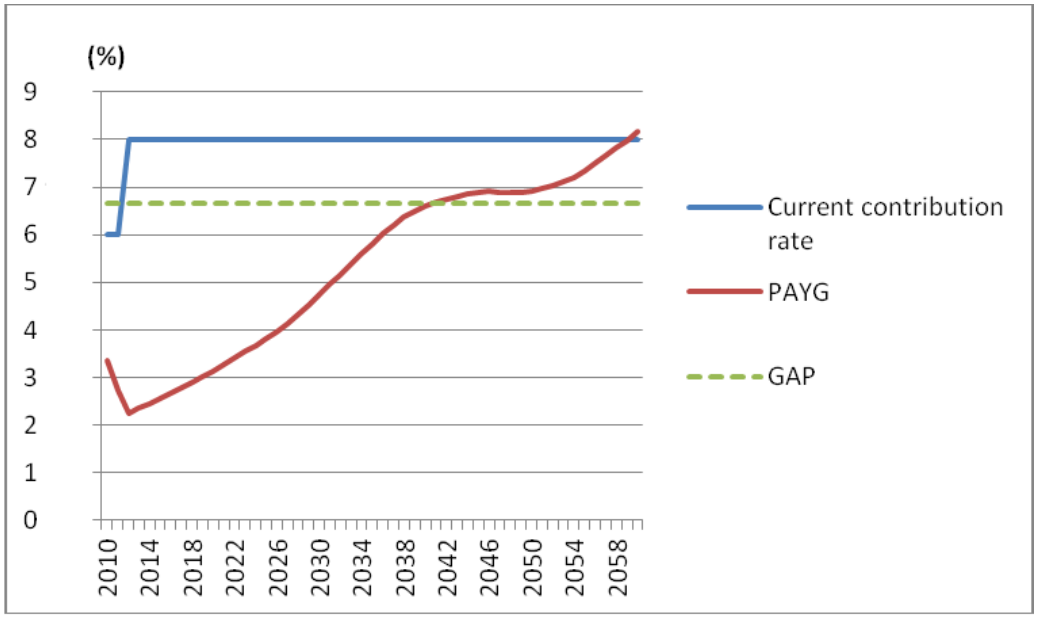
By increasing the current wage ceiling to US$700 and the contribution rate to 8 per cent, the amount of reserves are expected to increase for the entire period between 2010 and 2060. The reserve ratio is projected to decrease before 2030, but stay higher than six till the end of the projection period.

Figure 4.14. Option 5: Reserve ratio, 2010–60



The PAYG cost rate is projected to exceed the contribution rate in 2049. The GAP rate between the years of 2010 and 2060 is estimated at 6.66 per cent.

Figure 4.15. Option 5: PAYG cost rate and GAP rate, 2010–60



5. Recommendations

This section provides recommendations on modifications of the NPS to maintain its long-term financial viability as well as to keep the relevance of the benefits amid the changing economic development of the country. The section also deals with the role of the occupational pension schemes as a supplementary scheme for those already covered by the NPS as well as the possible introduction of a tax-based basic-tier pension for a wider coverage of the population.

5.1. Modifications of the NPS

Table 5.1 summarizes the results of the options presented in Chapter 4 of this report.

Table 5.1. Results of the different options

Options	Contribution rate (%)	Ceiling (US$)	Year PAYG exceeds the contribution rate	Year when the amount of reserves begin to decrease	Year when amount of reserves are exhausted	GAP (%)
Status quo (0)	6	200	2029	2029	2037	8.76
1	6	700	2036	2041	2056	6.45
2	7	200	2032	2034	2043	8.86
3	7	700	2052	2058	-	6.55
4	8	200	2035	2039	2051	8.97
5	8	700	2059	-	-	6.66

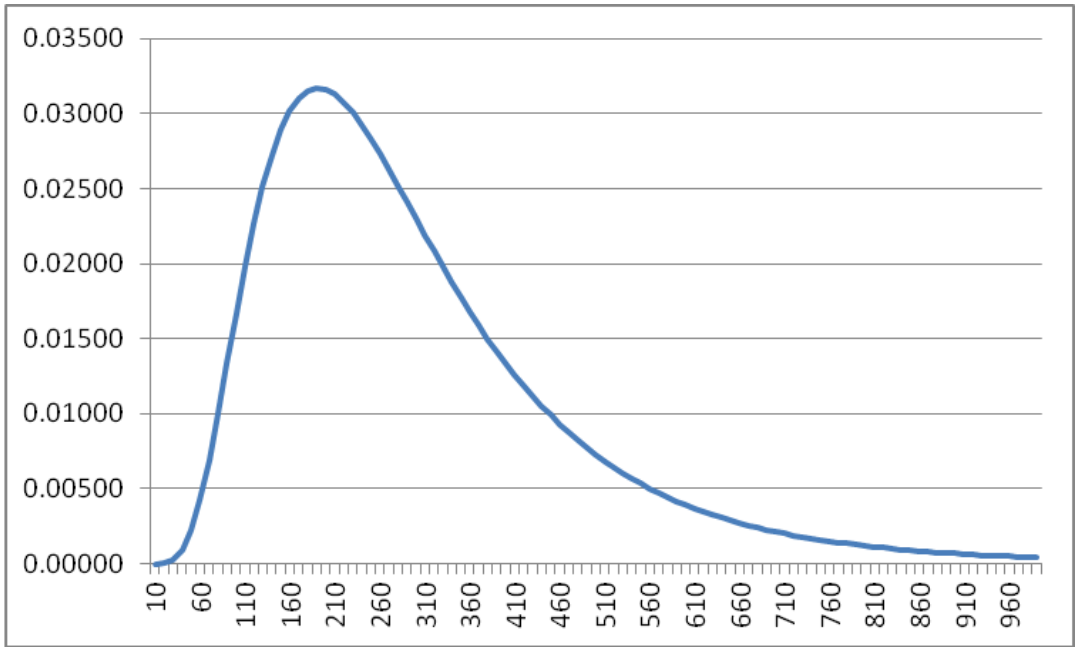
5.1.1. Increase of the ceiling on insurable earnings

The current ceiling of US$200 was introduced on 1 May 2010. This ceiling is below the average income, which is US$350. In many countries the contribution ceiling is normally twice or 2.5 times as much as the average wage of the covered population, and hence the ceiling should be at least US$700 if Zimbabwe follows this usual practice.

The salary distribution of the population usually follows a lognormal distribution with a mean and the standard deviation. As the standard deviation is unknown in Zimbabwe, two cases with a standard deviation of US$300 and US$400 respectively are presented here.

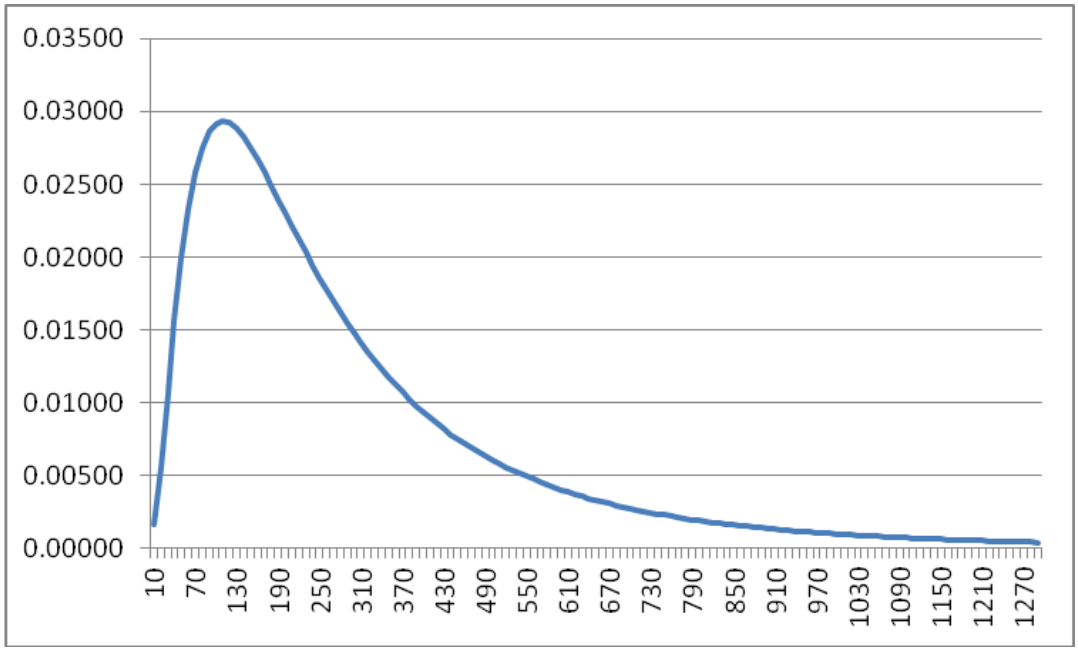
In the first case (figure 5.1), only 30.3 per cent of the population have salaries below the current ceiling of US$200. The remaining 69.7 per cent contribute according to the $200 contribution earnings base, irrespective of how much they actually earn. Ninety-six per cent of the population have salaries below the increased ceiling of US$700.

Figure 5.1. Lognormal salary distribution with mean US$350 and standard deviation US$300



In the second case, only 15.9 per cent of the population have salaries below US$100, with 43.4 per cent below the current ceiling of US$200. The remaining 56.7 per cent of the population contribute according to the $200 contribution earnings base, irrespective of how much they actually earn. The population with salaries below the increased ceiling of US$700 is 90.8 per cent.

Figure 5.2. Lognormal salary distribution with mean US$350 and standard deviation US$400



In both cases, the wage captured under the current US$200 ceiling is limited and this has a substantial impact both on contribution income and benefit levels. This raises a fundamental question on the adequacy of benefits in comparison with real wages and on the future financial sustainability of the scheme. **Therefore, it is recommended that the wage ceiling should be swiftly increased to US$700, around twice as much as the current average wage, and systematically increased in line with the average wage increase.**

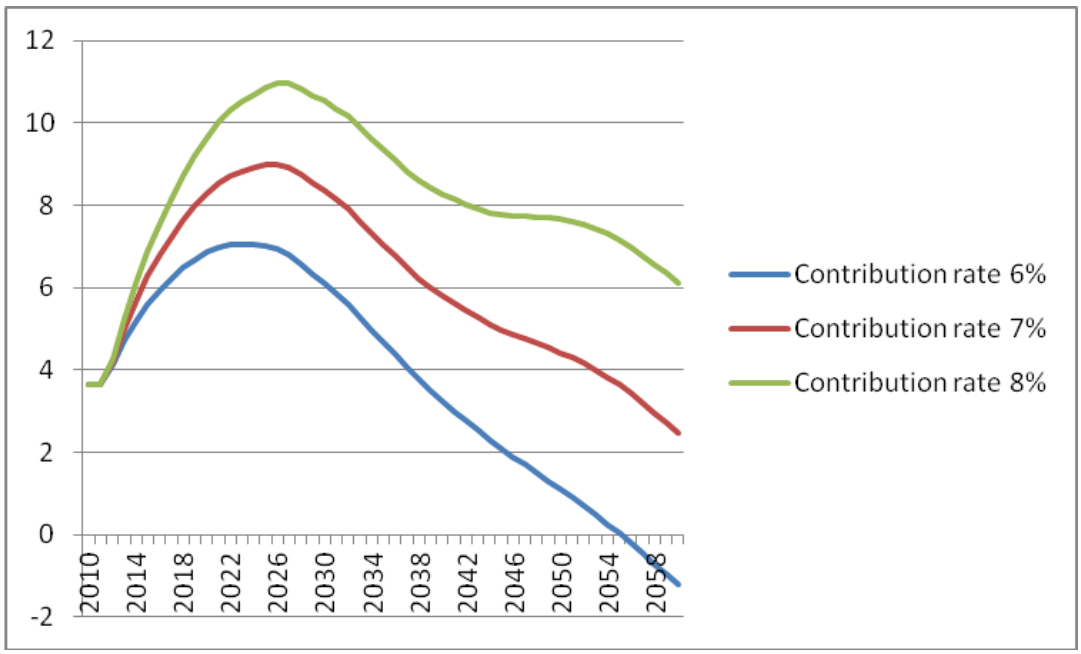
The reserves of the system will become exhausted in 2037 if the current ceiling and the 6 per cent contribution rate is maintained. If the ceiling is increased to US$700 and thereafter increased systematically in line with the average wage increase, but keeping the current contribution rate of 6 per cent, the reserve will continue to increase until the year 2041 and be exhausted in 2056 (Option 1, see section 4.2.2). The system will be more sustainable in the long term with this change but will still begin to encounter difficulties in ensuring sustainability from the year 2041 when the reserve begins to decrease. Therefore, a modification of the contribution rate on top of the increase in the wage ceiling is necessary to ensure the stability of the reserve.

5.1.2. Increase in the contribution rate

As mentioned in the previous section, it is recommended that the contribution rate should be increased on top of the increase of the wage ceiling.

If the ceiling is increased to US$700 as recommended but the current contribution rate remains at 6 per cent, the reserves are expected to be exhausted in 2056. If, however, the contribution rate is increased to 7 per cent, the reserves are not expected to be exhausted by 2060. By increasing the contribution rate to 8 per cent, the reserve ratio (calculated by dividing the total expenditure by the amount of reserves at the end of the year) is projected to be 6.09 in the year 2060.

Figure 5.3. Reserve ratios projected for the contribution rates of 6, 7 and 8 per cent, with the wage ceiling increased to US$700



To allow the NPS to remain financially sustainable it is therefore recommended that the contribution rate should be increased to 7 per cent together with an increase in the wage ceiling to US$700,

5.1.3. Operating expenses

In the year 2010, the Operating expenses were US$22.1 million out of a total expenditure of 42.9 million. This means that operating expenses account for 51.4 per cent of total expenditure. The rest of the expenditure was the benefit expenditure of US$20.8 million, lower than the operating expenses. Although the scheme is still young and it may not be fair to judge the volume of the operating expenses compared with the

benefit expenditure, the containment of the operating expenses should be taken seriously in order not only to keep the scheme sustainable in the long run but also to build people's trust and confidence in the scheme.

It is recommended that additional research and investigation in the comprehensive analysis on the administrative procedures, efficiency and cost containment should be carried out. It should be noted that investment in resources to improve the governance and efficiency of the scheme, e.g. better statistics collection, should not be undermined by the containment of the overall operating expenses.

5.1.4. Investment of the reserves

As the scheme is still young and is expected to accumulate substantial reserves, **it is recommended that a further study should be carried out for establishing long-term investment strategies and investment portfolios to maximize the investment return within the acceptable range of investment risks.**

5.1.5. Data

Good governance of the scheme relies on the planning of the scheme on a solid factual basis. An actuarial valuation is a major tool for maintaining the long-term future financial sustainability of the scheme; but reliable data as a starting point for the valuation, as well as requisites for setting future actuarial assumptions to control the dynamics of the scheme, are essential to carrying out an actuarial valuation. Even where the projection methodologies techniques are the most sophisticated and robust, results that rely heavily on these techniques become unreliable and seriously undermine the valuation.

An improvement in the data processing and data collection is thus strongly recommended. In particular, improvements should be made in the compilation of:

- the number of active and inactive contributors to the scheme by age and by sex;
- the number of beneficiaries by age, sex, retirement date, birthday, contribution history, salary and, in the case of survivors' beneficiaries, the specific age of the survivor; and
- the salary distribution of active contributors by age and by sex.

5.1.6. Eligibility conditions

It is recommended that the eligibility conditions for the invalidity, widow/er and orphan pension should be reviewed in order to avoid abuses and the discouragement of contributors. The current eligibility condition for such pensions is one year of contribution in the past. The active insured could become discouraged from continuing their contributions after one year, having fulfilled the eligibility condition for these three kinds of benefit. Stricter eligibility conditions are recommended, such as a longer period of contribution years to the scheme (e.g. a minimum of three years of contributions) or 12 months of contribution in the last 36 months preceding the incidents of death or invalidity.

5.2. Toward a more comprehensive pension scheme in Zimbabwe

5.2.1. Coverage of the NPS

The number of contributors of the NPS – 1.3 million compared with the population between 15 and 59 years old of 6.9 million – suggests that the coverage rate is less than 20 per cent of the working-age population. Although the coverage rate may be increased in line with the gradual formalization of the workforce, it should be noted that most of the population are and will be excluded from social security coverage.

It is recommended that another study should be carried out in order to assess the financial feasibility of substantially extending coverage through a tax-based universal benefit scheme which provides modest anti-poverty benefits to the needy, including the elderly, the disabled and survivors. Taking into account the current low level of benefits provided by the NPS (16.1 per cent in 2010 and estimated to be 24 per cent in 2060 with an assumed low density of contributions), such universal benefits would form a social protection floor even for NPS pension beneficiaries.

5.2.2. Coexistence of the NPS with occupational pension schemes

It is important that modest-level benefits should be provided to the elderly, the disabled and survivors for sustaining their lives, and that the Government should be the final guarantor of these basic provisions. The future uncertainty of volatile investment returns on investment should not play a role in the unpredictability of benefit levels, which should be at least sufficient for sustaining peoples' lives in times of no or scarce income; the elderly, the disabled and survivors are clearly among this category.

It is hence recommended that the NPS should play an essential role in providing basic income security for these people, through the recommended reforms of increasing the wage ceiling to a more suitable level (i.e. US$700) and increasing the contribution rate to 7 per cent.

As seen in the replacement level of the NPS, it is important that supplementary pension schemes should be developed in addition to the NPS. **Occupational pension schemes should play a role of supplementing the current provisions of the NPS by providing the top-up benefits.**

Annex

Tables

Table A1. Mortality rates used for males

Age	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	2065	2070
0	0.1154	0.0887	0.0730	0.0629	0.0568	0.0509	0.0453	0.0405	0.0354	0.0306	0.0270	0.0235	0.0208
1	0.0286	0.0187	0.0137	0.0108	0.0092	0.0077	0.0064	0.0054	0.0043	0.0034	0.0028	0.0023	0.0019
2	0.0149	0.0096	0.0070	0.0055	0.0047	0.0039	0.0032	0.0027	0.0022	0.0017	0.0014	0.0012	0.0010
3	0.0095	0.0061	0.0044	0.0035	0.0030	0.0025	0.0021	0.0017	0.0014	0.0011	0.0009	0.0008	0.0006
4	0.0067	0.0043	0.0032	0.0025	0.0021	0.0018	0.0015	0.0013	0.0010	0.0008	0.0007	0.0005	0.0005
5	0.0051	0.0033	0.0024	0.0019	0.0016	0.0014	0.0012	0.0010	0.0008	0.0006	0.0005	0.0004	0.0004
6	0.0040	0.0026	0.0019	0.0015	0.0013	0.0011	0.0009	0.0008	0.0007	0.0005	0.0004	0.0004	0.0003
7	0.0033	0.0022	0.0016	0.0013	0.0011	0.0010	0.0008	0.0007	0.0006	0.0004	0.0004	0.0003	0.0003
8	0.0029	0.0019	0.0014	0.0011	0.0010	0.0008	0.0007	0.0006	0.0005	0.0004	0.0003	0.0003	0.0002
9	0.0026	0.0017	0.0013	0.0010	0.0009	0.0008	0.0007	0.0006	0.0005	0.0004	0.0003	0.0003	0.0002
10	0.0024	0.0016	0.0012	0.0010	0.0009	0.0007	0.0006	0.0005	0.0004	0.0004	0.0003	0.0003	0.0002
11	0.0023	0.0016	0.0012	0.0010	0.0009	0.0007	0.0006	0.0005	0.0004	0.0004	0.0003	0.0003	0.0002
12	0.0023	0.0016	0.0012	0.0010	0.0009	0.0008	0.0007	0.0006	0.0005	0.0004	0.0003	0.0003	0.0002
13	0.0024	0.0017	0.0013	0.0011	0.0009	0.0008	0.0007	0.0006	0.0005	0.0004	0.0004	0.0003	0.0003
14	0.0026	0.0018	0.0014	0.0012	0.0010	0.0009	0.0008	0.0007	0.0006	0.0005	0.0004	0.0003	0.0003
15	0.0028	0.0020	0.0015	0.0013	0.0011	0.0010	0.0008	0.0007	0.0006	0.0005	0.0004	0.0004	0.0003
16	0.0031	0.0022	0.0017	0.0014	0.0012	0.0011	0.0009	0.0008	0.0007	0.0006	0.0005	0.0004	0.0003
17	0.0034	0.0024	0.0018	0.0015	0.0013	0.0012	0.0010	0.0009	0.0007	0.0006	0.0005	0.0004	0.0004
18	0.0037	0.0026	0.0020	0.0017	0.0014	0.0013	0.0011	0.0009	0.0008	0.0007	0.0006	0.0005	0.0004
19	0.0039	0.0028	0.0022	0.0018	0.0016	0.0014	0.0012	0.0010	0.0009	0.0007	0.0006	0.0005	0.0004
20	0.0042	0.0030	0.0023	0.0019	0.0017	0.0014	0.0012	0.0011	0.0009	0.0008	0.0006	0.0005	0.0005
21	0.0045	0.0032	0.0024	0.0020	0.0018	0.0015	0.0013	0.0011	0.0010	0.0008	0.0007	0.0006	0.0005
22	0.0047	0.0033	0.0026	0.0021	0.0019	0.0016	0.0014	0.0012	0.0010	0.0008	0.0007	0.0006	0.0005
23	0.0050	0.0035	0.0027	0.0022	0.0019	0.0017	0.0015	0.0013	0.0011	0.0009	0.0008	0.0006	0.0005
24	0.0052	0.0036	0.0028	0.0023	0.0020	0.0018	0.0015	0.0013	0.0011	0.0009	0.0008	0.0007	0.0006
25	0.0054	0.0038	0.0029	0.0024	0.0021	0.0018	0.0016	0.0014	0.0012	0.0010	0.0008	0.0007	0.0006
26	0.0056	0.0039	0.0030	0.0025	0.0022	0.0019	0.0016	0.0014	0.0012	0.0010	0.0008	0.0007	0.0006
27	0.0058	0.0041	0.0031	0.0026	0.0023	0.0020	0.0017	0.0015	0.0012	0.0010	0.0009	0.0007	0.0006
28	0.0059	0.0042	0.0032	0.0027	0.0023	0.0020	0.0018	0.0015	0.0013	0.0011	0.0009	0.0008	0.0007
29	0.0061	0.0043	0.0033	0.0028	0.0024	0.0021	0.0018	0.0016	0.0013	0.0011	0.0010	0.0008	0.0007
30	0.0063	0.0045	0.0035	0.0029	0.0025	0.0022	0.0019	0.0017	0.0014	0.0012	0.0010	0.0008	0.0007

Age	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	2065	2070
31	0.0065	0.0046	0.0036	0.0030	0.0026	0.0023	0.0020	0.0017	0.0015	0.0012	0.0010	0.0009	0.0008
32	0.0067	0.0048	0.0037	0.0031	0.0027	0.0024	0.0021	0.0018	0.0015	0.0013	0.0011	0.0009	0.0008
33	0.0069	0.0049	0.0039	0.0032	0.0029	0.0025	0.0022	0.0019	0.0016	0.0014	0.0012	0.0010	0.0009
34	0.0071	0.0051	0.0041	0.0034	0.0030	0.0026	0.0023	0.0020	0.0017	0.0014	0.0013	0.0011	0.0009
35	0.0074	0.0054	0.0042	0.0036	0.0032	0.0028	0.0024	0.0021	0.0018	0.0015	0.0013	0.0011	0.0010
36	0.0077	0.0056	0.0045	0.0038	0.0033	0.0029	0.0026	0.0023	0.0019	0.0017	0.0014	0.0012	0.0011
37	0.0080	0.0059	0.0047	0.0040	0.0035	0.0031	0.0027	0.0024	0.0021	0.0018	0.0015	0.0013	0.0012
38	0.0084	0.0062	0.0050	0.0042	0.0038	0.0033	0.0029	0.0026	0.0022	0.0019	0.0017	0.0014	0.0013
39	0.0088	0.0065	0.0053	0.0045	0.0040	0.0036	0.0031	0.0028	0.0024	0.0021	0.0018	0.0016	0.0014
40	0.0092	0.0069	0.0056	0.0048	0.0043	0.0038	0.0034	0.0030	0.0026	0.0022	0.0020	0.0017	0.0015
41	0.0097	0.0073	0.0060	0.0051	0.0046	0.0041	0.0036	0.0032	0.0028	0.0024	0.0021	0.0019	0.0016
42	0.0103	0.0078	0.0064	0.0055	0.0049	0.0044	0.0039	0.0035	0.0031	0.0026	0.0023	0.0020	0.0018
43	0.0109	0.0083	0.0068	0.0059	0.0053	0.0048	0.0043	0.0038	0.0033	0.0029	0.0025	0.0022	0.0020
44	0.0115	0.0089	0.0073	0.0063	0.0057	0.0052	0.0046	0.0041	0.0036	0.0032	0.0028	0.0024	0.0022
45	0.0123	0.0095	0.0079	0.0068	0.0062	0.0056	0.0050	0.0045	0.0040	0.0035	0.0031	0.0027	0.0024
46	0.0131	0.0102	0.0085	0.0074	0.0067	0.0061	0.0054	0.0049	0.0043	0.0038	0.0034	0.0030	0.0026
47	0.0139	0.0109	0.0091	0.0080	0.0073	0.0066	0.0059	0.0053	0.0047	0.0042	0.0037	0.0033	0.0029
48	0.0148	0.0117	0.0098	0.0086	0.0079	0.0072	0.0064	0.0058	0.0052	0.0045	0.0041	0.0036	0.0032
49	0.0158	0.0126	0.0106	0.0093	0.0085	0.0078	0.0070	0.0064	0.0057	0.0050	0.0045	0.0040	0.0036
50	0.0169	0.0135	0.0115	0.0101	0.0093	0.0084	0.0077	0.0070	0.0062	0.0055	0.0049	0.0044	0.0039
51	0.0181	0.0145	0.0124	0.0109	0.0101	0.0092	0.0083	0.0076	0.0068	0.0060	0.0054	0.0048	0.0044
52	0.0194	0.0156	0.0134	0.0119	0.0109	0.0100	0.0091	0.0083	0.0075	0.0066	0.0060	0.0053	0.0048
53	0.0208	0.0169	0.0145	0.0129	0.0119	0.0109	0.0099	0.0091	0.0082	0.0073	0.0066	0.0059	0.0054
54	0.0223	0.0182	0.0156	0.0140	0.0129	0.0119	0.0109	0.0100	0.0090	0.0080	0.0073	0.0065	0.0059
55	0.0238	0.0196	0.0169	0.0151	0.0140	0.0129	0.0118	0.0109	0.0099	0.0088	0.0080	0.0072	0.0066
56	0.0256	0.0211	0.0183	0.0164	0.0153	0.0141	0.0129	0.0119	0.0108	0.0097	0.0088	0.0080	0.0073
57	0.0274	0.0227	0.0198	0.0178	0.0166	0.0154	0.0141	0.0131	0.0119	0.0107	0.0097	0.0088	0.0081
58	0.0294	0.0245	0.0215	0.0194	0.0180	0.0168	0.0154	0.0143	0.0130	0.0118	0.0107	0.0098	0.0089
59	0.0315	0.0264	0.0232	0.0210	0.0196	0.0183	0.0169	0.0157	0.0143	0.0129	0.0118	0.0108	0.0099
60	0.0338	0.0285	0.0251	0.0228	0.0214	0.0199	0.0184	0.0171	0.0157	0.0142	0.0131	0.0119	0.0110
61	0.0363	0.0307	0.0272	0.0248	0.0232	0.0217	0.0201	0.0188	0.0172	0.0157	0.0144	0.0132	0.0122
62	0.0389	0.0331	0.0294	0.0269	0.0253	0.0236	0.0220	0.0205	0.0189	0.0172	0.0159	0.0146	0.0135
63	0.0417	0.0357	0.0319	0.0292	0.0275	0.0258	0.0240	0.0225	0.0207	0.0189	0.0175	0.0161	0.0149
64	0.0448	0.0385	0.0345	0.0317	0.0299	0.0281	0.0262	0.0246	0.0227	0.0208	0.0193	0.0178	0.0165
65	0.0480	0.0415	0.0373	0.0344	0.0325	0.0306	0.0286	0.0269	0.0249	0.0229	0.0213	0.0196	0.0183
66	0.0515	0.0447	0.0403	0.0373	0.0353	0.0333	0.0312	0.0294	0.0273	0.0252	0.0234	0.0217	0.0202

Age	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	2065	2070
67	0.0552	0.0482	0.0436	0.0404	0.0383	0.0362	0.0341	0.0322	0.0300	0.0277	0.0258	0.0240	0.0224
68	0.0591	0.0519	0.0472	0.0438	0.0416	0.0395	0.0372	0.0352	0.0328	0.0304	0.0285	0.0265	0.0248
69	0.0633	0.0559	0.0510	0.0475	0.0452	0.0429	0.0405	0.0384	0.0360	0.0334	0.0313	0.0292	0.0274
70	0.0678	0.0602	0.0551	0.0515	0.0491	0.0467	0.0442	0.0420	0.0394	0.0367	0.0345	0.0323	0.0304
71	0.0726	0.0648	0.0595	0.0558	0.0533	0.0508	0.0482	0.0459	0.0431	0.0403	0.0380	0.0356	0.0336
72	0.0777	0.0697	0.0643	0.0604	0.0578	0.0552	0.0525	0.0501	0.0472	0.0443	0.0418	0.0393	0.0371
73	0.0832	0.0749	0.0694	0.0654	0.0627	0.0600	0.0572	0.0547	0.0517	0.0486	0.0459	0.0433	0.0410
74	0.0890	0.0805	0.0748	0.0707	0.0680	0.0652	0.0623	0.0596	0.0565	0.0533	0.0505	0.0477	0.0453
75	0.0951	0.0865	0.0807	0.0765	0.0737	0.0708	0.0677	0.0650	0.0618	0.0584	0.0555	0.0526	0.0500
76	0.1017	0.0929	0.0870	0.0827	0.0798	0.0768	0.0737	0.0709	0.0675	0.0640	0.0609	0.0579	0.0552
77	0.1086	0.0998	0.0937	0.0893	0.0864	0.0833	0.0801	0.0772	0.0737	0.0700	0.0669	0.0637	0.0609
78	0.1159	0.1070	0.1009	0.0964	0.0934	0.0903	0.0870	0.0840	0.0804	0.0767	0.0734	0.0700	0.0671
79	0.1237	0.1148	0.1086	0.1041	0.1010	0.0978	0.0945	0.0914	0.0877	0.0838	0.0804	0.0770	0.0739
80	0.1319	0.1230	0.1168	0.1122	0.1091	0.1059	0.1025	0.0994	0.0956	0.0916	0.0881	0.0845	0.0813
81	0.1405	0.1317	0.1255	0.1209	0.1178	0.1146	0.1111	0.1080	0.1041	0.1000	0.0964	0.0927	0.0895
82	0.1497	0.1409	0.1348	0.1302	0.1271	0.1238	0.1204	0.1172	0.1133	0.1091	0.1054	0.1017	0.0983
83	0.1593	0.1507	0.1446	0.1401	0.1370	0.1337	0.1303	0.1271	0.1231	0.1190	0.1152	0.1113	0.1079
84	0.1694	0.1610	0.1551	0.1506	0.1475	0.1443	0.1408	0.1377	0.1337	0.1296	0.1257	0.1218	0.1183
85	0.1800	0.1719	0.1661	0.1618	0.1587	0.1556	0.1521	0.1490	0.1451	0.1409	0.1371	0.1332	0.1296
86	0.1912	0.1833	0.1778	0.1736	0.1706	0.1675	0.1642	0.1611	0.1573	0.1531	0.1493	0.1454	0.1418
87	0.2028	0.1954	0.1901	0.1860	0.1832	0.1802	0.1770	0.1740	0.1702	0.1662	0.1624	0.1585	0.1550
88	0.2150	0.2080	0.2030	0.1992	0.1965	0.1936	0.1905	0.1877	0.1840	0.1801	0.1764	0.1725	0.1691
89	0.2277	0.2212	0.2166	0.2130	0.2105	0.2078	0.2048	0.2022	0.1987	0.1949	0.1913	0.1876	0.1842
90	0.2409	0.2350	0.2308	0.2276	0.2252	0.2227	0.2200	0.2175	0.2142	0.2106	0.2072	0.2036	0.2003
91	0.2547	0.2494	0.2457	0.2428	0.2406	0.2384	0.2359	0.2336	0.2306	0.2273	0.2240	0.2206	0.2175
92	0.2689	0.2644	0.2612	0.2587	0.2568	0.2548	0.2526	0.2505	0.2478	0.2448	0.2417	0.2386	0.2357
93	0.2836	0.2799	0.2773	0.2752	0.2736	0.2719	0.2700	0.2683	0.2659	0.2632	0.2604	0.2576	0.2550
94	0.2988	0.2960	0.2940	0.2924	0.2911	0.2897	0.2882	0.2868	0.2848	0.2825	0.2801	0.2776	0.2752
95	0.3145	0.3126	0.3113	0.3102	0.3093	0.3082	0.3071	0.3060	0.3044	0.3027	0.3006	0.2985	0.2964
96	0.3306	0.3297	0.3292	0.3286	0.3280	0.3274	0.3266	0.3260	0.3249	0.3236	0.3219	0.3202	0.3186
97	0.3471	0.3473	0.3475	0.3476	0.3474	0.3471	0.3468	0.3466	0.3460	0.3452	0.3440	0.3428	0.3416
98	0.3640	0.3653	0.3663	0.3670	0.3672	0.3674	0.3676	0.3678	0.3677	0.3675	0.3668	0.3661	0.3653
99	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Table A2. Mortality rates used for females

Age	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	2065	2070
0	0.1078	0.0877	0.0732	0.0637	0.0583	0.0531	0.0475	0.0423	0.0357	0.0301	0.0228	0.0139	0.0086
1	0.0354	0.0248	0.0182	0.0143	0.0123	0.0104	0.0086	0.0070	0.0053	0.0039	0.0027	0.0013	0.0005
2	0.0196	0.0133	0.0095	0.0074	0.0063	0.0053	0.0043	0.0035	0.0026	0.0019	0.0014	0.0008	0.0005
3	0.0127	0.0086	0.0061	0.0047	0.0040	0.0034	0.0027	0.0022	0.0016	0.0012	0.0009	0.0007	0.0005
4	0.0091	0.0061	0.0043	0.0033	0.0028	0.0024	0.0019	0.0016	0.0011	0.0008	0.0007	0.0006	0.0005
5	0.0068	0.0046	0.0033	0.0025	0.0021	0.0018	0.0015	0.0012	0.0009	0.0006	0.0005	0.0005	0.0004
6	0.0054	0.0036	0.0026	0.0020	0.0017	0.0014	0.0012	0.0009	0.0007	0.0005	0.0004	0.0003	0.0003
7	0.0044	0.0030	0.0021	0.0016	0.0014	0.0012	0.0010	0.0008	0.0006	0.0004	0.0003	0.0003	0.0002
8	0.0037	0.0025	0.0018	0.0014	0.0012	0.0010	0.0008	0.0007	0.0005	0.0004	0.0003	0.0002	0.0002
9	0.0032	0.0022	0.0016	0.0012	0.0010	0.0009	0.0007	0.0006	0.0004	0.0003	0.0002	0.0002	0.0001
10	0.0029	0.0020	0.0014	0.0011	0.0009	0.0008	0.0007	0.0005	0.0004	0.0003	0.0002	0.0002	0.0001
11	0.0027	0.0019	0.0014	0.0010	0.0009	0.0008	0.0006	0.0005	0.0004	0.0003	0.0002	0.0002	0.0001
12	0.0027	0.0018	0.0013	0.0010	0.0009	0.0007	0.0006	0.0005	0.0004	0.0003	0.0002	0.0002	0.0002
13	0.0028	0.0019	0.0014	0.0011	0.0009	0.0008	0.0006	0.0005	0.0004	0.0003	0.0002	0.0002	0.0002
14	0.0030	0.0020	0.0015	0.0011	0.0010	0.0008	0.0007	0.0005	0.0004	0.0003	0.0003	0.0002	0.0002
15	0.0033	0.0022	0.0016	0.0012	0.0010	0.0009	0.0007	0.0006	0.0004	0.0003	0.0003	0.0003	0.0003
16	0.0036	0.0024	0.0017	0.0013	0.0011	0.0010	0.0008	0.0006	0.0005	0.0004	0.0003	0.0003	0.0003
17	0.0040	0.0027	0.0019	0.0015	0.0013	0.0011	0.0009	0.0007	0.0005	0.0004	0.0003	0.0004	0.0003
18	0.0044	0.0030	0.0021	0.0016	0.0014	0.0012	0.0009	0.0008	0.0006	0.0004	0.0004	0.0004	0.0004
19	0.0049	0.0033	0.0023	0.0018	0.0015	0.0013	0.0010	0.0008	0.0006	0.0004	0.0004	0.0004	0.0004
20	0.0053	0.0035	0.0025	0.0019	0.0016	0.0014	0.0011	0.0009	0.0007	0.0005	0.0004	0.0004	0.0004
21	0.0057	0.0038	0.0027	0.0021	0.0017	0.0015	0.0012	0.0010	0.0007	0.0005	0.0005	0.0005	0.0004
22	0.0061	0.0041	0.0029	0.0022	0.0019	0.0016	0.0013	0.0010	0.0007	0.0006	0.0005	0.0005	0.0004
23	0.0064	0.0043	0.0030	0.0023	0.0020	0.0017	0.0013	0.0011	0.0008	0.0006	0.0005	0.0005	0.0005
24	0.0067	0.0045	0.0032	0.0025	0.0021	0.0018	0.0014	0.0011	0.0008	0.0006	0.0005	0.0005	0.0005
25	0.0069	0.0047	0.0033	0.0026	0.0022	0.0018	0.0015	0.0012	0.0009	0.0007	0.0005	0.0005	0.0005
26	0.0071	0.0048	0.0035	0.0027	0.0023	0.0019	0.0016	0.0013	0.0009	0.0007	0.0006	0.0005	0.0005
27	0.0073	0.0050	0.0036	0.0028	0.0024	0.0020	0.0016	0.0013	0.0010	0.0007	0.0006	0.0005	0.0005
28	0.0075	0.0051	0.0037	0.0029	0.0024	0.0021	0.0017	0.0014	0.0010	0.0008	0.0006	0.0006	0.0005
29	0.0076	0.0052	0.0038	0.0029	0.0025	0.0021	0.0018	0.0014	0.0011	0.0008	0.0007	0.0006	0.0005
30	0.0077	0.0053	0.0039	0.0030	0.0026	0.0022	0.0018	0.0015	0.0011	0.0008	0.0007	0.0006	0.0006
31	0.0078	0.0054	0.0040	0.0031	0.0027	0.0023	0.0019	0.0016	0.0012	0.0009	0.0007	0.0007	0.0006
32	0.0079	0.0055	0.0040	0.0032	0.0028	0.0024	0.0020	0.0016	0.0012	0.0009	0.0008	0.0007	0.0006
33	0.0079	0.0056	0.0042	0.0033	0.0029	0.0025	0.0020	0.0017	0.0013	0.0010	0.0008	0.0008	0.0007
34	0.0080	0.0057	0.0043	0.0034	0.0030	0.0026	0.0021	0.0018	0.0014	0.0011	0.0009	0.0008	0.0008
35	0.0081	0.0058	0.0044	0.0035	0.0031	0.0027	0.0022	0.0019	0.0014	0.0011	0.0010	0.0009	0.0008
36	0.0083	0.0060	0.0045	0.0037	0.0032	0.0028	0.0023	0.0020	0.0015	0.0012	0.0010	0.0010	0.0009
37	0.0084	0.0061	0.0047	0.0038	0.0033	0.0029	0.0025	0.0021	0.0016	0.0013	0.0011	0.0011	0.0010
38	0.0086	0.0063	0.0049	0.0040	0.0035	0.0031	0.0026	0.0022	0.0018	0.0014	0.0012	0.0012	0.0011
39	0.0088	0.0065	0.0051	0.0042	0.0037	0.0032	0.0028	0.0024	0.0019	0.0015	0.0013	0.0013	0.0012
40	0.0091	0.0068	0.0053	0.0044	0.0039	0.0034	0.0029	0.0025	0.0020	0.0016	0.0014	0.0013	0.0012
41	0.0094	0.0071	0.0055	0.0046	0.0041	0.0036	0.0031	0.0027	0.0022	0.0018	0.0015	0.0014	0.0013
42	0.0097	0.0074	0.0058	0.0049	0.0044	0.0039	0.0034	0.0029	0.0023	0.0019	0.0017	0.0016	0.0015
43	0.0101	0.0077	0.0062	0.0052	0.0046	0.0041	0.0036	0.0031	0.0025	0.0021	0.0018	0.0017	0.0016
44	0.0106	0.0082	0.0065	0.0055	0.0050	0.0044	0.0039	0.0034	0.0028	0.0023	0.0020	0.0019	0.0018
45	0.0111	0.0086	0.0069	0.0059	0.0053	0.0048	0.0042	0.0037	0.0030	0.0025	0.0022	0.0021	0.0020
46	0.0116	0.0091	0.0074	0.0063	0.0057	0.0051	0.0045	0.0040	0.0033	0.0027	0.0025	0.0024	0.0022
47	0.0123	0.0097	0.0079	0.0068	0.0061	0.0055	0.0049	0.0043	0.0036	0.0030	0.0027	0.0026	0.0024
48	0.0130	0.0103	0.0085	0.0073	0.0066	0.0060	0.0053	0.0047	0.0039	0.0033	0.0029	0.0028	0.0026
49	0.0138	0.0110	0.0091	0.0078	0.0071	0.0065	0.0058	0.0051	0.0043	0.0036	0.0032	0.0031	0.0028

Age	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	2065	2070
50	0.0146	0.0118	0.0098	0.0085	0.0077	0.0070	0.0063	0.0056	0.0047	0.0039	0.0035	0.0033	0.0031
51	0.0156	0.0126	0.0105	0.0091	0.0084	0.0076	0.0068	0.0061	0.0051	0.0043	0.0039	0.0037	0.0034
52	0.0166	0.0135	0.0113	0.0099	0.0091	0.0083	0.0074	0.0066	0.0056	0.0048	0.0043	0.0040	0.0036
53	0.0178	0.0146	0.0122	0.0107	0.0098	0.0090	0.0081	0.0072	0.0062	0.0053	0.0047	0.0043	0.0039
54	0.0190	0.0157	0.0132	0.0116	0.0107	0.0098	0.0088	0.0079	0.0068	0.0058	0.0052	0.0047	0.0043
55	0.0204	0.0169	0.0143	0.0126	0.0116	0.0107	0.0096	0.0087	0.0074	0.0064	0.0057	0.0052	0.0047
56	0.0219	0.0182	0.0154	0.0137	0.0126	0.0116	0.0105	0.0095	0.0081	0.0070	0.0062	0.0056	0.0051
57	0.0235	0.0196	0.0167	0.0148	0.0137	0.0127	0.0115	0.0104	0.0089	0.0077	0.0069	0.0062	0.0055
58	0.0253	0.0211	0.0181	0.0161	0.0149	0.0138	0.0125	0.0114	0.0098	0.0085	0.0075	0.0068	0.0060
59	0.0272	0.0228	0.0196	0.0175	0.0163	0.0150	0.0137	0.0124	0.0108	0.0094	0.0083	0.0074	0.0066
60	0.0292	0.0247	0.0213	0.0190	0.0177	0.0164	0.0150	0.0136	0.0119	0.0104	0.0092	0.0082	0.0073
61	0.0315	0.0267	0.0231	0.0207	0.0193	0.0179	0.0164	0.0149	0.0130	0.0114	0.0101	0.0090	0.0080
62	0.0339	0.0288	0.0250	0.0225	0.0210	0.0195	0.0179	0.0163	0.0143	0.0126	0.0112	0.0099	0.0088
63	0.0365	0.0311	0.0272	0.0245	0.0229	0.0213	0.0196	0.0179	0.0157	0.0139	0.0123	0.0109	0.0097
64	0.0393	0.0337	0.0295	0.0266	0.0249	0.0232	0.0214	0.0196	0.0173	0.0153	0.0136	0.0121	0.0107
65	0.0423	0.0364	0.0320	0.0289	0.0271	0.0254	0.0234	0.0215	0.0190	0.0168	0.0150	0.0133	0.0118
66	0.0455	0.0393	0.0347	0.0314	0.0296	0.0277	0.0256	0.0235	0.0209	0.0185	0.0166	0.0148	0.0131
67	0.0490	0.0425	0.0376	0.0342	0.0322	0.0302	0.0279	0.0258	0.0229	0.0204	0.0183	0.0164	0.0146
68	0.0528	0.0460	0.0407	0.0371	0.0350	0.0329	0.0305	0.0282	0.0252	0.0225	0.0203	0.0183	0.0163
69	0.0568	0.0497	0.0442	0.0404	0.0381	0.0359	0.0334	0.0309	0.0277	0.0248	0.0224	0.0205	0.0183
70	0.0611	0.0536	0.0479	0.0439	0.0415	0.0391	0.0364	0.0338	0.0304	0.0273	0.0249	0.0231	0.0208
71	0.0658	0.0579	0.0519	0.0477	0.0452	0.0426	0.0398	0.0370	0.0333	0.0300	0.0276	0.0258	0.0233
72	0.0707	0.0626	0.0562	0.0518	0.0491	0.0464	0.0434	0.0405	0.0366	0.0330	0.0305	0.0287	0.0262
73	0.0761	0.0675	0.0609	0.0562	0.0534	0.0506	0.0474	0.0443	0.0401	0.0363	0.0338	0.0321	0.0294
74	0.0818	0.0729	0.0659	0.0610	0.0581	0.0551	0.0517	0.0484	0.0440	0.0400	0.0374	0.0358	0.0330
75	0.0879	0.0786	0.0713	0.0662	0.0631	0.0599	0.0564	0.0529	0.0482	0.0439	0.0410	0.0391	0.0362
76	0.0943	0.0847	0.0771	0.0717	0.0685	0.0652	0.0615	0.0578	0.0528	0.0483	0.0456	0.0442	0.0413
77	0.1013	0.0913	0.0834	0.0777	0.0744	0.0709	0.0670	0.0631	0.0578	0.0530	0.0507	0.0501	0.0473
78	0.1087	0.0983	0.0901	0.0842	0.0807	0.0770	0.0729	0.0688	0.0633	0.0582	0.0564	0.0570	0.0542
79	0.1165	0.1058	0.0973	0.0912	0.0875	0.0837	0.0794	0.0751	0.0692	0.0639	0.0628	0.0646	0.0620
80	0.1248	0.1138	0.1050	0.0986	0.0948	0.0908	0.0863	0.0818	0.0757	0.0701	0.0705	0.0752	0.0727
81	0.1337	0.1224	0.1132	0.1066	0.1027	0.0985	0.0938	0.0891	0.0827	0.0768	0.0777	0.0836	0.0813
82	0.1431	0.1315	0.1220	0.1152	0.1111	0.1068	0.1019	0.0970	0.0903	0.0841	0.0854	0.0921	0.0900
83	0.1530	0.1411	0.1314	0.1244	0.1201	0.1157	0.1106	0.1055	0.0985	0.0920	0.0935	0.1006	0.0988
84	0.1635	0.1513	0.1414	0.1342	0.1298	0.1252	0.1200	0.1147	0.1074	0.1006	0.1020	0.1092	0.1077
85	0.1745	0.1622	0.1521	0.1446	0.1401	0.1354	0.1300	0.1245	0.1170	0.1099	0.1101	0.1155	0.1143
86	0.1862	0.1736	0.1633	0.1558	0.1511	0.1463	0.1407	0.1351	0.1273	0.1200	0.1202	0.1259	0.1251
87	0.1984	0.1857	0.1753	0.1675	0.1628	0.1579	0.1522	0.1464	0.1384	0.1308	0.1314	0.1379	0.1374
88	0.2112	0.1984	0.1879	0.1800	0.1753	0.1702	0.1644	0.1584	0.1502	0.1425	0.1437	0.1514	0.1514
89	0.2246	0.2118	0.2012	0.1933	0.1884	0.1833	0.1773	0.1713	0.1629	0.1550	0.1571	0.1664	0.1669
90	0.2386	0.2258	0.2152	0.2072	0.2023	0.1971	0.1911	0.1850	0.1765	0.1684	0.1725	0.1853	0.1864
91	0.2532	0.2405	0.2298	0.2219	0.2170	0.2118	0.2057	0.1995	0.1909	0.1827	0.1877	0.2021	0.2036
92	0.2684	0.2558	0.2452	0.2373	0.2324	0.2272	0.2211	0.2149	0.2062	0.1980	0.2037	0.2195	0.2214
93	0.2841	0.2717	0.2613	0.2534	0.2485	0.2433	0.2373	0.2311	0.2224	0.2141	0.2205	0.2375	0.2398
94	0.3004	0.2883	0.2780	0.2702	0.2654	0.2603	0.2543	0.2481	0.2395	0.2313	0.2382	0.2562	0.2588
95	0.3172	0.3054	0.2953	0.2877	0.2830	0.2780	0.2720	0.2659	0.2574	0.2493	0.2567	0.2755	0.2785
96	0.3345	0.3231	0.3133	0.3059	0.3013	0.2964	0.2906	0.2846	0.2763	0.2683	0.2761	0.2953	0.2987
97	0.3523	0.3413	0.3319	0.3247	0.3203	0.3155	0.3098	0.3040	0.2959	0.2881	0.2962	0.3158	0.3195
98	0.3705	0.3600	0.3510	0.3441	0.3398	0.3352	0.3298	0.3242	0.3163	0.3088	0.3171	0.3368	0.3408
99	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.8231	0.5198	0.3627
100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Table A3. Demographic ratios for the total population, 2010–60

Year	15–64	65+	Old-age demographic ratio	15–59	60+	Old-age demographic ratio
2010	7156186	561606.0	7.8	6935557	782235.0	11.3
2011	7364168	543370.6	7.4	7140277	767261.3	10.7
2012	7569641	527771.3	7.0	7336553	760859.5	10.4
2013	7769760	515743.3	6.6	7524784	760719.4	10.1
2014	7960968	509041.9	6.4	7705813	764196.7	9.9
2015	8140825	508433.7	6.2	7879656	769602.7	9.8
2016	8307195	513137.6	6.2	8043472	776860.0	9.7
2017	8466999	521905.0	6.2	8204817	784087.3	9.6
2018	8623385	533210.8	6.2	8365621	790975.0	9.5
2019	8781163	544954.9	6.2	8528668	797450.4	9.4
2020	8943135	555807.3	6.2	8695482	803460.0	9.2
2021	9108461	565884.2	6.2	8865427	808918.2	9.1
2022	9276593	575061.0	6.2	9037736	813918.0	9.0
2023	9443954	583214.6	6.2	9208873	818295.7	8.9
2024	9603854	590394.4	6.1	9372438	821810.1	8.8
2025	9738382	596644.3	6.1	9510532	824494.1	8.7
2026	9907421	601967.7	6.1	9682603	826785.8	8.5
2027	10099452	606514.4	6.0	9876834	829132.6	8.4
2028	10311319	610217.1	5.9	10089266	832270.2	8.2
2029	10539638	612961.6	5.8	10315508	837092.5	8.1
2030	10780893	614868.4	5.7	10551357	844404.2	8.0
2031	11030058	616385.3	5.6	10791884	854559.4	7.9
2032	11283377	617942.9	5.5	11033527	867793.1	7.9
2033	11539227	620196.2	5.4	11273919	885504.4	7.9
2034	11795931	623882.4	5.3	11510370	909443.4	7.9
2035	12052007	629668.6	5.2	11740939	940737.0	8.0
2036	12306428	637877.6	5.2	11964944	979361.5	8.2
2037	12558322	648766.8	5.2	12181703	1025386	8.4
2038	12805843	663678.7	5.2	12390385	1079137	8.7
2039	13046824	684324.0	5.2	12590222	1140925	9.1
2040	13279596	711808.0	5.4	12780522	1210882	9.5
2041	13503645	746081.1	5.5	12960688	1289038	9.9
2042	13718736	787138.0	5.7	13130427	1375448	10.5
2043	13924788	835192.5	6.0	13290797	1469183	11.1
2044	14122012	890400.1	6.3	13443558	1568854	11.7
2045	14310944	952741.7	6.7	13590258	1673428	12.3
2046	14492207	1022136	7.1	13731641	1782703	13.0

Year	15–64	65+	Old-age demographic ratio	15–59	60+	Old-age demographic ratio
2047	14666351	1098535	7.5	13868645	1896241	13.7
2048	14834781	1180973	8.0	14002263	2013491	14.4
2049	14999222	1268078	8.5	14133378	2133922	15.1
2050	15160942	1358819	9.0	14262867	2256893	15.8
2051	15320305	1452935	9.5	14391479	2381761	16.5
2052	15477783	1549963	10.0	14519714	2508033	17.3
2053	15633854	1649319	10.5	14649026	2634147	18.0
2054	15786989	1750284	11.1	14779392	2757882	18.7
2055	15937435	1852197	11.6	14911885	2877747	19.3
2056	16085257	1954428	12.2	15046320	2993365	19.9
2057	16236544	2057031	12.7	15189068	3104508	20.4
2058	16390188	2158307	13.2	15337606	3210889	20.9
2059	16545809	2256268	13.6	15489383	3312693	21.4
2060	16702800	2349563	14.1	15642243	3410120	21.8

Table A4. Retirement probabilities assumed, 2011–70 (percentages)

Age	Male	Female
60	8.3	3
61	8.9	6
62	10.4	5
63	10.6	4
64	10.1	5
65	15.2	7
66	14.4	9
67	15.9	10
68	18.4	9
69	18.7	9
70	21.2	10
71	23.1	12
72	24.3	18
73	28.1	18
74	25.6	15
75	25.9	24
76	23.3	25
77	22.8	23
78	27.6	25
79	100.0	100

Table A5. Financial statements of the NPS, 2009 and 2010 (US$ millions)

	31 Dec. 2009	31 Dec. 2010
Revenue	135 600 055.9	153 030 719.1
Contribution income	128 187 861.0	137 594 965.7
Interest and rental income	5 521 014.0	15 594 430.7
Sundry income	30 964.1	218 018.6
Share of profit (loss) from associate	1 860 216.7	–376 695.9
Expenditure	57 845 549.3	42 949 998.5
Benefits	14 034 399.8	20 840 154.9
Invalidity pension	810 191.9	1 197 026.3
Retirement grant	78 021.1	1 685 232.2
Invalidity grant	-	250.0
Refund contributions	2 052.1	19 650.7
Survivor's grant	5 962.2	43 372.6
Survivor's pension	8 090 110.2	11 304 323.6
Medical services	1 251.0	4 586.5
Funeral grant	434 900.0	1 131 594.0
Retirement pension	4 611 911.3	5 454 119.1
Operating expenses	43 811 149.5	22 109 843.6
Administration costs	28 827 100.8	16 743 087.9
Directors' fees	18 758.7	19 066.2
Loss on sale of property, plant and equipment	60 225.0	-
Revaluation loss on property, plant and equipment	3 274 597.0	-
Revaluation loss on investment property	7 739 269.0	5 737 689.4
Revaluation loss (gain) on other investment	2 980 000.0	–390 000.0
Loss on inventory written down to net realizable value	911 199.0	-
Surplus (or deficit)	105 934 485.2	107 632 992.3
Other comprehensive income	28 179 977.6	–2 447 728.3
Gain (loss) on available for-sale financial assets	25 655 713.0	–4 663 225.6
Revaluation surplus property, plant and equipment	-	1 306 237.6
Share of other comprehensive income from associates	2 524 264.6	909 259.7
Total comprehensive income	105 934 485.2	107 632 992.3
Reserve at end of year	265 029 676.8	369 530 206.7

Table A6. Projected revenues of the status quo scheme, 2010–60 (US$ millions)

Year	Contribution rate (%)	Total insurable earnings	Contributions	Investment earnings	Total
2010	6	2 293.211	137.5927	15.59	153.1827
2011	6	2 494.462	149.6677	21.95411	171.6218
2012	6	2 725.092	163.5055	24.93128	188.4368
2013	6	3 007.535	180.4521	28.18534	208.6374
2015	6	3 711.13	222.6678	35.98171	258.6495
2020	6	5 831.983	349.919	69.57385	419.4928
2025	6	8 973.976	538.4386	114.3872	652.8258
2030	6	13 800.34	828.0205	167.5133	995.5338
2035	6	20 227.95	1 213.677	198.1985	1 411.876
2040	6	29 172.36	1 750.342	145.0491	1 895.391
2045	6	41 165.02	2 469.901	0	2 469.901
2050	6	56 752.16	3 405.129	0	3 405.129
2055	6	76 995.11	4 619.707	0	4 619.707
2060	6	103 651.4	6 219.085	0	6 219.085

Table A7. Projected expenses, reserves and PAYG rates, status quo scheme, 2010–60 (US$ millions)

Year	Benefits	Administrative expenses	Total	Reserve (EoY)	Reserve ratio	PAYG cost (%)
2010	20.84016	22.51356	43.35372	365.161	3.660617	3.37
2011	94.72852	24.18444	118.913	417.8699	3.514082	3.80
2012	105.835	25.89045	131.7255	474.5812	3.602804	3.88
2013	117.3118	27.98895	145.3008	537.9178	3.702099	3.90
2015	145.1406	33.09327	178.2339	690.0738	3.871732	3.91
2020	244.2668	46.33434	290.6011	1 221.253	4.202507	4.19
2025	424.8229	62.57046	487.3933	1 979.584	4.061574	4.73
2030	771.1012	82.80205	853.9033	2 778.858	3.254301	5.59
2035	1 367.032	121.3677	1488.4	2 928.369	1.967461	6.76
2040	2 261.55	175.0342	2 436.585	1 232.605	0.505874	7.75
2045	3 383.28	246.9901	3 630.27	–3 329.98	–0.91728	8.22
2050	4 756.213	340.5129	5 096.726	–10 625.5	–2.08477	8.38
2055	6 919.406	461.9707	7 381.377	–21 970.2	–2.97644	8.99
2060	10 389.35	621.9085	11 011.25	–41 474.3	–3.76654	10.02

Table A8. Number of insured in the scheme, and beneficiaries, 2010–60

Year	Insured members of the scheme	Total pensioners	Old-age pension	Invalidity pension	Widow/er pension	Orphan's pension
2010	1 257 245	263 094	57 823	11 250	143 899	50 122
2011	1 276 681	269 341	59 598	10 958	143 429	55 355
2012	1 303 615	276 627	63 639	10 759	143 674	58 554
2013	1 343 100	283 333	66 526	10 650	144 551	61 607
2014	1 396 023	291 342	70 029	10 610	146 239	64 464
2015	1 444 318	299 873	73 914	10 632	148 570	66 756
2016	1 488 290	308 184	78 076	10 696	151 394	68 018
2017	1 539 253	316 420	83 054	10 798	154 628	67 940
2018	1 590 556	323 461	87 573	10 936	158 338	66 614
2019	1 641 778	330 946	92 870	11 104	162 589	64 384
2020	1 689 684	338 835	98 589	11 301	167 248	61 697
2021	1 734 018	347 584	105 103	11 523	172 108	58 850
2022	1 784 316	357 280	112 618	11 775	176 957	55 931
2023	1 834 830	367 689	120 883	12 062	181 723	53 020
2024	1 885 770	378 050	129 159	12 384	186 390	50 117
2025	1 935 560	388 618	137 709	12 746	190 955	47 207
2026	1 985 743	400 352	147 207	13 147	195 539	44 459
2027	2 043 419	414 954	158 966	13 576	200 335	42 077
2028	2 101 750	432 845	173 208	14 015	205 452	40 171
2029	2 160 109	452 784	188 830	14 455	210 834	38 665
2030	2 215 870	474 109	204 740	14 900	216 413	38 055
2031	2 273 752	498 925	222 014	15 351	222 120	39 440
2032	2 340 444	524 143	239 478	15 811	227 984	40 870
2033	2 408 167	552 979	260 248	16 277	234 130	42 323
2034	2 475 480	582 112	281 139	16 747	240 550	43 677
2035	2 537 578	612 415	303 236	17 225	247 114	44 841
2036	2 596 682	643 664	326 492	17 720	253 660	45 792
2037	2 665 038	674 788	350 037	18 234	260 044	46 473
2038	2 732 938	704 426	372 472	18 779	266 273	46 902
2039	2 799 375	733 572	394 613	19 364	272 465	47 130
2040	2 859 250	761 652	415 813	19 988	278 645	47 206
2041	2 915 500	786 833	434 195	20 658	284 830	47 151
2042	2 979 315	812 717	453 308	21 376	290 996	47 037
2043	3 041 573	839 986	473 728	22 146	297 174	46 939
2044	3 100 722	865 899	492 619	22 970	303 423	46 886
2045	3 152 258	888 609	508 150	23 855	309 730	46 874
2046	3 198 538	909 023	521 208	24 813	316 098	46 905
2047	3 253 144	927 956	532 580	25 844	322 547	46 985
2048	3 305 024	947 498	544 295	26 948	329 107	47 148
2049	3 353 726	967 979	556 582	28 119	335 832	47 446

Year	Insured members of the scheme	Total pensioners	Old-age pension	Invalidity pension	Widow/er pension	Orphan's pension
2050	3 395 384	989 586	569 549	29 351	342 769	47 917
2051	3 431 844	1 012 801	583 668	30 638	349 911	48 584
2052	3 476 680	1 038 246	599 442	31 954	357 342	49 508
2053	3 520 348	1 065 934	616 702	33 290	365 204	50 738
2054	3 562 432	1 096 384	635 923	34 637	373 561	52 263
2055	3 599 007	1 129 944	657 492	35 989	382 417	54 046
2056	3 631 706	1 165 751	680 651	37 339	391 729	56 032
2057	3 672 930	1 203 939	705 672	38 682	401 437	58 148
2058	3 713 064	1 243 054	731 211	40 018	411 502	60 323
2059	3 751 541	1 282 771	757 034	41 344	421 904	62 488
2060	3 785 365	1 323 186	783 336	42 661	432 605	64 584

Table A9. Demographic ratios of pensioners to active persons, 2010–60

Year	Total pensioners	Old-age pension	Invalidity pension	Widow/er pension	Orphans' pension
2010	20.93	4.60	0.89	11.45	3.99
2011	21.10	4.67	0.86	11.23	4.34
2012	21.22	4.88	0.83	11.02	4.49
2013	21.10	4.95	0.79	10.76	4.59
2014	20.87	5.02	0.76	10.48	4.62
2015	20.76	5.12	0.74	10.29	4.62
2016	20.71	5.25	0.72	10.17	4.57
2017	20.56	5.40	0.70	10.05	4.41
2018	20.34	5.51	0.69	9.95	4.19
2019	20.16	5.66	0.68	9.90	3.92
2020	20.05	5.83	0.67	9.90	3.65
2021	20.04	6.06	0.66	9.93	3.39
2022	20.02	6.31	0.66	9.92	3.13
2023	20.04	6.59	0.66	9.90	2.89
2024	20.05	6.85	0.66	9.88	2.66
2025	20.08	7.11	0.66	9.87	2.44
2026	20.16	7.41	0.66	9.85	2.24
2027	20.31	7.78	0.66	9.80	2.06
2028	20.59	8.24	0.67	9.78	1.91
2029	20.96	8.74	0.67	9.76	1.79
2030	21.40	9.24	0.67	9.77	1.72
2031	21.94	9.76	0.68	9.77	1.73
2032	22.40	10.23	0.68	9.74	1.75
2033	22.96	10.81	0.68	9.72	1.76
2034	23.52	11.36	0.68	9.72	1.76
2035	24.13	11.95	0.68	9.74	1.77
2036	24.79	12.57	0.68	9.77	1.76

Year	Total pensioners	Old-age pension	Invalidity pension	Widow/er pension	Orphans' pension
2037	25.32	13.13	0.68	9.76	1.74
2038	25.78	13.63	0.69	9.74	1.72
2039	26.20	14.10	0.69	9.73	1.68
2040	26.64	14.54	0.70	9.75	1.65
2041	26.99	14.89	0.71	9.77	1.62
2042	27.28	15.22	0.72	9.77	1.58
2043	27.62	15.58	0.73	9.77	1.54
2044	27.93	15.89	0.74	9.79	1.51
2045	28.19	16.12	0.76	9.83	1.49
2046	28.42	16.30	0.78	9.88	1.47
2047	28.52	16.37	0.79	9.91	1.44
2048	28.67	16.47	0.82	9.96	1.43
2049	28.86	16.60	0.84	10.01	1.41
2050	29.15	16.77	0.86	10.10	1.41
2051	29.51	17.01	0.89	10.20	1.42
2052	29.86	17.24	0.92	10.28	1.42
2053	30.28	17.52	0.95	10.37	1.44
2054	30.78	17.85	0.97	10.49	1.47
2055	31.40	18.27	1.00	10.63	1.50
2056	32.10	18.74	1.03	10.79	1.54
2057	32.78	19.21	1.05	10.93	1.58
2058	33.48	19.69	1.08	11.08	1.62
2059	34.19	20.18	1.10	11.25	1.67
2060	34.96	20.69	1.13	11.43	1.71

Table A10. Replacement ratios, 2010–60

Year	Total pensions	Old-age pension	Invalidity pension	Widow/er pension	Orphans' pension
2010	16.1	27.0	13.5	12.9	13.2
2011	15.8	26.1	13.6	12.9	12.9
2012	16.1	26.5	14.0	13.0	12.8
2013	16.3	26.8	14.4	13.2	12.8
2014	16.5	27.1	14.9	13.2	12.7
2015	16.7	27.4	15.3	13.2	12.6
2016	17.0	28.0	16.0	13.3	12.6
2017	17.4	28.6	16.7	13.5	12.6
2018	17.7	29.2	17.3	13.6	12.6
2019	18.2	29.8	18.0	13.7	12.7
2020	18.7	30.4	18.6	13.9	12.9
2021	19.2	31.0	19.2	14.0	13.1
2022	19.7	31.6	19.8	14.1	13.4
2023	20.3	32.2	20.3	14.3	13.7
2024	20.9	32.8	20.9	14.4	14.1

Year	Total pensions	Old-age pension	Invalidity pension	Widow/er pension	Orphans' pension
2025	21.4	33.2	21.3	14.6	14.5
2026	21.9	33.7	21.8	14.7	15.1
2027	22.5	34.1	22.2	14.9	15.7
2028	23.2	34.5	22.5	15.0	16.5
2029	23.8	34.8	22.8	15.2	17.4
2030	24.1	34.8	22.9	15.2	18.0
2031	24.6	35.1	23.0	15.4	18.2
2032	25.1	35.4	23.2	15.5	18.4
2033	25.5	35.7	23.3	15.7	18.5
2034	25.9	35.9	23.3	15.8	18.5
2035	26.3	36.0	23.3	16.0	18.5
2036	26.7	36.2	23.2	16.1	18.5
2037	27.0	36.3	23.1	16.2	18.4
2038	27.2	36.4	23.0	16.3	18.3
2039	27.4	36.4	22.9	16.3	18.1
2040	27.6	36.4	22.8	16.4	18.0
2041	27.6	36.3	22.7	16.4	17.8
2042	27.7	36.3	22.6	16.4	17.6
2043	27.8	36.2	22.5	16.4	17.5
2044	27.8	36.1	22.4	16.3	17.3
2045	27.7	36.0	22.4	16.3	17.2
2046	27.7	35.9	22.3	16.2	17.0
2047	27.6	35.7	22.3	16.2	16.9
2048	27.5	35.6	22.2	16.1	16.9
2049	27.5	35.5	22.2	16.1	16.8
2050	27.4	35.4	22.2	16.0	16.8
2051	27.3	35.3	22.1	16.0	16.8
2052	27.3	35.2	22.1	15.9	16.9
2053	27.3	35.1	22.1	15.9	16.9
2054	27.2	35.1	22.1	15.8	17.0
2055	27.2	35.0	22.0	15.8	17.0
2056	27.2	35.0	22.0	15.8	17.0
2057	27.3	34.9	22.0	15.8	17.1
2058	27.3	34.9	22.0	15.8	17.0
2059	27.3	34.9	22.0	15.8	17.0
2060	27.4	34.9	22.0	15.7	16.9

Table A11. PAYG cost rates, status quo scheme, 2010–60 (percentages)

Year	Total	Old-age pensions	Invalidity pensions	Widow/er pensions	Orphans' pensions
2010	3.37	1.24	0.12	1.48	0.52
2011	3.80	1.22	0.12	1.45	0.56
2012	3.88	1.30	0.12	1.43	0.57
2013	3.90	1.33	0.11	1.42	0.59
2014	3.90	1.36	0.11	1.38	0.59
2015	3.91	1.40	0.11	1.36	0.58
2016	3.97	1.47	0.11	1.36	0.58
2017	4.02	1.54	0.12	1.35	0.56
2018	4.06	1.61	0.12	1.35	0.53
2019	4.11	1.69	0.12	1.36	0.50
2020	4.19	1.77	0.12	1.37	0.47
2021	4.29	1.88	0.13	1.39	0.44
2022	4.39	2.00	0.13	1.40	0.42
2023	4.51	2.12	0.13	1.41	0.40
2024	4.62	2.24	0.14	1.43	0.38
2025	4.73	2.36	0.14	1.44	0.35
2026	4.86	2.50	0.14	1.45	0.34
2027	5.01	2.65	0.15	1.46	0.32
2028	5.21	2.84	0.15	1.47	0.32
2029	5.42	3.04	0.15	1.48	0.31
2030	5.59	3.22	0.15	1.48	0.31
2031	5.82	3.43	0.16	1.50	0.32
2032	6.03	3.62	0.16	1.51	0.32
2033	6.28	3.85	0.16	1.52	0.32
2034	6.51	4.07	0.16	1.54	0.33
2035	6.76	4.31	0.16	1.56	0.33
2036	7.02	4.55	0.16	1.57	0.33
2037	7.24	4.77	0.16	1.58	0.32
2038	7.42	4.96	0.16	1.59	0.31
2039	7.59	5.13	0.16	1.59	0.31
2040	7.75	5.29	0.16	1.60	0.30
2041	7.87	5.41	0.16	1.60	0.29
2042	7.97	5.52	0.16	1.60	0.28
2043	8.07	5.63	0.16	1.60	0.27
2044	8.16	5.73	0.17	1.60	0.26
2045	8.22	5.80	0.17	1.60	0.26
2046	8.27	5.84	0.17	1.60	0.25
2047	8.27	5.85	0.18	1.60	0.24
2048	8.28	5.87	0.18	1.60	0.24
2049	8.32	5.89	0.19	1.61	0.24
2050	8.38	5.94	0.19	1.62	0.24

Year	Total	Old-age pensions	Invalidity pensions	Widow/er pensions	Orphans' pensions
2051	8.47	6.00	0.20	1.63	0.24
2052	8.56	6.07	0.20	1.64	0.24
2053	8.67	6.15	0.21	1.65	0.24
2054	8.81	6.26	0.21	1.66	0.25
2055	8.99	6.39	0.22	1.68	0.26
2056	9.19	6.55	0.23	1.71	0.26
2057	9.39	6.71	0.23	1.73	0.27
2058	9.59	6.88	0.24	1.75	0.28
2059	9.80	7.04	0.24	1.77	0.28
2060	10.02	7.22	0.25	1.80	0.29

Table A12. Benefit expenditure, 2011–60 (US$ millions)

Year	Old-age pensions	Invalidity pensions	Widow/er pensions	Orphans' pensions	Funeral grants
2011	30.40	2.91	36.13	13.93	11.27
2012	35.83	3.22	39.64	15.95	12.41
2013	41.64	3.66	44.51	18.67	13.66
2015	58.24	5.00	55.95	24.88	16.76
2020	133.22	10.20	99.70	37.29	25.96
2025	295.20	18.60	175.11	47.91	38.89
2030	633.74	31.63	295.25	69.34	57.35
2035	1 243.57	47.33	467.99	106.64	79.66
2040	2 145.04	67.96	697.43	136.94	109.11
2045	3 185.92	100.69	978.45	163.05	145.74
2050	4 373.25	156.23	1 335.88	205.52	196.36
2055	6 277.14	243.54	1 843.63	298.90	284.51
2060	9 492.76	371.00	2 604.15	451.37	409.97