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Thailand

Report to the Government

Actuarial Valuation of Thailand Social Security Scheme administered by the Social Security Office as of 31 December 2013

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The Director of the ILO Country Office for Thailand, Cambodia and Lao People's Democratic Republic and the Decent Work Team (DWT) for East and South-East Asia and the Pacific, Mr Maurizio Bussi, are pleased to submit to the Government of Thailand, represented by the Secretary-General of the Social Security Office, Mr Kowit Sachavisad, this ILO technical report on the actuarial valuation of Thailand Social Security administered by the Social Security Office as of 31 December 2013.

The engagement of the ILO DWT in Bangkok in collaboration with the Social Protection Department draws upon technical collaboration between the Government of Thailand and the ILO dating back to the early days of the Social Security Law of Thailand.

The Public Finance, Actuarial and Statistics Services Branch (SOC/PFACTS) of the ILO assumed responsibility for the supervision, review and editing of this actuarial review.

Mr Nuno Cunha Meira Simoes, Senior Social Protection Specialist, provided general policy guidance and supervision. Mr Hiroshi Yamabana was appointed as the senior actuarial policy supervisor, along with coordination by Mr Andre Picard, F.S.A., F.C.I.A. Mr Georges Langis, F.S.A, F.C.I.A. was appointed to carry out the actuarial valuation. Mr Langis, accompanied by Mr Renaud Bourget, visited Thailand from 23−27 February 2015 to gather necessary data for the valuation in collaboration with SSO staff, and held discussions with stakeholders of the Fund, including the Secretary-General of the SSO, SSO senior management staff, and representatives of workers' and employers' organizations. Mr Bourget was responsible for the preparation of data for the valuation, and received assistance in data collection from Ms Khwanploy Cheechang, national consultant for the project. The ILO Country Office for Thailand, Cambodia and Lao People's Democratic Republic, especially Ms Jittima Srisuknam, Programme Officer for Thailand, Cambodia and Lao PDR, further supported the drafting process and worked heavily on coordination, administration and contractual matters. Mr Hiroshi Yamabana presented the draft report in Bangkok on 30 November 2015.

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Finally, the ILO wishes to extend his gratitude to the Secretary-General of the SSO for her trust in the ILO, and offers his compliments to the Minister of Labour and Social Welfare of Thailand.

Executive summary

The Social Security Office (SSO) administers a scheme that in 2013 covered about 13.5 million workers, about one-third of all workers. The scheme provides protection in old age, disability, death, employment injury, children, unemployment, maternity and sickness. This actuarial valuation deals with all these benefits except for employment injury benefits, separately administered by the Workers' Compensation Fund (WCF).

The social security system in Thailand is comprehensive and universal. All those above 60 years old are awarded universal tax-based pensions, and those covered by the SSO are awarded social insurance pensions on top of the universal tax-based pension. All Thai citizens are provided with health care through the SSO scheme, Civil Servant Medical Benefit Scheme (CSMBS) or the tax-based universal health-care scheme. Multiple ways of financing, namely the combination of social insurance contributions with taxation, have substantially contributed to the current comprehensive and universal social security coverage in Thailand, and the SSO manages one of the major pillars of the social security system. This system, including the social insurance scheme run by the SSO as a major pillar, needs to be maintained, although future continuous reforms are necessary, as suggested in this actuarial valuation report.

The actuarial valuation analysed each benefit separately, and an explicit contribution rate has been assessed for each branch, namely (1) the four benefits type (sickness, maternity, invalidity, death / funeral); (2) unemployment benefit; and (3) the two benefits type (old-age pension, child allowance).

This actuarial valuation of the SSO was carried out as of 31 December 2013 based on the ILO projection methodology which takes into account demographic, macroeconomic and labour market frames. The ILO's generic pension model was fine-tuned to carry out long-term demographic and financial projections of old-age pensions and lump-sum disability benefits.

1. The four benefits type branch

All these benefits (except for disability) are short-term benefits. The pay-as-you-go (PAYG) cost rate, as a contribution rate to annually meet expenditure through contributions only, with additional small margins for accumulating contingency reserves, has been estimated. As for the disability benefits, the general average premium (GAP) for the projection between 2014 and 2110 has been assessed by taking into account the benefit nature of gradual and steady cost increases over the long term.

Table ES.1 summarizes the assessed contribution rate for each benefit of the four benefits type branch.

Table ES.1. Contribution rates for the four benefits type branch

	Contribution rate*
Maternity	0.66
Sickness (cash and in kind)	2.80
Disability	0.26
Funeral	0.21
Administrative and other expenditure	0.30
Total	4.23
Recommended contribution rate	4.25

* The contribution rate excludes the planned inclusion of promotion and prevention benefits.

The current contribution rate of 4.5 per cent for the four benefit type branch is assessed as adequate for the next five years. The planned introduction of promotion and prevention benefits will increase the cost and needs to be analysed once a more concrete design of the new benefits becomes available. It should be noted that the contribution rate required for health care depends on the capitation amount which has been and will be negotiated between the SSO and various health service providers.

2. Unemployment benefits

The current contribution rate of 1.25 per cent for the unemployment benefits branch is substantially higher than the required contribution rate of 0.55 per cent, including administration costs. However, it is important to bear in mind that the required contribution rate of 0.55 per cent has been assessed by relying on experiences of the period between 2009 and 2013 when the unemployment rate considerably deceased from 1.5 to 0.7 per cent.

In order to have margins for economic downturns, it is recommended to decrease the contribution rate of the unemployment branch to 0.75 per cent and to transfer the 0.5 per cent to the two benefits type branch, which includes old-age pensions.

3. The two benefits type branch

The two benefits type branch is comprised of child allowances and old-age pensions.

Child allowances. The assessed PAYG cost rate for child allowances, taking into account cost increases due to the change in the maximum number of children from two to three, is 0.55 per cent. The recommended contribution rate for child allowance benefit is 0.65 per cent, arrived at by adding the administrative cost of 0.1 per cent.

Old-age pensions. Old-age pensions began to be paid in 2014 and are projected to gradually and steadily increase in the future. The status-quo projections show that:

1) Contributions will be sufficient to meet all annual expenditures until the year 2034.

2) From 2035 to 2042, investment returns in addition to contributions will be used to meet annual expenditures. As a result, the amount of reserve will still grow but at a slower pace.

3) From the year 2043 onwards, the total income of the scheme will no longer meet annual expenditures and the amount of reserve will start to decrease.

4) In the year 2054, the reserve will be depleted.

5) After the depletion of the reserve in 2054, the required contribution rate will be the PAYG cost rate, for example, 16.8 per cent in 2054 and 32.1 per cent in 2113.

6) The general average premium (GAP), namely a flat contribution rate to balance the financing of the status-quo scheme for the whole projection period of 100 years from 2014 to 2113, is estimated at 21.1 per cent, which is substantially higher than the current contribution rate allocated to old-age pensions.

As seen in many other countries, gradual reforms of the pension scheme are unavoidable. Reforms include, as major elements, gradual increases in the pensionable age

as well as the contribution rate. The main recommendations of this actuarial valuation include the following.

Recommendation 1: Increase in the pensionable age

It is necessary to gradually increase the current retirement age of 55. This will contribute to make the scheme financially sustainable in the long run. Pensionable age increases should be planned over a long period in the future so that the Government can formulate labour market policies and that workers, especially those near retirement, as well as employers, can have ample time to prepare for changes.

Recommendation 2: Increase in the contribution rate

It is recommended that the contribution rate of the pension branch should be gradually increased in phases. The excess contribution rate of 0.5 per cent of the unemployment benefit branch can be allocated to the pension branch.

Recommendation 3: A combined reform

As shown in section 5.1.2 of this actuarial valuation report, the financial sustainability of the old-age pension scheme can be maintained through the combination of several reforms. These include: (1) increase of the contribution rate by 2 per cent every five years from the year 2018; (2) increase of the pensionable age by one year every five years till it reaches 65; and (3) 1 per cent higher rate of return on investment due to more efficient investment management. It is therefore recommended to start an increase of the contribution rate by 2 per cent in 2018. This is a net 1.5 per cent contribution rate increase, provided that 0.5 per cent is transferred from the unemployment benefit branch.

Recommendation 4: Adoption of a financing and investment policy

No formal financing policy of the old-age pension branch exists at present. Such a policy would trigger necessary reforms, such as the pensionable age as well as the contribution rate increases in the future. It is therefore recommended that the SSO should adopt a financing and funding policy in order to:

(a) formalize the long-term funding objectives of the scheme: for example, targeting an appropriate level of reserve over the long term. This objective will be a major driver of the contribution rate increase and/or major scheme design reforms such as the pensionable age increase;

(b) better understand the risks and advantages of financing options;

(c) ensure that scheme reserves and future contributions are sufficient to deliver the promised benefits; and

(d) enhance scheme governance and increase transparency.

A financing policy should address the interests of stakeholders, namely:

- current as well as former scheme members as beneficiaries and contributors;
- employers as one of the main funders of the pension system; and
- the Government.

The financing policy usually specifies such elements as:

- contribution rates
- risks faced by the scheme and how these risks can be managed
- risk tolerance
- allocation of risks among members and employers
- funding objectives, such as contribution rate stability expressed as expected frequencies and the level of contribution rate increases and the ultimate contribution rate, and a targeted level of reserve
- frequency of actuarial valuations
- methods of actuarial projections, including actuarial assumptions and parameters of the scheme
- funding methods
- goals related to intergenerational equity
- all other funding issues

It is recommended that the SSO should hold discussions with stakeholders on the possibility of implementing a written financing policy, which will need to be periodically reviewed in the future in order to tackle future changes in the socio-economic environment.

The financing policy should be closely linked to the investment policy. The investment policy should take into account the result of the actuarial valuation and the clearly mention financial risk that the scheme will face. A specific and different investment policy should be adopted for each benefit branch. For the pension branch, the investment policy should reflect the long-term nature of the branch and hence the majority of the assets should be invested in long-term assets in order to obtain better and more stable investment returns in the long run. Investing a greater proportion in foreign investments should be also considered for the pension branch.

Other recommendations

- It is recommended to allocate administrative and other expenditures to each branch to assess the administrative efficiency of each branch.
- It is recommended to have a common long-term benefit branch for disability benefits and old-age pensions. It is recommended that child allowance should be merged with short-term benefits, namely maternity, sickness and funeral benefits.
- It is recommended to increase the pension amount in payment each year in line with inflation. It is recommended to adjust the amount of the maximum insurable earnings each year in line with the average salary increase.
- It is recommended to use a revalorized career-average salary for calculating a newly-awarded pension, instead of the current five-year simple average salary.

- It is recommended to implement a survivors' pension to better protect the family of a deceased contributor or pensioner.

- It is recommended to specify either in the Social Security Act or in the regulations that periodic actuarial valuations should be carried out. It is important that a frequency of actuarial valuations should be clearly stated, in such a form as: "at least once every three years and on top of a periodic requirement at any time major changes and reforms of the scheme are planned and implemented".

Abbreviations and acronyms

ABND	Assessment Based National Dialogue
ALM	asset liability management
CSMBS	Civil Servant Medical Benefit Scheme
DC	defined contributions
DRG	diagnosis-related group
GAP	general average premium
GDP	gross domestic product
HA	hospital accreditation
HIV/AIDS	human immunodeficiency virus / acquired immunodeficiency syndrome
ILO	International Labour Organization / Office
IMF	International Monetary Fund
IP	inpatient
ISSA	International Social Security Association
MOU	Memorandum of Understanding
NESDB	National Economic and Social Development Board
NRA	normal retirement age
NSF	National Saving Fund
OECD	Organisation for Economic Co-operation and Development
OP	outpatient
PAYG	pay-as-you-go
PV	present value
RER	reserve-to-expenditures ratio
Reserve ratio	ratio of the end-of-year reserve to total annual expenditure of the scheme
RW	relative weight
SOC/PFACTS	Public Finance, Actuarial and Statistics Services Branch (of the ILO)
SSA	Social Security Act
SSF	Social Security Fund
SSO	Social Security Office
TFR	total fertility rate
THB	Thai Baht (currency)
T-Bill	Treasury Bill
UCS	Universal Coverage Scheme
UN	United Nations
WCF	Workers' Compensation Fund

Introduction

The Social Security Act of 1990 came into force on 2 September 1990 and the Social Security Office (SSO) began its operations on 3 September 1990. The SSO provides comprehensive protection, including benefits for sickness, maternity, invalidity, death, unemployment and old age, and a child support grant. The SSO also provides benefits related to employment injury under the Workers' Compensation Fund. The Workers' Compensation Fund is however not covered by this actuarial valuation.

There is no mandatory requirement in the Social Security Act to perform an actuarial valuation on a regular basis.

This report consists of six sections. Section 1 presents the scheme experience and new developments in recent years. Investment performance and funding issues are also discussed in this section. Section 2 concentrates on the projection of the general population and on the establishment of the macroeconomic projection frame in Thailand. Section 3 concerns demographic and financial projections of all benefit branches in line with the legal provisions. Section 4 presents sensitivity analyses, while Section 5 elaborates on pension reforms such as an increase in the retirement age. The final section provides conclusions and recommendations.

1. Review of the SSO performance and developments in recent years

1.1. Brief history of social security in Thailand

About twenty years after the first attempt to implement social security in Thailand, the first social insurance scheme was implemented in 1972 in the form of an Employment Injury Insurance following Announcement No. 103 of the Revolutionary Party. The Workers' Compensation Fund (WCF) was established in 1974 under the Ministry of the Interior.

In September 1990 the Social Security Act came into force and the Social Security Office began its operations on 3 September 1990. Initially the scheme covered companies with 20 or more employees, but in 1993 coverage was extended to smaller companies with 10 or more employees. Currently, every employer who has at least one employee must register their employees under the scheme. It is possible for a former employee to continue his/her contributions to the scheme under Article 39 of the Act. Informal economy workers have been covered since 1994 on a voluntary basis under the Article 40 and the coverage has considerably increased since 2011 with the introduction of a revised benefit package as well as flat rate contributions. [1] Informal economy workers can choose between five benefit packages.

At first, protection for health, disability, maternity and death were offered. In 1998, two new benefits, namely old-age benefits and child allowances, were added to the original benefit package. As insured persons need to contribute for at least 15 years to receive old-age pensions, the first old-age pensioners appeared in 2014. Originally, the annual accrual rate of old-age pensions was 1 per cent, but in 2006 the old-age pension formula was modified to the current formula, namely 20 per cent for the first 15 years and 1.5 per cent for every additional year of contributions. In January 2004, unemployment insurance came into force.

Contribution rates have changed since 1990. Table 1.1 shows their evolution over the last 10 years.

[1] This is in line with the National Economic and Social Development Plan 10.

Table 1.1. Legal contribution rates, all benefits, 2004−13 (percentage of insurable earnings)

Benefit	Jan. 2004 – June 2009	July 2009 – Dec. 2009	Jan. 2010 – Dec. 2011	Jan. 2012 – June 2012	July 2012 – Dec. 2013
Four benefits type	**4.50**	**1.50**	**4.50**	**1.50**	**1.50**
(sickness, maternity, invalidity and death)					
Employee	1.50	0.50	1.50	0.50	0.50
Employer	1.50	0.50	1.50	0.50	0.50
Government	1.50	0.50	1.50	0.50	0.50
Two benefits type	**7.00**	**6.00**	**7.00**	**6.00**	**8.00**
(old-age pension and child allowance)					
Employee	3.00	2.00	3.00	2.00	3.00
Employer	3.00	2.00	3.00	2.00	3.00
Government	1.00	2.00	1.00	2.00	2.00
Unemployment benefit	**1.25**	**1.25**	**1.25**	**1.25**	**1.25**
Employee	0.50	0.50	0.50	0.50	0.50
Employer	0.50	0.50	0.50	0.50	0.50
Government	0.25	0.25	0.25	0.25	0.25
Total contribution rates	**12.75**	**8.75**	**12.75**	**8.75**	**10.75**
Employee	5.00	3.00	5.00	3.00	4.00
Employer	5.00	3.00	5.00	3.00	4.00
Government	2.75	2.75	2.75	2.75	2.75

1.2. Amendments and modifications to the Fund since 31 December 2009

Amendments and modifications to the Social Security Act and Regulations have been implemented since 31 December 2009 and have been integrated into the present actuarial valuation. The principal modifications are:

- adjustments to the payments for high-cost sickness treatments;
- capitation amount increase to THB 1,446 (Thailand Baht) in 2012 and to 1,460 in 2014;
- maternity grant increased from THB 12,000 to 13,000 in 2011;
- modifications of limits to medical payments in case of disability;
- monthly child allowance increase from THB 350 to 400;
- modifications to the contribution rate;
- introduction of new benefits package options for informal economy workers under Article 40, including:
  - Option 1: sickness cash benefit, disability benefit and funeral benefit
  - Option 2: Option 1 + old-age lump sum

– Option 3: Old-age pension

– Option 4: Option 1 + Option 3

– Option 5: Option 2 + Option 3

with the pension part in Options 3, 4 and 5 to be transferred to the National Saving Fund (NSF) for both contribution collection and benefit payment; and

- modifications to the scheme on 20 October 2015 according to the amended Social Security Act, No. 4, 2015:

  – the eligibility condition for maternity grants to be reduced from 7 months of contribution in the last 15 months to 5 months of contribution in the last 15 months:

    - maximum of two maternity grants to be eliminated;

  – maximum number of children receiving child allowance at the same time to be increased from 2 to 3;

  – employees of employers who have offices in the country and are stationed abroad to be included in the coverage;

  – the factors used for the calculation of funeral assistance benefits to be changed:

    - from 3 to 4 for those having contributed between 36 months and 10 years; and

    - from 10 to 12 for those having contributed over 10 years.

  Appendix 1 details the provisions offered by the SSO.

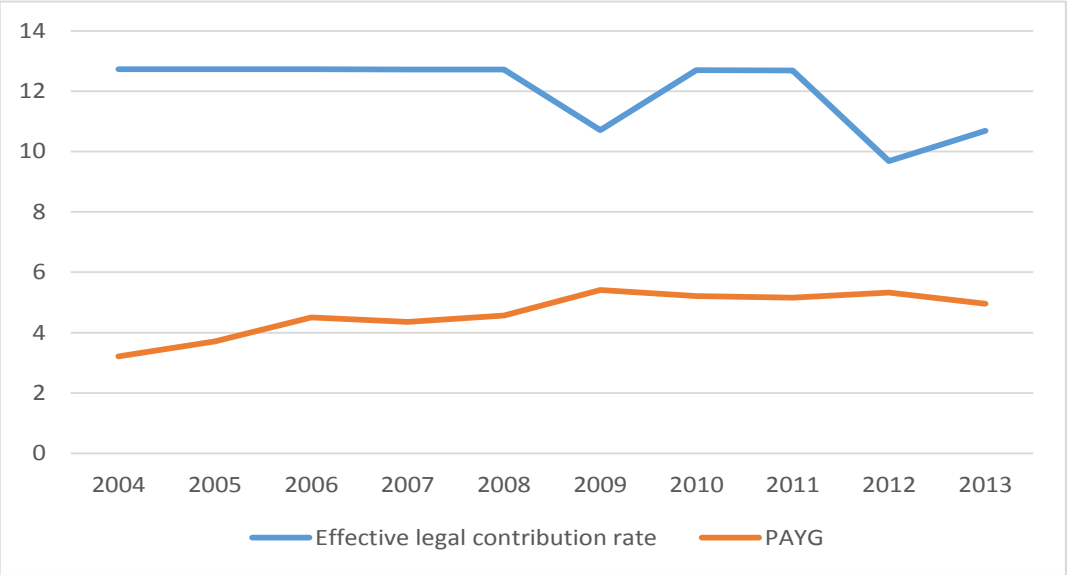
1.3. Trends in financial developments over the last ten years

Figures 1.1 to 1.4 illustrate the trends in the main indicators of the financial experience of the Social Security Fund (SSF) over the last ten years. Figure 1.1 compares the effective legal contribution rates and the pay-as-you-go (PAYG) cost rates for the period between 2004 and 2013. The PAYG cost rate is the rate that is necessary to pay all expenditures, namely benefit as well as administrative expenditures, in a given year. For a social security pension scheme, at the beginning of the scheme this rate can be close to zero but will increase with time.

The PAYG cost rate has continued to increase for the last ten years to reach 5.0 per cent in 2013. It has been stable for the last five years. Normally, as a scheme is maturing, the PAYG cost rate gradually increases as more people retire, with an increase in pension amount due to more past years of services. This was not the case for the SSO since there were no old-age pensioners before 2014 as the old-age pension was established in 1999 and it takes 15 years of contributions before members become eligible. It is expected that the PAYG cost rate will gradually increase in coming years. The difference between the effective legal contribution rates and the PAYG cost rates, if positive, is used to accumulate a reserve. The amount of reserve accumulated at the end of 2013 was THB 1,170 billion. Figure 1.2 shows the reserves as a percentage of GDP for the last ten years. The reserves increased from 4.5 per cent of GDP in 2004 to 9.8 per cent in 2013 in spite of

the temporary decrease in the contribution rates which has slowed the reserve accumulation over the past years.

Figure 1.1. Effective legal contribution rates and PAYG cost rates, all benefits, 2004−13



Note: Income and expenditure from Article 40 are excluded in this graph. The effective legal contribution rate takes into account the fact that the total contribution rate is different for members contributing under Article 33 and those contributing under Article 39.

Figure 1.2. Year-end reserves as a percentage of GDP, 2004−13

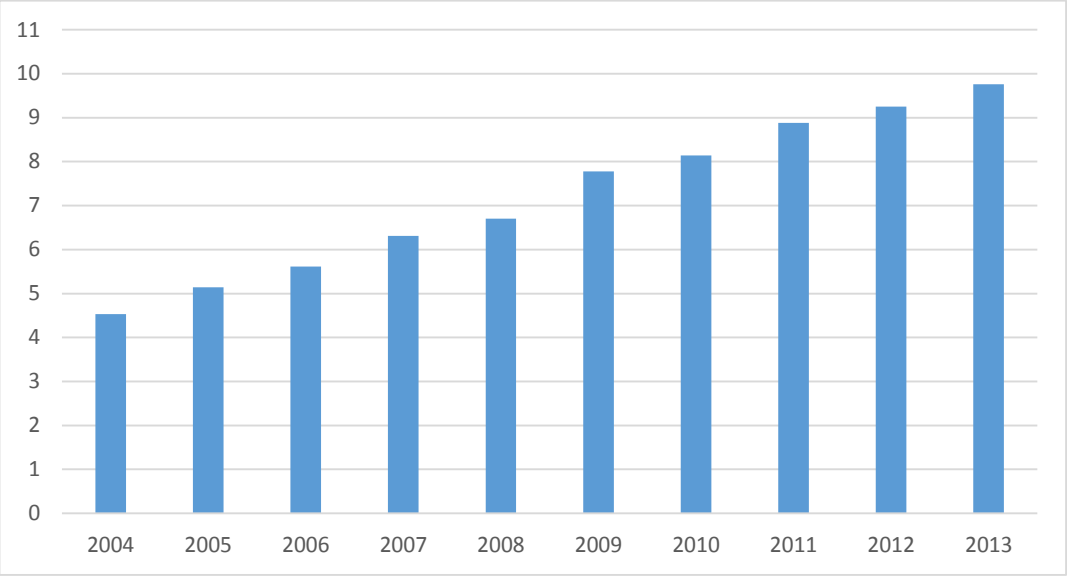


Figure 1.3 presents the reserve-to-expenditures ratio (RER ratio) that reflects the size of the year-end reserve relative to that year's total expenditures. It is a useful indicator of the funding level at a particular point in time, but does not indicate long-term financial sustainability of the scheme, especially in the case of an immature pension system such as the Thai SSO. The RER ratio has increased for the last ten years and reached 18.7 in 2013.

Figure 1.3. Reserve-to-expenditures ratio (RER), 2004−13

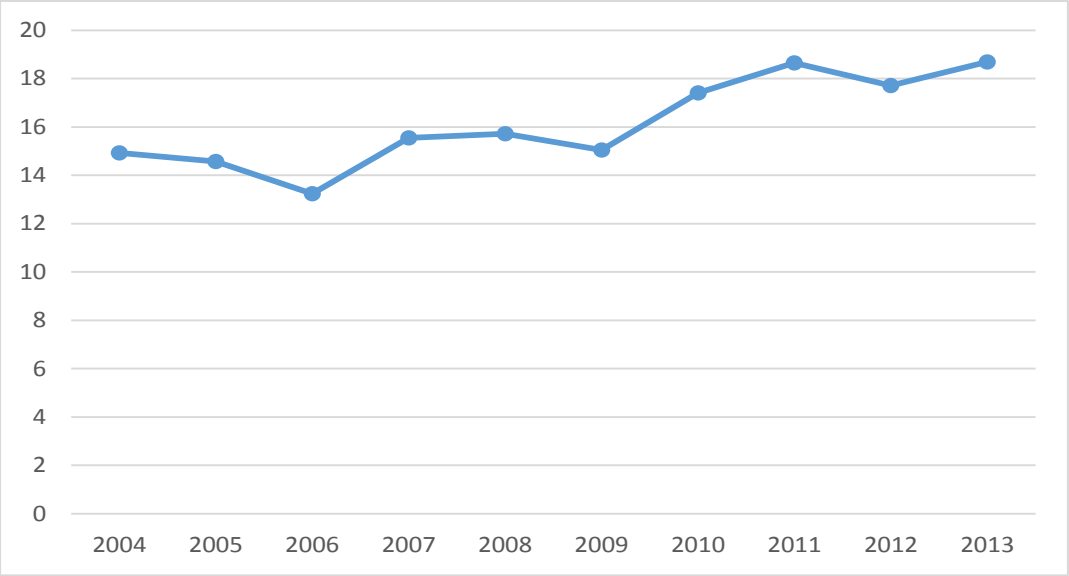


Figure 1.4 shows the proportion of each type of benefits paid to the total amount of benefit expenditures. Sickness benefit is the most important one and accounts for about 53 per cent of all benefits paid in 2013. Old-age benefits are becoming increasingly important compared to other types of benefits. It is expected that old-age benefits will increase in the future with the increase in the number of pensioners. These benefits will drive the cost of the SSO in the future. The bump in 2009 in unemployment benefits is due to the effects of the financial crisis.

Figure 1.4. Proportion of benefits paid, 2004−13

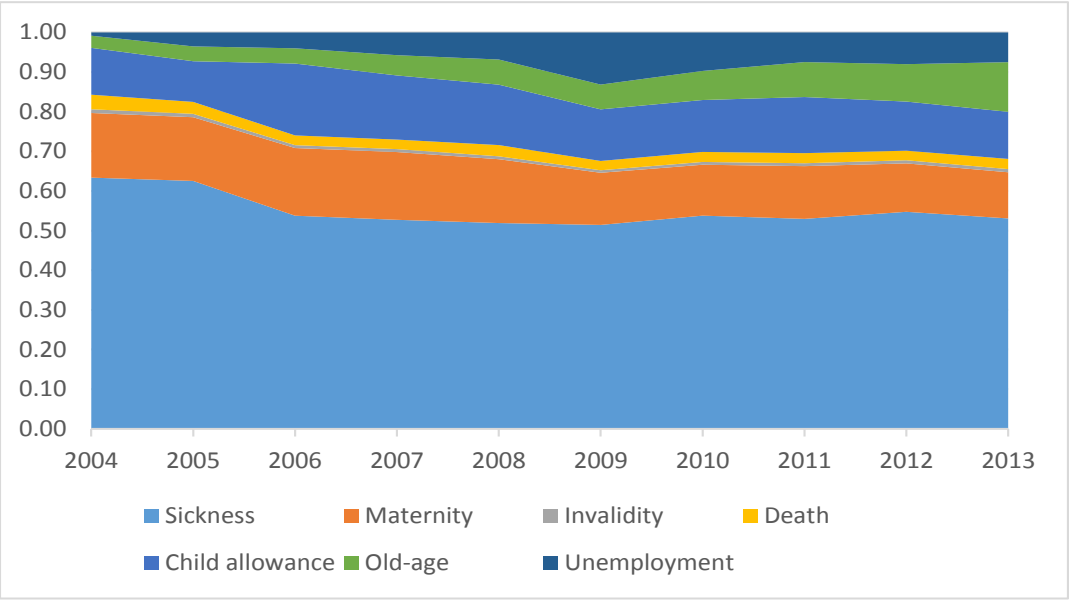


Table 1.2 shows the PAYG rates for each benefit branch, together with the related administrative expenditure, over the last ten years. For all types of expenditure there is an upward trend, while old-age pensions and administrative costs have increased the most.

Table 1.2. PAYG rates, all benefits, 2004−13 (percentages)

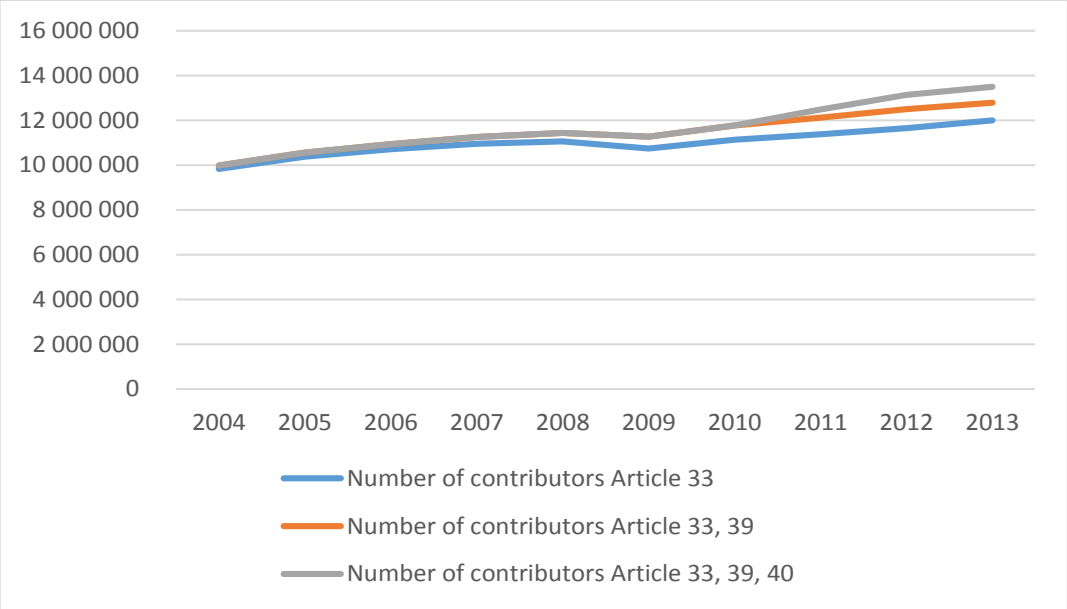
Items	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Four benefits type										
Sickness	1.91	2.14	2.17	2.15	2.18	2.59	2.57	2.51	2.66	2.42
Maternity	0.49	0.55	0.69	0.70	0.68	0.66	0.61	0.63	0.59	0.53
Invalidity	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04
Death	0.11	0.10	0.10	0.10	0.12	0.12	0.12	0.12	0.12	0.12
Total	2.54	2.82	2.99	2.98	3.01	3.40	3.33	3.29	3.41	3.11
Two benefits type										
Child allowance	0.36	0.35	0.73	0.66	0.64	0.66	0.63	0.67	0.60	0.54
Old-age pension	0.09	0.13	0.16	0.21	0.27	0.31	0.35	0.42	0.46	0.57
Total	0.45	0.48	0.89	0.87	0.91	0.97	0.98	1.09	1.06	1.11
1 benefit type										
Unemployment	-	0.12	0.17	0.24	0.30	0.69	0.49	0.37	0.41	0.36
Administration	0.19	0.29	0.46	0.28	0.36	0.35	0.41	0.40	0.46	0.38
Total	3.18	3.71	4.51	4.37	4.58	5.41	5.21	5.15	5.34	4.96

Note: only administrative expenditure are in the table not the items called other fees in the financial statement.

By comparing the figures in table 1.2 with those in table 1.1, it can be observed that the PAYG rate of the "four benefits type" (sickness, maternity, invalidity and death), without administrative expenditure, was higher than the contribution rate (3.11 versus 1.5 per cent in 2013). The situation has been resolved in 2014, since the contribution rate is going back to its normal level of 4.5 per cent. In 2014, the Government decreased its participation in the "two benefits type" from 8 to 7 per cent (see table 1.1 for more details on the evolution of contribution rates by branch in recent years).

Figure 1.5 shows the evolution of the number of contributors over the last ten years. The total number of contributors (article 33, 39 and 40) has increased by 35 percent.

Figure 1.5. Evolution of the number of contributors, 2004−13



1.4. Financial experience for the years 2009−13

Table 1.3 shows the statement of account for the period 2009−13. In all these years, income exceeded expenditures.

Table 1.3. Statement of account, 2009−13 (THB millions)

	2009	2010	2011	2012	2013
Total income	**120 702**	**150 082**	**159 443**	**151 834**	**184 458**
Contributions received	92 927	115 628	124 230	109 465	135 724
Investment Income	27 774	34 024	34 721	40 781	46 878
Other income	-	430	492	1 588	1 855
Total expenditures	**48 336**	**47 326**	**50 639**	**59 625**	**63 306**
Benefits paid	43 902	43 546	46 294	54 137	57 269
General and administrative costs	3 059	3 720	3 896	5 175	4 808
Other expenses	1 376	60	449	313	1 229
Surplus	**72 366**	**102 756**	**108 804**	**92 209**	**121 152**
Assets at year end	**707 186**	**827 304**	**945 103**	**1 059 216**	**1 170 202**

Source: SSO.

Key highlights of income and expenditure are:

- According to the statements of account, from 2009 to 2013 total income increased by 53 per cent, while for the same period total expenditures increased by 31 per cent.
- Contributions increased by 46 per cent and benefits by 30 per cent. The introduction of Article 40 accounts for only 1 per cent in the increase of contributions income. This means that without introduction of Article 40, the increase in contribution would have been 45 per cent.
- One should be prudent when analysing the evolution of contributions, since the contribution rate fluctuated considerably between 2009 and 2013 (between 8.75 and 12.75 per cent).
- It is impossible to analyse the financial statement by branch since there is no breakdown of the administrative expenditure by branch. It is important that the SSO put in place internal accounting procedures to show the experience of each branch separately. This would allow better monitoring, as these branches have different characteristics (frequency, severity, duration of payment) and financing mechanisms.
- General and administrative costs increased by 57 per cent, which is high relative to the increases in benefits and contributions. Administrative expenditures cannot be higher than 10 per cent of the contributions. During the period analysed their level was about 3.6 per cent on average. It is important to keep in mind that the salary of a civil servant working for the scheme is paid by the Government, and not from the contributions to the fund.
- Investment income increased by 69 per cent over the period. The increase was partly due to the return on assets, but also as a result of contributions exceeding total expenditure, as the scheme is in the accumulation phase.

In the financial statements, the contingency reserves are calculated according to the following procedure (the expenditures are allocated on the basis of the contributions):

1) For the four benefits type and the child allowances, the contingency reserve in the financial statement is calculated as:

   25% x (the last year of benefits + administrative expenditure).

2) For the unemployment benefits, the contingency reserve in the financial statement is calculated as:

   2 x (the last year of benefits + administrative expenditure).

3) For the invalidity benefits, the contingency reserve in the financial statement is calculated as:

   10 x (the last year of benefits + administrative expenditure).

4) For old-age pensions, the contingency is the residual of:

   reserve t+1 = reserve t-1 + contribution + investment income + penalties – benefit expenditure – administrative expenditure.

In the financial statements, the total amount of money held as contingency reserve for the first three items is THB 30,773 million. The balance goes to the pension fund. The different factors used to calculate the contingency reserves by type of benefit are appropriate. When there is more credible experience for the disability branch, it would be appropriate to calculate more precise factors instead of using a factor equal to 10 times the last year of benefits. In fact, the calculation could be based on each individual case and the factors would take into account the gender and age of newly disabled.

The actuarial valuation report usually contains a section comparing emerging experience with what was expected from the previous actuarial valuation. Since no recent official actuarial valuations have been undertaken, such comparison would consequently be meaningless for the current actuarial valuation.

1.5. Investments

1.5.1. Description of assets, financial investments and investment policy

As of 31 December 2013, the total assets of the SSO were THB 1,170,202.2 million. Table 1.4 shows the breakdown of total assets for two years, 2012 and 2013.

Table 1.4. Asset values at end 2012 and 2013

	December 2013		December 2012	
	THB millions	%	THB millions	%
A) Assets	**1 170 202.20**	**100.0**	**1 059 216.20**	**100.0**
Current assets	**348 264.3**	**29.8**	**251 478.5**	**23.7**
Cash and cash equivalents	6 851.2	0.6	8 847.7	0.8
Short-term investments	269 439.9	23.0	183 921.3	17.4
Contributions receivable	61 237.4	5.2	50 518.3	4.8
Accrued fines for late contributions	41.1	0.0	42.6	0.0
Accrued revenue	7 549.6	0.6	7 432.6	0.7
Investments accounts receivable	2 728.4	0.2	233.7	0.0
Other current assets	416.7	0.0	482.3	0.0
Long-term investments	**821 937.9**	**70.2**	**807 737.7**	**76.3**
B) Liabilities	**796 457.0**	**100.0**	**686 241.3**	**100.0**
Current liabilities - Benefits payable	5 928.5	0.7	6 163.4	0.9
Current liabilities - Investment creditor	2 616.3	0.3	229.9	0.0
Current liabilities - Other current liabilities	86.5	0.0	94.3	0.0
Non-current liabilities - Provision for old-age pension	787 825.7	98.9	679 753.7	99.1
C) Equities	**373 745.0**	**100.0**	**372 975.1**	**100.0**
Unrealized gain (loss) on accumulated fund	45 907.8	12.3	58 218.1	15.6
Appropriated for benefits	30 773.2	8.2	30 711.3	8.2
Unappropriated	297 064.0	79.5	284 045.7	76.2
G) Equities and liabilities	**1 170 202.0**		**1 059 216.4**	

Source: SSO, Annual report.

Contributions receivable account for THB 61 billion and represent an important part of the assets. This is partly due to the fact that since 2012 the Government has paid only a proportion of its contributions, aiming at financing only the health benefits.

The assets can be divided in two main components:

- current assets, which represent 29.8 per cent of total assets, are composed principally of short-term investments (23 per cent); and
- long-term investments, which represent 70.2 per cent of total assets.

The section in the balance sheet regarding liabilities and equities is structured in a rather unusual way for a social security pension scheme; some liabilities listed do not represent the actuarial liabilities but rather name the contingency reserve. This is the case for the liabilities called “Non-current liabilities - Provision for old-age pension”.

The following tables 1.5−1.9 show the investment portfolios for all funds and by type of funds for the years 2010 and 2013.

Table 1.5. Investment portfolio, by type of investment, all funds, 2010 and 2013

	2010		2013	
	THB millions	%	THB millions	%
Total Assets	**811 636.3**	**100.0**	**1 110 440.4**	**100.0**
Non-Risky Assets	654 128.5	80.6	879 164.2	79.2
Treasury bills, government bonds	502 029.1	61.9	742 529.5	66.9
State-enterprise bonds	92 290.2	11.4	90 542.4	8.2
Bank deposits (guaranteed)	11 638.9	1.4	-	-
Investment -grade fixed income securities	48 170.3	5.9	46 092.3	4.2
Risky Assets	157 507.8	19.4	231 276.2	20.8
Bank deposits (non guarandeed)	12 080.3	1.5	34 921.0	3.1
Other debt instruments	39 625.1	4.9	62 760.8	5.7
Unit trusts	31 094.9	3.8	41 206.8	3.7
Equities	74 707.4	9.2	92 387.6	8.3

Source: SSO, Investment Department.

Table 1.6. Investment portfolio, by type of investment, four benefits type, 2010 and 2013

	2010		2013	
	THB millions	%	THB millions	%
Total Assets	**103 863.1**	**100.0**	**39 396.7**	**100.0**
Non-Risky Assets	81 863.6	78.8	18 790.1	47.7
Treasury bills, government bonds	52 029.9	50.1	18 790.1	47.7
State-enterprise bonds	13 870.0	13.4	-	-
Bank deposits (guaranteed)	8 687.9	8.4	-	-
Investment -grade fixed income securities	7 275.8	7.0	-	-
Risky Assets	21 999.5	21.2	20 606.6	52.3
Bank deposits (non guaranteed)	5 080.3	4.9	15 351.7	39.0
Other debt instruments	7 360.0	7.1	-	-
Unit trusts	413.0	0.4	199.5	0.5
Equities	9 146.2	8.8	5 055.4	12.8

Source: SSO, Investment Department.

Table 1.7. Investment portfolio, by type of investment, two benefits type, 2010 and 2013

	2010		2013	
	THB millions	%	THB millions	%
Total Assets	**655 105.9**	**100.0**	**984 377.4**	**100.0**
Non-Risky Assets	530 982.2	81.1	794 187.1	80.7
Treasury bills, government bonds	418 752.9	63.9	671 352.4	68.2
State-enterprise bonds	73 013.7	11.1	82 676.5	8.4
Bank deposits (guaranteed)	2 807.2	0.4		-
Investment -grade fixed income securities	36 408.4	5.6	40 158.2	4.1
Risky Assets	124 123.7	18.9	190 190.2	19.3
Bank deposits (non guaranteed)	-	-	5 673.2	0.6
Other debt instruments	29 238.1	4.5	58 740.2	6.0
Unit trusts	30 681.9	4.7	41 007.2	4.2
Equities	64 203.7	9.8	84 769.6	8.6

Source: SSO, Investment Department.

Table 1.8. Investment portfolio, by type of investment, unemployment, 2010 and 2013

	2010		2013	
	THB millions	%	THB millions	%
Total Assets	**52 667.3**	**100.0**	**1 449.9**	**100.0**
Non-Risky Assets	41 282.7	78.4	808.4	55.8
Treasury bills. government bonds	31 246.3	59.3	808.4	55.8
State-enterprise bonds	5 406.5	10.3	-	-
Bank deposits (guaranteed)	143.9	0.3	-	-
Investment -grade fixed income securities	4 486.1	8.5	-	-
Risky Assets	11 384.5	21.6	641.5	44.2
Bank deposits (non guaranteed)	7 000.0	13.3	641.5	44.2
Other debt instruments	3 027.0	5.7	-	-
Unit trusts	-	-	-	-
Equities	1 357.5	2.6	-	-

Source: SSO, Investment Department.

Table 1.9. Investment portfolio, by type of investment, Article 40, 2010 and 2013

	2010		2013	
	Sickness, invalidity, death		Old-age	
	THB millions	%	THB millions	%
Total Assets	**1 067.0**	**100.0**	**84 149.4**	**100.0**
Non-Risky Assets	869.8	81.5	64 508.7	76.7
Treasury bills, government bonds	245.0	23.0	51 333.5	61.0
State-enterprise bonds	222.2	20.8	7 643.8	9.1
Bank deposits (guaranteed)	-	-	-	-
Investment -grade fixed income securities	402.7	37.7	5 531.4	6.6
Risky Assets	197.1	18.5	19 640.7	23.3
Bank deposits (non guaranteed)	166.7	15.6	13 088.0	15.6
Other debt instruments	30.5	2.9	3 990.1	4.7
Unit trusts	-	-	-	-
Equities	-	-	2 562.6	3.0

Source: SSO, Investment Department.

The fact that the investment portfolio is managed by branch is a good practice. The principal category of investment is composed of T-Bills and government bonds which represent 66.9 per cent of all investment portfolio funds on December 2013. Equities represent only 8.3 per cent of the investment portfolio. When the investments are compared between lines of business, there is no material difference. For example, risky assets account for about 20 per cent in all funds. The "two benefits type" branch includes the old-age pension benefits, which should be invested with a long-term view. This seems not to be the case.

Over the last ten years, the average return on total assets has been 4.1 per cent. If we exclude the effect of inflation, the real average return on assets is 1.0 per cent, as shown in figure 1.6. A relatively high proportion of investment in T-Bills and government bonds, and the currently prevailing low interest rate environment, partly explain the results.

Figure 1.6. Return on total assets, 2004−13

Source: SSO annual reports; ILO calculations.

In 2013, a consulting firm provided recommendations regarding the investment process for the old-age pension branch. These included:

- adoption of a more aggressive investment policy than the one currently prevailing;
- implementation of short-term and long-term investment objectives;
- asset liability management (ALM) studies and strategic asset allocation studies to be performed every three years;
- restructuring of the investment bureau and the establishment of an advisory committee on investment and risk management; and
- implementation of a structure likely to attract and maintain talents working in the investment field at the SSO.

There is no formal investment policy at the SSO. The asset allocation of the Social Security Fund must comply with the Social Security Committee Regulations on Investment of the Social Security Fund B.E. 2549 (2006), which specifies that not less than 60 per cent of the fund must be invested in highly secured assets and no more than 40 per cent invested in risky assets. The investments must strictly follow not only the guidelines, but also the annual plan approved by the Board. It is of the highest priority for the Social Security Office to manage the fund to achieve its targeted return at an acceptable level of risk and to attain long-term sustainability of the fund.

1.5.2. Comments on the investments

Pension plans have long-term liabilities, so that a long-term investment policy should be in place. A long period of time elapses between members' payment of contributions and the time a benefit will become payable. Assets are normally accumulated for the payment of future benefits. This accumulation of assets has a secondary role to play in helping to equalize contribution rates paid by various generations of contributors. A pension plan should therefore adopt an investment policy with a long-term perspective in order to maximize the expected return of the fund. Variable income investments (for example, stocks, real estate, infrastructure and private equities) have, by nature, a long-term horizon. It has been observed that they produce a higher return than bonds in the long run. It is recommended that the SSO adopt a formal investment policy as is encountered in the majority of social security schemes.

Investing in short-term vehicles is a reasonable strategy for short-term benefits. For long-term pension benefits, however, this could create a mismatch between the time horizon of assets and liabilities. Usually, a different investment strategy should be adopted for each type of benefit. In our opinion, the investment policy should take into account the benefit offered by the scheme and should address investment issues for each type of benefit. For the long-term pension branch, it is important to note that there should be a proper balance between the objective of efficiency and higher investment returns on the one hand, and the long-term stability and security of the assets on the other.

For the pension plan, the investment policy should refer to the results of the actuarial valuation. The investment strategy is of course affected by the future outlook of the social security scheme. In the current situation, the total PAYG rate is lower than the legal contribution rate, as the SSO is in the accumulation phase. What is questionable in the current system is that there are no clear financing objectives related to the financial sustainability of the scheme. In our opinion, for a system to be effective, an efficient and optimal investment policy should be linked to a clear financing strategy road map: the

funding policy. The following section gives more details about the funding policy. It is therefore recommended that the investment policy be developed in coordination with the funding policy and that a detailed risk analysis be included in the investment policy.

Diversification is a way of reducing the overall risk of the portfolio, and can be carried out in both the local and the foreign portions of the portfolio. The current assets portfolio has about 66 per cent in government securities or related investments. This is a high concentration in one type of risk exposure, and the investment policy should address this issue. In our opinion, there is room to invest overseas in private equities, real estate, infrastructure and emerging markets.

It could be advisable to increase the proportion of shares (for example, by buying commodity shares) and real estate in the portfolio since these types of investments generally provide better protection against inflation. Inflation normally affects all elements of pension plan expenditures. The amount of new pensions depends on salaries at the time of retirement; salaries are affected by inflation; pensions in payment are adjusted over time to preserve the purchasing power of retirees; and most components of administrative expenses are also affected by inflation. It is thus important that revenues derived from investments also provide a hedge against inflation. This would also allow for a higher expected return on assets, meaning that investment income could be higher in the future. Obviously, a higher expected return means higher risk of short-term fluctuations, but the long-term nature of the scheme allows for such fluctuations. There is a need to maximize the expected return on invested assets for future generations of contributors.

Where investments are made in foreign currency, the fund may be subject to currency risk. If the SSO decides to invest more heavily in foreign currency (or to maintain the present proportion of its assets in foreign currency) it may be appropriate to adopt strategies to manage the currency risk.

1.6. Financial system

Social security practice stipulates that contribution rates must be fixed so that the total income makes it possible to cover the technical expenses as well as the administrative costs. Furthermore, a specified reserve amount should be constituted as a way to diversify the risk, to increase the expected return of the scheme, to cushion impacts of economic downturns and to increase equity among the generation of contributors. However, there are different factors that will affect the achievement of this goal:

- the natural increase in the level of expenditures over a long period (especially for a non-mature scheme like the SSO when more and more pensions will be paid);
- the desire to have a stable contribution rate (making it more likely that employees and employers will remain confident in the scheme) at a level that will not become a burden on the contributors; and
- the duration of the equilibrium period (the period where the contribution rate and the investment income are enough to pay the expenditure of the scheme) and the amount (level) of reserve that will be attained throughout this period.

Currently there are no formal financing objectives for the SSO. Thus, the following questions are not answered: For what period is the contribution rate expected to be adequate? What is the desired level of reserve-to-expenditure ratio (RER)? Is a stable contribution rate desirable to maintain equity among generations? What happens if experience is worse than expected? Who shares the risk of the scheme?

Some countries are beginning to become aware of these problems and include in their financing strategy some explicit financing objectives. Some are also trying to put in place automatic adjustment provisions to take into account demographic or economic changes.

One way of dealing with financing problems is to put in place a funding policy. In pension plans, there is growing interest in funding policies; many major pension plans already have one in place. The adoption of a funding policy has been discussed at the 18th International Conference of Social Security Actuaries and Statisticians of the International Social Security Association (ISSA) and is addressed in the new *ISSA-ILO Guidelines on Actuarial Work for Social Security*. A funding policy is a useful tool to:

- formalize the long-term funding objectives of the scheme;
- better understand the risks and advantages of financing options;
- ensure that plan assets are sufficient to deliver the promised benefits; and
- enhance corporate governance by increasing transparency.

Funding rules must address the interests of stakeholders:

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

The funding policy would specify:

- contribution rates
- risks faced by the scheme and how these risks can be managed
- risk tolerance
- allocation of risks among participants and employers
- funding objectives (such as contribution stability or a targeted level of reserve)
- frequency of actuarial valuation
- methods of actuarial projection, including actuarial assumptions and parameters of the scheme
- funding methods
- goals related to intergenerational equity
- all other funding issues

Usually, the funding policy is a document, like the investment policy, where all the preceding points are discussed. More emphasis is given to the most important risks faced by the scheme. There is no universal funding target rule that applies to each social security scheme. It depends on the circumstances: the maximum contribution rate that stakeholders can afford, the access to a well-organized investment market, the size of the country, the

generosity of the scheme. For example, a stipulated reserve ratio can be targeted at the end of the projection period. In that case, if the projection shows that the reserve ratio is below the targeted one, the contribution rate should be increased (or benefits should be adjusted) to meet the objective.

We suggest that the SSO hold discussions with stakeholders on the possibility of implementing an explicit written funding policy. The funding policy should be well-thought-out and periodically reviewed.

Appendix 3 describes the basic concepts behind the funding of social insurance.

2. Macroeconomic and general demographic projection framework

2.1. Population projections

Future SSO income and expenditures will be closely linked to the changes in the size and age structure of the population, the employment levels, the economic and wage growth, the inflation, and the rates of return on investments. To improve the projections of the future SSO finances, projections of Thailand's total population and economic activity are required.

Population projection is the basis to estimate the size and composition of the labour force, while projections of gross domestic product (GDP) and worker productivity growth indicate how many workers are needed in the economy and what their likely income will be. Since these factors are interrelated, population and economic projections are performed together to ensure that consistent assumptions are used. For this review, 100-years projections of the population, economy and SSO finances have been performed.

Given the significant uncertainty inherent in forecasting such a long period, sensitivity analysis will be carried out on the population projection to capture the effect on the future financial position of the scheme. Further details of the population projection may be found in Appendix 2.

2.1.1. Demographic assumptions

The determinants of future population changes are fertility, mortality and net migration.

Fertility rates determine the number of births while mortality rates determine how many, and at what ages, people are expected to die. Net migration represents the difference between the number of persons who permanently enter and leave Thailand, and is the most difficult assumption to make in this kind of projection because internal factors as well as external ones are going to affect the migration figures. The results of the actuarial valuation can be very sensitive to the net migration assumption.

The last official population census occurred in 2010. At that moment there were 63.8 million Thai nationals living in Thailand. According to the official projection this number is 64.6 million in 2013.

There are some uncertainties regarding the migrant population in Thailand. First, the non-Thai population is not part of the official projection. The National Economic and Social Development Board (NESDB), which is responsible for the population projection, takes them into account by adding a constant 2.1 million of people for each year of their projection. There is some other information stating that the population of non-Thais was 2.7 million in 2010 [2] and 3.7 million in 2013.[3] For this actuarial valuation, we make the

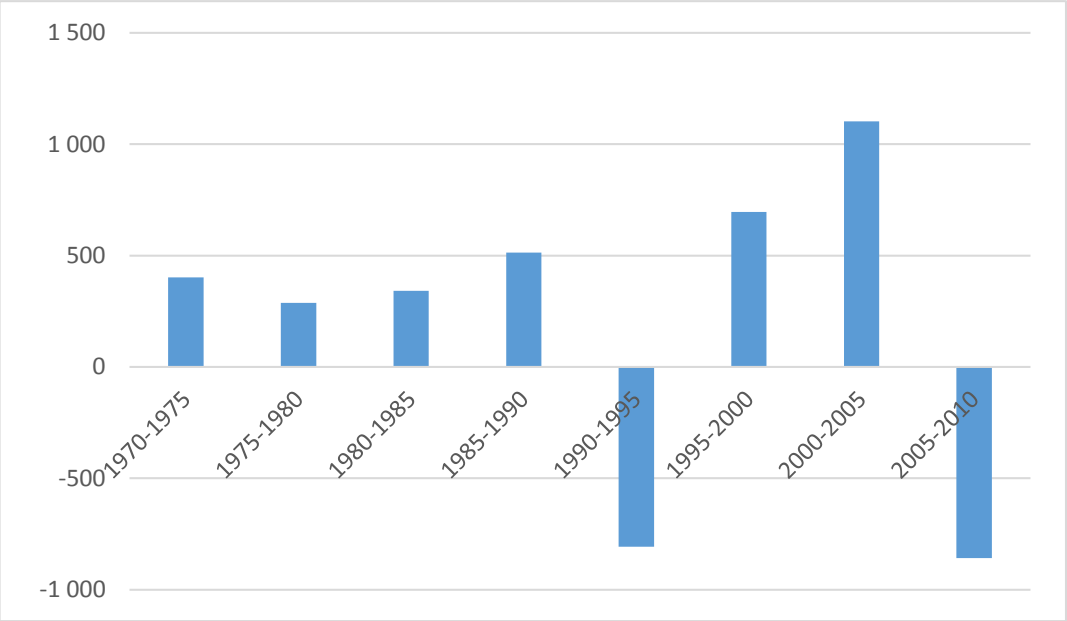
[2] National Statistical Office (NSO), Ministry of Information and Communication Technology, National Statistical Office: *The 2010 Population and Housing Census* (Bangkok).

[3] United Nations Children's Emergency Fund (UNICEF): Migration Profiles –Thailand. Available at: http://esa.un.org/miggmgprofiles/indicators/files/Thailand.pdf.

assumption that, at the beginning of the projection period, the non-Thai population is 2.5 million.

According to the projection in the UN *World Population Prospects*, [4] an annual increase of 20,000 net migrants is expected for the first years but is expected to decrease over the projection period. The NESDB, by adding a constant number of non-Thais to the population, implicitly makes the assumption that net migration over the projection period is 0. For this actuarial valuation, 40,000 net migrants are assumed at the beginning of the projection in 2013 and throughout the projection period. While this level is higher than those expected in other projections, it is quite low regarding the total projection and is more in line with past experience (see figure 2.1). The assumption used reflects in a sense that demographic pressure in the future will support an increase in the net migrant population. The recent introduction of the minimum wage can also help to go in that direction. The ratio of the net migrants to the total population is less than 0.1 per cent at the beginning of the projection period and will remain less than 0.1 per cent 50 years later. Sensitivity analysis will be performed to show how the results of this actuarial valuation are sensitive to different population projection scenarios.

Figure 2.1. Net number of migrants (both sexes combined), 1970−2010

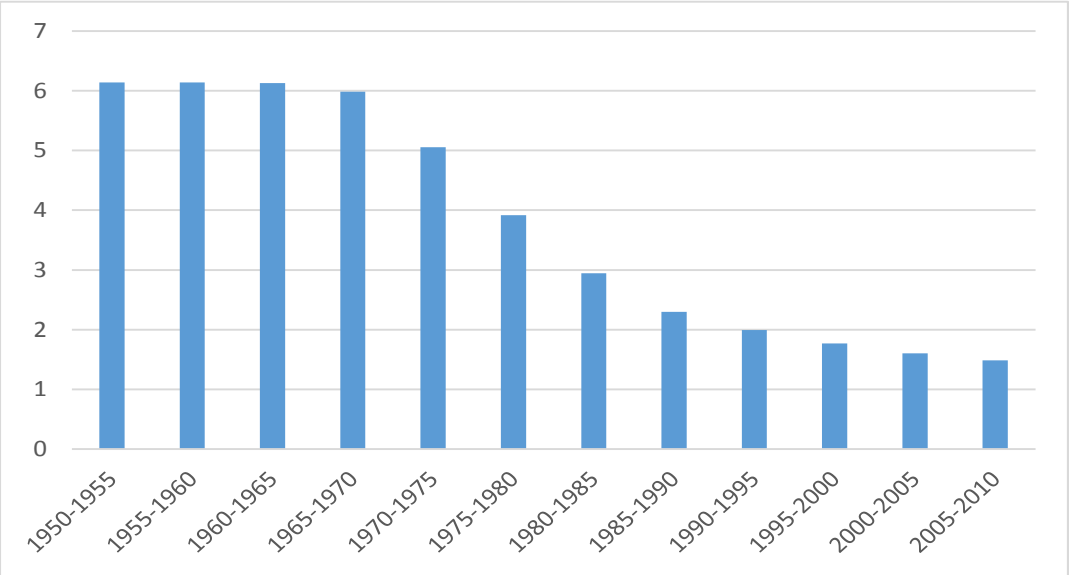


Source: UN DESA, *World Population Prospects: The 2015 Revision.*

[4] United Nations, Department of Economic and Social Affairs (UN DESA): *World Population Prospects: The 2015 Revision* (New York).

The total fertility rate (TFR) represents the average number of children each woman will have between age 15 and 49. If there is no migration, a TFR of 2.1 is required for each generation to replace itself. According to NSO data, the TFR has oscillated between 1.5 and 1.6 over the last eight years. The NESDB uses a TFR of 1.6 at the beginning of its projection period.

Figure 2.2. Total fertility rate, 1960−2010



Source: UN DESA, *World Population Prospects: The 2015 Revision.*

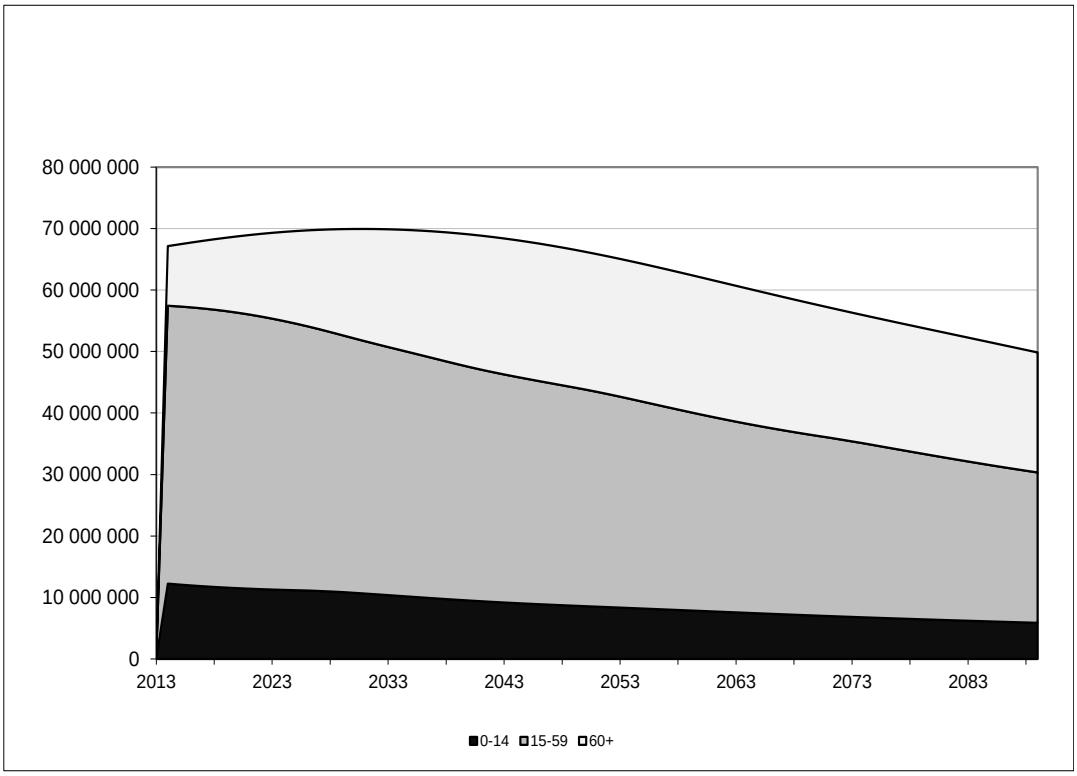
In 2013, Thailand's TFR is estimated at 1.60, a continuing decrease since 1960 when its level was around 6.0. For this actuarial valuation, the TFR of 1.60 at the beginning of the projection is expected to fall to 1.5 over the first 20 years of projection. After that, it stays at this level throughout the rest of the projection period. This assumption is more optimistic than that used by the NESDB, where the expected long-term TFR falls to 1.3. A sensitivity analysis is performed and presented in this report to show the results of the actuarial valuation under a scenario where the fertility rate drops to 1.3. It should be kept in mind that if the fertility rate is significantly below 2.1 and migration does not compensate the population decrease, the economic and demographic outlook of the country will be considerably affected, creating pressure on the pension scheme. These are crucial assumptions for a partially funded system such as the SSO.

According to the NESDB, life expectancy at birth in 2010 is 70.4 for males and 77.5 for females. For the first year of projection (2013), life expectancy is estimated at 71.1 for males and 78.2 for females. For these projections, improvements in mortality are assumed to occur in accordance with UN medium estimates. With these assumptions, life expectancy at birth in 2063 is estimated to be 80.1 for males and 84.3 for females. A more important figure for the SSO is the life expectancy at retirement age, when old-age pensions are paid. For example, life expectancy at age 60 is projected to increase over the first 50 years of projection from 19.8 to 23.7 years and from 22.6 to 26.5 years for males and females, respectively. These expected increases in life expectancy, although slightly higher, are in line with the NESDB projections.

2.1.2. Results of the population projection

Figures 2.3 and 2.4, and table 2.1, show the expected evolution of the population of Thailand over the next 100 years. The changes in the relative size of each age group – 0−14 years old, 15−59, and 60 and over – is a direct result of reductions in birth rates, improvements in longevity and the migration of mainly persons of working age.

Figure 2.3. Projected population distribution, 2013−2113



The reader should be aware of the continuous decrease in the population between ages 15 and 59. This population is the future base of the contributors to the SSO. This downward trend is also a good indicator of the upward trend in the cost of social security pension schemes that are partially funded, like the SSO.

Figure 2.4. Population pyramids, 2013−88

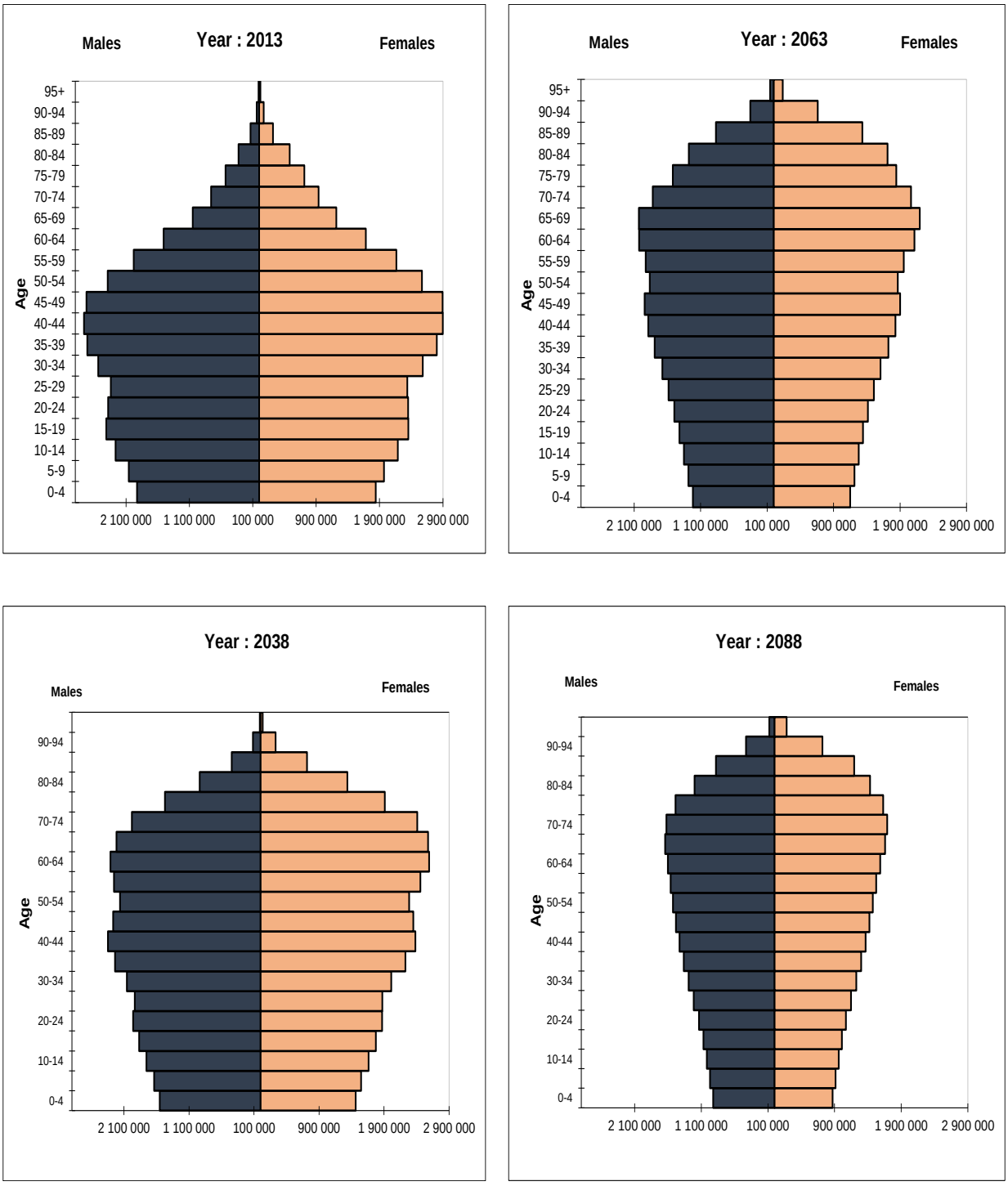


Table 2.1. Population and dependency ratio, 2013−2113

		Age			
Year	Total	0-14	15-59	60+	Ratio 15-59 / 60+
2013	67 154 240	12 247 830	45 205 455	9 700 954	4.7
2014	67 445 400	12 095 948	45 241 155	10 108 297	4.5
2015	67 732 086	11 954 720	45 237 405	10 539 960	4.3
2016	68 006 365	11 825 517	45 194 382	10 986 466	4.1
2017	68 266 421	11 708 676	45 110 680	11 447 064	3.9
2018	68 510 916	11 603 839	44 985 651	11 921 426	3.8
2023	69 467 179	11 228 524	43 746 739	14 491 915	3.0
2028	69 916 835	10 880 626	41 804 212	17 231 997	2.4
2033	69 831 842	10 246 452	40 026 677	19 558 713	2.0
2038	69 235 988	9 614 772	38 327 303	21 293 913	1.8
2043	68 139 208	9 081 848	36 831 199	22 226 162	1.7
2048	66 583 557	8 657 729	35 517 967	22 407 861	1.6
2053	64 661 073	8 270 586	33 975 166	22 415 320	1.5
2058	62 497 738	7 882 781	32 274 395	22 340 561	1.4
2063	60 246 313	7 493 113	30 742 890	22 010 310	1.4
2068	58 032 427	7 116 692	29 476 579	21 439 156	1.4
2073	55 911 940	6 767 684	28 308 815	20 835 442	1.4
2078	53 877 150	6 449 134	26 962 676	20 465 340	1.3
2083	51 871 013	6 153 923	25 656 938	20 060 151	1.3
2088	49 858 876	5 873 084	24 462 291	19 523 501	1.3
2093	47 904 746	5 603 210	23 391 640	18 909 896	1.2
2098	46 056 640	5 346 003	22 384 918	18 325 719	1.2
2103	44 232 547	5 103 736	21 407 676	17 721 135	1.2
2108	42 390 082	4 876 555	20 460 027	17 053 500	1.2
2113	40 551 713	4 662 666	19 554 444	16 334 603	1.2

Highlights of the population projections are:

- Average annual growth of the population over the projection period is -0.5 per cent.
- The total population will increase to reach 69,945,854 in 2030 and then will begin to decrease gradually.
- The number of people aged 15−59 (the working-age population) will begin to decrease in 2015. This downward trend will continue for the whole projection period.
- Starting in 2029, there are more deaths than births.
- In 2013, there are 4.7 persons aged 15−59 for each person aged 60 and over. One hundred years later, this ratio drops to 1.2.
- The average age of the population is about 37 years old in 2013 and will increase to 49 in 2088.

2.2. Economic assumptions

The economy of Thailand contracted in 2009 by 2.3 per cent, mainly due to the global crisis, while between 2010 and 2013 real GDP growth was 4.3 per cent on average. The evolution of social security contributions is highly impacted by economic performance. It is however difficult to assess the impact of economic performance on the total contributions received, as over the past five years the global contribution rate has fluctuated between 8.5 and 11.5 per cent. The number of contributors in 2009 was however 2.8 per cent less than in 2008. For the future, the performance of the economy will continue to have a major impact on the SSO experience. According to the latest projection of the International Monetary Fund (IMF) the economy of Thailand is expected to grow on average at an annual rhythm of 3.5 per cent up until 2020. This expected growth will serve as a basis for the short-term projection.

While the short-term economic outlook is important, it is essential to bear in mind that it is the performance of the economy and the investment over the entire projection period that will drive the financial performance of the scheme.

Table 2.2 shows economic indicators for the decade 2003−13.

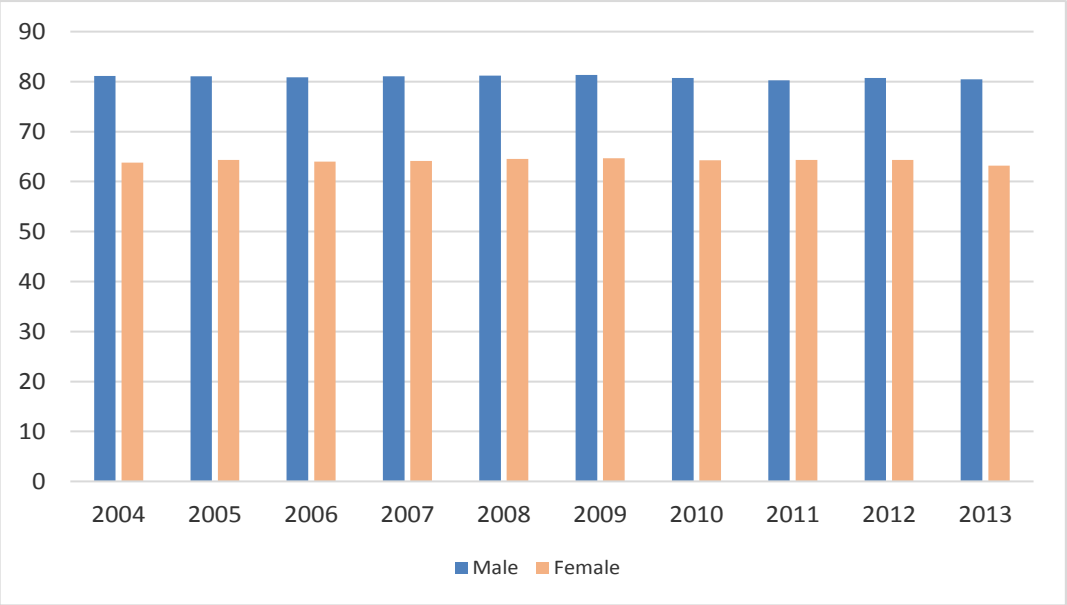
Table 2.2. Economic indicators, 2004−13

Economic Indicators	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
GDP at current price (THB billion)	6 489	7 093	7 845	8 525	9 080	9 042	10 105	10 540	11 375	11 899
Real GDP growth (%)	6.3	4.6	5.1	5.0	2.5	-2.3	7.8	0.1	6.5	2.9
Inflation rate (December to December, %)	3.0	5.8	3.6	3.1	0.4	3.5	3.1	3.5	3.6	1.7
Labour force participation rate, 15+, (%)	72.4	72.5	72.2	72.4	72.6	72.8	72.3	72.1	72.3	71.6
Unemployment rate	2.1	1.8	1.5	1.4	1.4	1.5	1.0	0.7	0.7	0.7
Interest rate, 10-years government bonds (December)		5.5	5.4	4.9	2.7	4.3	3.8	3.4	3.5	4.0

2.2.1. Labour force and employed population

Figure 2.5 presents the evolution of labour force participation rates (labour force population divided by the general population aged 15 and over) in the decade 2004−13. For both males and females, the global labour force participation rates have been quite stable over the period, with a very slight decrease towards 2013.

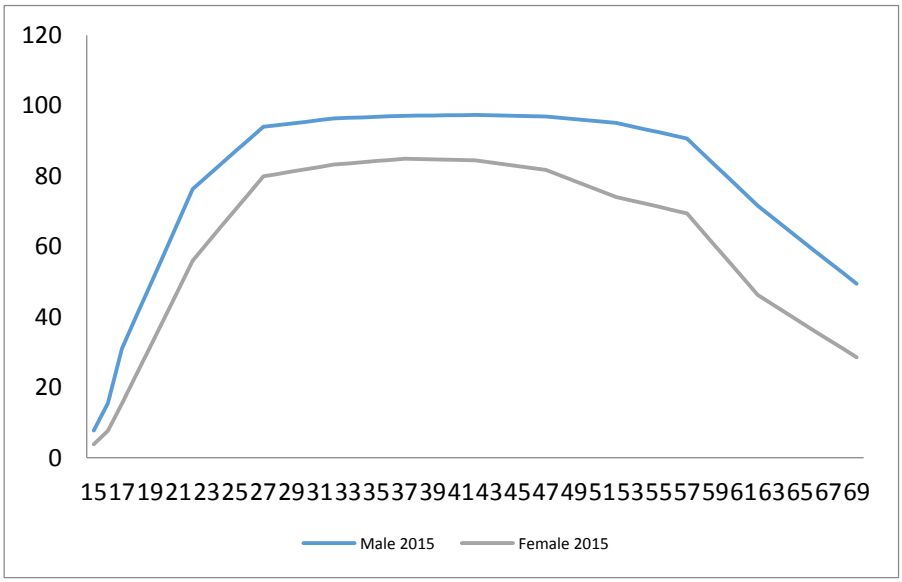
Figure 2.5. Total labour force participation rates, by sex, 2004−13



Source: NSO.

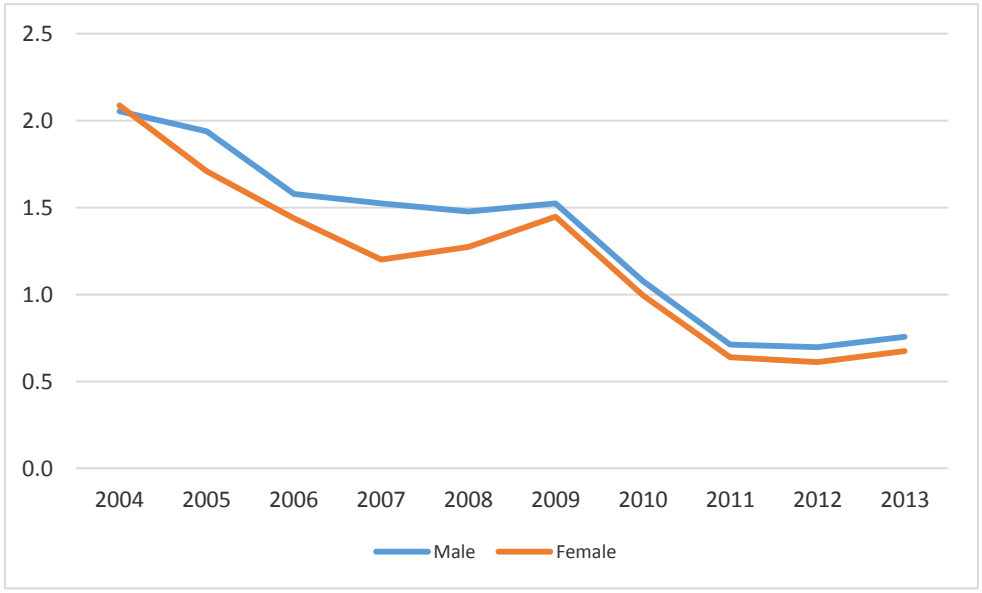
In the actuarial valuation, the projection of the labour force is performed by applying labour force participation rates to the corresponding projected population groups in Thailand. When looking at the history of labour force participation rates by gender and age, it can be observed that they have been quite constant over the years. Labour force participation rates by age group for the years 2013 and 2014 have been used as the basis for future labour force participation rates. They have been transformed to individual age labour force participation rates, and for 2013 and 2014 have been slightly adjusted to replicate the total number of people in the labour force. For the years 2015 and beyond, the labour force participation rates are defined as the mean of those in 2013 and 2014. They are held constant over the projection period for the base scenario. Figure 2.6 presents the labour force participation rates used in this actuarial study.

Figure 2.6. Labour force participation rate assumptions, by age and sex, 2015 and beyond
(percentage of population)



As shown in figure 2.7, unemployment rates have been quite low over the last ten years, with a decreasing trend. They are relatively high for younger age groups, so that it is important to set unemployment rates by age. There is a difference in unemployment by gender but the level is quite similar.

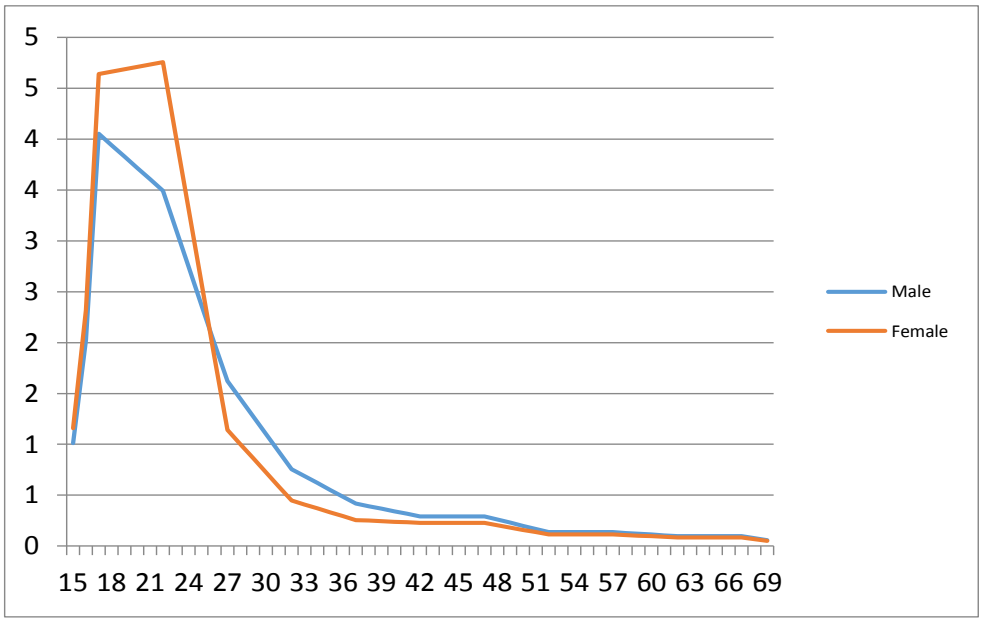
Figure 2.7. Unemployment rates, by sex, 2004−13



Source: NSO.

The unemployment rates by age group for 2013 and 2014 have been used for the basis of future unemployment rates. They have been transformed to individual age unemployment rates, and for 2013 and 2014 have been slightly adjusted to replicate the total number of people in the labour force. For the years 2015 and beyond shown in figure 2.8, the individual age unemployment rates are defined as the mean of those in 2013 and 2014. They are held constant over the projection period for the base scenario.

Figure 2.8. Unemployment rate assumptions, by age and sex, 2015 and beyond
(percentage of population)



The resulting labour market balance for Thailand in the next 100 years is presented in table 2.3.

Table 2.3. Projection of the labour force and the employed population, 2013−2113

		2013	2038	2063	2088	2113
Population (no. of persons)						
	Males	32 846 134	33 510 295	29 387 841	24 629 759	20 182 220
	Females	34 308 106	35 567 661	30 670 364	25 066 044	20 293 574
	Total	67 154 240	69 077 956	60 058 205	49 695 803	40 475 794
Population aged 15−69 (no. of persons)						
	Males	26 721 180	28 572 812	25 540 414	21 615 329	17 789 483
	Females	28 302 979	30 898 219	27 035 435	22 217 509	18 031 697
	Total	55 024 159	59 471 031	52 575 849	43 832 838	35 821 181
Labour force participation rate (%)						
	Males	80	72	68	66	65
	Females	63	53	49	47	46
	Total	72	62	58	56	55
Labour force (no. of persons)						
	Males	21 495 859	20 656 915	17 438 919	14 243 097	11 474 350
	Females	17 887 931	16 456 222	13 198 114	10 472 609	8 355 242
	Total	39 383 790	37 113 137	30 637 033	24 715 706	19 829 592
Unemployment rate (%)		0.7	0.7	0.6	0.6	0.6
Employed persons (no. of persons)						
	Males	21 231 224	20 352 930	17 092 088	13 923 084	11 194 051
	Females	17 727 023	16 270 850	13 007 441	10 311 122	8 220 857
	Total	38 958 247	36 623 780	30 099 529	24 234 207	19 414 908

Note: Seasonally inactive people have been included in the employed population for simplicity. Because the number of people in the formal sector is close to the number of people cover under Article 33 that are contributing to the scheme, and to some extent people covered under Article 39, there is no need to project the formal and informal population separately. Projecting the number of people covered under Article 33 is almost the same as projecting the people in the formal sector.

2.2.2 Inflation and salary increases

The annual increase in the remuneration of an insured person consists of three components: the changes in the cost of living, the general economic productivity increase and the increase in personal productivity for work experience and seniority.

The increase in the cost of living can be measured through the Thai Consumer Price Index. The cost of living has increased at an annual rate of 3.1 per cent over the last ten years (see table 2.4).

Table 2.4. Inflation (Consumer Price Index), December to December, 2004−13 (percentage)

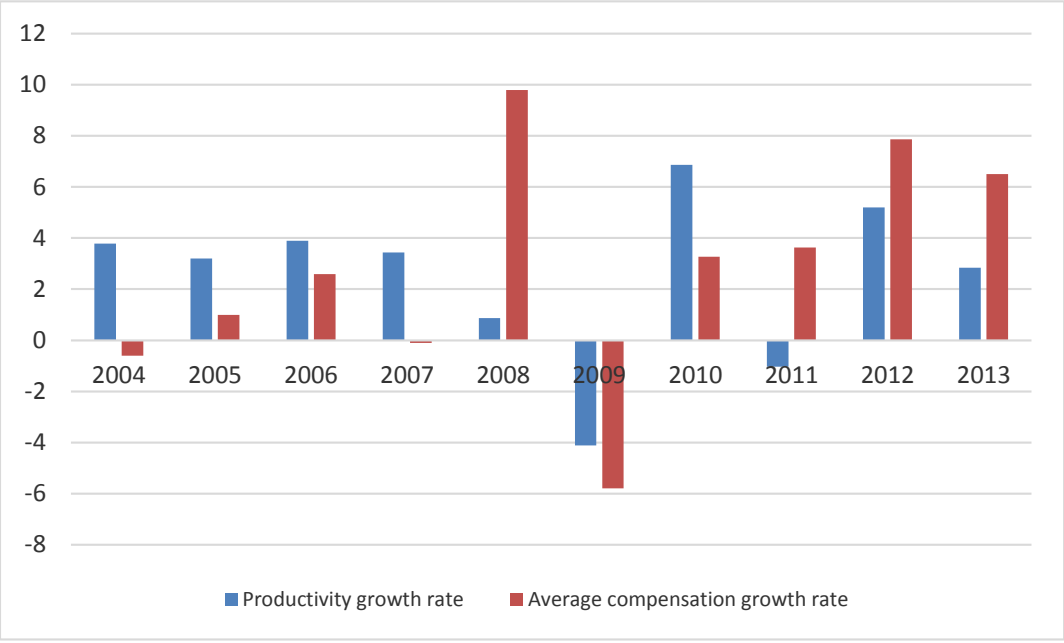
Year	%
2004	3.0
2005	5.8
2006	3.6
2007	3.1
2008	0.4
2009	3.5
2010	3.1
2011	3.5
2012	3.6
2013	1.7
Average	3.1

Source: IMF.

For the first seven years of projection, the IMF assumptions are used. An inflation rate of 0.6 per cent is used for the year 2014, increasing to 2.2 per cent in 2017 and staying at that level until 2020. After that the inflation rate increases by 0.1 by year to its ultimate level of 3.0 per cent in 2028.

Wage adjustments depend to some extent on the evolution of the productivity of employees, namely labour productivity (GDP divided by the number of employed workers). For the period 2004−13, the real labour productivity increase has been 2.5 per cent on average. For the same period, the real average increase in compensation was 2.8 per cent. Figure 2.9 displays the variations of these two indicators by year.

Figure 2.9. Real labour productivity growth rate and real average compensation increase, 2004−13 (percentage)



For this actuarial study, it is assumed that both labour productivity and wages will move in the same direction and that the percentage increase in the long run will be the same. For the first seven years of the projection the IMF results are used, meaning that the labour productivity assumptions are derived from these projections. Real annual increase in labour productivity rises from 2.7 per cent in 2014 to 3.7 in 2020. Starting in 2021, labour productivity slowly decreases by 0.05 per cent each year to reach its ultimate level of 3.00 per cent in 2034. Thus the real wage increase will also stay at this level for the rest of the projection. Results of a sensitivity analysis are presented in this report to show the impact on the actuarial valuation if a lower wage increase was used instead of the one assumed in the base scenario. Depending on the choice of the financing system, the results of the actuarial valuation can be considerably affected.

The increase in personal productivity for work experience and seniority is reflected in the salary scale distribution. This is presented in Appendix 2.

As in many countries, the interest rate environment is quite low in Thailand. Returns on assets invested in the fund will be impacted by this environment, as shown in figure 2.10. For the actuarial valuation, an annual real return on assets of 2 per cent is used.

Figure 2.10. Interest rates, 3 months T-Bills and 10 years government bonds, 2005−14 (percentage)

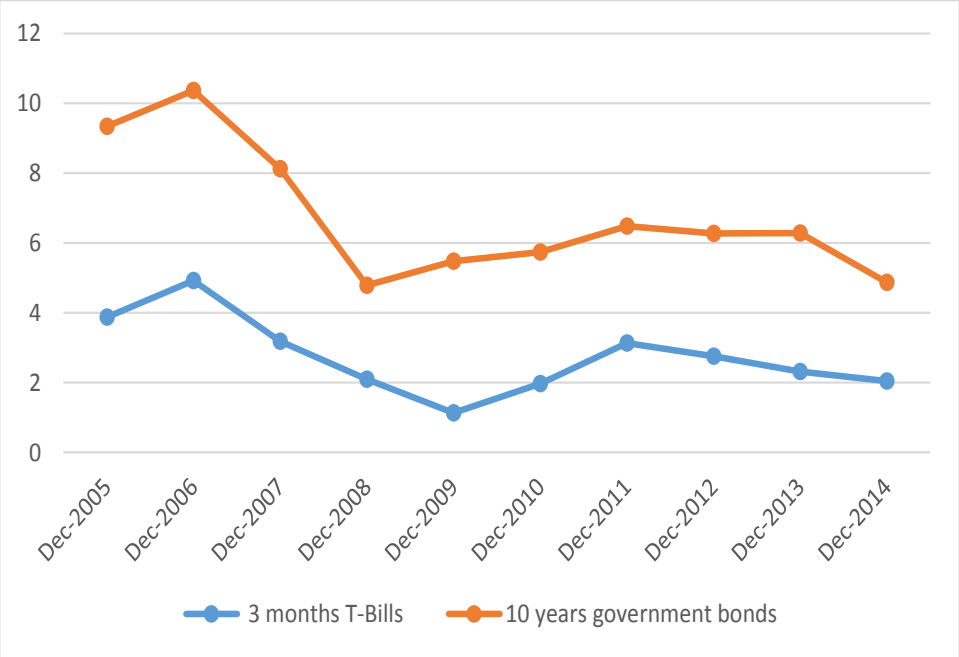
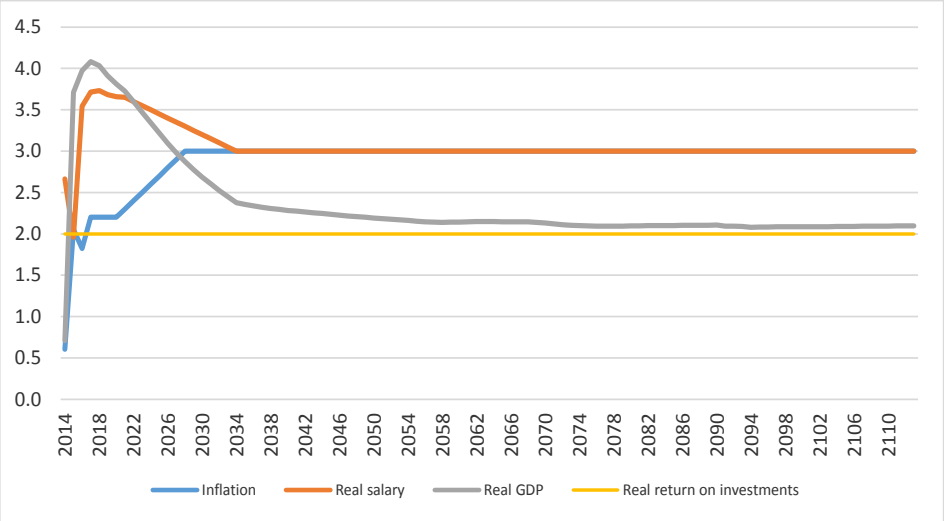


Figure 2.11 indicates the growth rates of the principal macroeconomic indicators used in the projection.

Figure 2.11. Growth rates in real GDP, employment, real salary, real investment return and inflation, 2014−2113 (percentage)



3. Demographic and financial projections

This valuation deals with the ability of the social security scheme to meet its future obligations at the time they fall due. An open-group approach has been used; it is assumed that workers will continue to be insured with the SSO indefinitely, thus paying contributions and accruing benefit entitlements, and later receive benefits in accordance with the current rules of the SSO. Future contributions and benefits are calculated according to the demographic and economic assumptions presented in Section 2 and on the basis of the database and scheme-specific assmptions presented in Appendix 2.

This review has been separated into three main parts: valuation of the short-term benefits (maternity, sickness, funeral (death), child allowances and unemployment), of the disability benefits and of the old-age pension benefits. There is no need to project short-term benefits over a very long period to estimate if the contribution rates are adequate. Usually, short-term projections are made more frequently than long-term projections. The approach used in this actuarial valuation is to analyse short-term benefits separately and to calculate the effect of separate contribution rates. In a next step, these contribution rates are subtracted from the total contribution rate to undertake the pension projection. It will then be possible to ascertain the current contribution rate allocated to the pension branch. Using this approach permits more emphasis to be put on the old-age pension projection.

Insured persons and beneficiaries under Article 40 are not taken into account in this actuarial valuation, for the following reasons:

- The branch is very new and there is not enough emerging experience to analyse it.
- The pension part is going to be transferred to the National Saving Fund (NSF).
- People have been allowed to contribute retroactively, making analysis difficult.

Table 3.1 shows contributions and expenditures for the years 2011−13 for persons insured under Article 40.

Table 3.1. Article 40, contribution and benefits expenditure, 2011−13

Years	Contributions (THB millions)	Expenditure (sickness/disability/funeral)	Total expenditure
2011	404	5	5
2012	1 012	67	69
2013	1 292	125	132

As mentioned previously in this report, there is no explicit allocation of administrative expenditures by branch. The accounting system of SSO should normally permit this kind of allocation. For the actuarial valuation, assumptions were made to allocate administrative and other expenditures by branch. Administrative expenditures and other expenditures have been allocated by taking into account the contribution rates, the benefits paid and the number of cases settled. Figure 3.1 shows the ratio of administrative expenditures and other expenditures to the insurable salary for the last five years as an average of 0.47 per cent. It is also important to remember that the salaries of civil servants working at SSO are paid by the Government and not by the fund.

Figure 3.1. Administrative and other expenditures, ratio to total insurable earnings, 2009−13

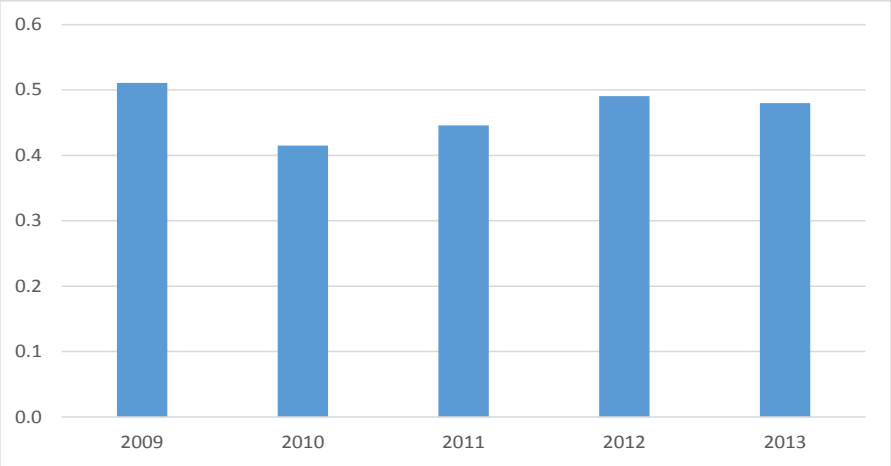


Table 3.2 displays the breakdown by branch of the ratio of administrative and other expenditures over insurable earnings.

Table 3.2. Administrative and other expenditures, ratio to total insurable earnings, by branch, 2009−13

Branch	Ratio (%)
Four benefits type	0.28
Two benefits type	0.16
Unemployment	0.03
Article 40	0.00
Total	0.47

The assumptions regarded the ratio of the administrative and other expenditures over the insurable earnings used in this actuarial valuation are the following:

- 0.30 per cent for the four benefits type, of which 0.05 per cent is for disability benefits;
- 0.20 percent for 2the two benefits type, of which 0.1 per cent is for child allowances and 0.1 per cent for old-age benefits; and
- 0.05 per cent for unemployment benefits.

A projection of the cost of short-term benefits in relation to the contributory salary has been undertaken to estimate the upcoming cost over the next five years. No margins are used in the valuation, but investment income and other income which represent additional revenue to finance the benefits have been voluntarily omitted. The contribution rates are those necessary to pay all the benefits related to a given year. For the disability benefit, a longer period of analysis is used because of the long-term nature of the benefit. The same period is used as for the old-age pension branch. The recommended contribution rates are displayed at the end of each section.

3.1. The four benefits type

Except for disability benefits, all benefits in this branch are of short-term nature. The ILO-Pens model has been used to project the disability and funeral benefits. A separate model has been used to project:

- maternity benefits;
- sickness cash benefits; and
- sickness in kind benefits (health care).

3.1.1. Maternity benefits

Major assumptions, such as the evolution of the insured population, inflation and salary increases, used to project the maternity benefits are the same as those explained in the section related to long-term old-age benefits. Table 3.3 displays key statistics regarding maternity benefits for the years 2009−13.

Table 3.3. Maternity benefits, key statistics 2009−13

	Number of claims awarded per 1,000 female insured	Number of claims awarded per 1,000 male insured	Average benefit duration (days)	Average monthly benefit − female cash benefit (THB)
2009	33.0	11.7	90	3 567
2010	35.3	12.7	90	3 658
2011	34.9	13.3	90	3 789
2012	34.3	13.4	90	4 173
2013	37.4	14.2	90	4 641

Table 3.4 shows the number of cases, the expenditures and the PAYG rate for the next five years, 2014−18. The increase of the PAYG rate in 2016 (to 0.70 per cent) can be explained by the new eligibility condition (five months instead of seven) and the abolition in the condition on the maximum number of children. The recommended contribution rate for maternity benefits, without administrative expenditures, is 0.66 per cent.

Table 3.4. Maternity benefits, projection 2014−18

	2014	2015	2016	2017	2018
Maternity cash benefit					
Number of newborns	218 394	233 793	292 368	295 360	297 155
Total expenditure (THB millions)	3 122	3 458	4 537	4 854	5 173
Maternity grants					
Number of newborns	220 150	235 639	294 643	297 641	299 432
Total expenditure (THB millions)	2 862	3 063	3 900	4 027	4 140
Paternity grant					
Number of newborns	79 684	85 835	107 471	108 446	108 943
Total expenditure (THB millions)	1 036	1 116	1 423	1 467	1 506
Total expenditure (THB millions)	7 019	7 637	9 860	10 347	10 819
Variation of the reserve	81	167	569	136	132
PAYG (%)	0.55	0.56	0.70	0.65	0.64

3.1.2. Sickness cash benefits

Key assumptions, such as the evolution of the insured population, inflation and salary increases, used to project the sickness cash benefits are the same as those explained in the section related to long-term old-age benefits. Table 3.5 displays key statistics regarding the sickness cash benefits for the years 2009−13.

Table 3.5. Sickness cash benefits, key statistics 2009−13

	Number of claims awarded per 1,000 female insured	Number of claims awarded per 1,000 male insured	Average benefit duration (days) − female	Average benefit duration (days) − male
2009	2.5	2.9	40.2	54.4
2010	2.5	2.9	41.2	55.1
2011	2.5	2.9	42.6	55.5
2012	2.6	2.8	41.6	54.9
2013	2.6	2.8	41.9	54.0

Table 3.6 shows the number of cases and the expenditures for the next five years, 2014−18.

Table 3.6. Sickness cash benefits, projection 2014−18

	2014	2015	2016	2017	2018
Number of cases	35 603	36 936	37 678	38 221	38 552
Expenditure (THB millions)	278	300	323	348	372

3.1.3. Sickness in kind benefits (health care)

The medical branch is classified under 18 categories of services.[5] Outpatient (OP) and inpatient (IP) services, which are under the capitation system, are the major cost drivers on the expenditure side. Currently, the amount of capitation is THB 1,460 per person per year.

The breakdown is the following:

1) Capitation (OP and IP)

2) Payment for risk adjustment (concerns 26 diseases)

3) Hospital accreditation (HA)

4) Relative Weight (RW) (severe cases). Diagnosis-related group (DRG) software is used to allocate cases. The SSO pays if the adjusted factor is > =2. If the factor is < 2, it is paid by the capitation system

5) High-cost drugs

[5] Seventeen if the sickness cash benefit discussed previously is excluded.

6) Organs transplant

7) Emergency/accident

8) HIV/AIDS

9) Hemodialysis

10) Dental treatment and artificial teeth

11) High-cost special service

12) Medical instruments

13) Bone marrow

14) Chronic peritoneal dialysis

15) Kidney transplant

16) Cornea transplant

17) Renal failure drugs

Tables 3.7 and 3.8 display the breakdown of sickness benefits. It can be observed that in 2013 capitation accounts for 52 per cent of all expenditures, followed by risk adjustment expenditures and inpatient adjusted RW expenditures, which account respectively for 16 and 15 per cent.

Table 3.7. Sickness benefits branch, cash and in kind, amount by type of benefit, 2000−13 (THB millions)

Year	Sickness cash benefit	Capitation	Emergency	Accident	Inpatient (Adj RW >= 2)	HA	Risk adjust	High cost	Medical instruments	Dental care	Bone marrow	Hemodialysis	HIV/AIDS	Peritoneal dialysis	Kidney transplant	Cornea	Erythropoietin	High cost drugs	Total
2000	76	5 808	80	67	-	-	-	81	6	140	10	58	-	-	-	-	-	-	6 327
2001	85	6 518	88	74	-	-	889	90	7	157	6	95	-	-	-	-	-	-	8 008
2002	91	7 316	78	68	-	-	998	110	8	175	16	136	-	-	-	-	-	-	8 996
2003	115	8 541	103	97	-	-	1 165	142	10	210	4	178	-	-	-	-	-	-	10 565
2004	131	8 967	113	100	-	-	1 223	173	11	231	10	225	115	-	-	-	-	-	11 298
2005	157	10 708	159	124	-	-	1 756	219	15	246	8	285	285	-	4	-	-	-	13 965
2006	183	11 969	193	151	-	-	1 866	254	17	-	10	353	451	2	19	-	48	-	15 517
2007	199	12 167	210	147	-	-	1 998	330	21	312	18	429	625	3	74	-	76	-	16 608
2008	188	12 914	246	159	-	-	2 304	332	20	434	16	522	716	4	32	0	94	-	17 983
2009	178	13 761	253	161	-	538	4 479	431	23	454	29	667	817	10	32	1	109	-	21 940
2010	187	13 962	271	159	-	626	4 529	712	27	448	29	876	804	18	68	1	140	-	22 858
2011	195	14 409	303	158	-	724	4 813	643	36	555	26	926	1 025	27	87	1	143	-	24 071
2012	209	15 208	363	160	4 460	692	4 543	457	39	576	20	1 123	1 016	31	166	0	301	141	29 507
2013	233	15 868	337	140	4 460	678	4 741	397	46	562	19	1 863	908	37	107	1	30	150	30 575

Note: Inpatient cost is based on budget.

Table 3.8. Sickness benefits branch, cash and in kind, percentage by type of benefit, 2000−13

Year	Sickness cash benefit	Capitation	Emergency	Accident	Inpatient (Adj RW >= 2)	HA	Risk adjust	High cost	Medical instruments	Dental care	Bone marrow	Hemodialysis	HIV/AIDS	Peritoneal dialysis	Kidney transplant	Cornea	Erythropoietin	High cost drugs	Total
2000	1.2	91.8	1.3	1.1	-	-	-	1.3	0.1	2.2	0.2	0.9	-	-	-	-	-	-	100.0
2001	1.1	81.4	1.1	0.9	-	-	11.1	1.1	0.1	2.0	0.1	1.2	-	-	-	-	-	-	100.0
2002	1.0	81.3	0.9	0.8	-	-	11.1	1.2	0.1	2.0	0.2	1.5	-	-	-	-	-	-	100.0
2003	1.1	80.8	1.0	0.9	-	-	11.0	1.3	0.1	2.0	0.0	1.7	-	-	-	-	-	-	100.0
2004	1.2	79.4	1.0	0.9	-	-	10.8	1.5	0.1	2.0	0.1	2.0	1.0	-	-	-	-	-	100.0
2005	1.1	76.7	1.1	0.9	-	-	12.6	1.6	0.1	1.8	0.1	2.0	2.0	-	0.0	-	-	-	100.0
2006	1.2	77.1	1.2	1.0	-	-	12.0	1.6	0.1	-	0.1	2.3	2.9	0.0	0.1	-	0.3	-	100.0
2007	1.2	73.3	1.3	0.9	-	-	12.0	2.0	0.1	1.9	0.1	2.6	3.8	0.0	0.4	-	0.5	-	100.0
2008	1.0	71.8	1.4	0.9	-	-	12.8	1.8	0.1	2.4	0.1	2.9	4.0	0.0	0.2	0.0	0.5	-	100.0
2009	0.8	62.7	1.2	0.7	-	2.5	20.4	2.0	0.1	2.1	0.1	3.0	3.7	0.0	0.1	0.0	0.5	-	100.0
2010	0.8	61.1	1.2	0.7	-	2.7	19.8	3.1	0.1	2.0	0.1	3.8	3.5	0.1	0.3	0.0	0.6	-	100.0
2011	0.8	59.9	1.3	0.7	-	3.0	20.0	2.7	0.1	2.3	0.1	3.8	4.3	0.1	0.4	0.0	0.6	-	100.0
2012	0.7	51.5	1.2	0.5	15.1	2.3	15.4	1.5	0.1	2.0	0.1	3.8	3.4	0.1	0.6	0.0	1.0	0.5	100.0
2013	0.8	51.9	1.1	0.5	14.6	2.2	15.5	1.3	0.2	1.8	0.1	6.1	3.0	0.1	0.4	0.0	0.1	0.5	100.0

Various statistics regarding outpatient and inpatient services are shown in figures 3.2−3.9.

Figure 3.2. Outpatients, average number of visits by insured, by age and sex, 2011−13

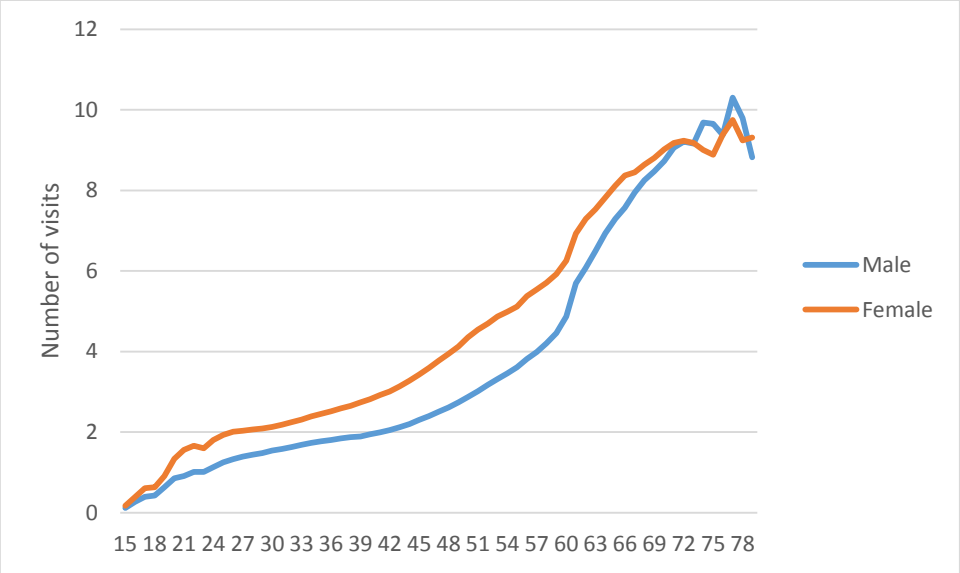


Figure 3.3. Outpatients, average reimbursement by visit, by age and sex, 2011−13 (THB)

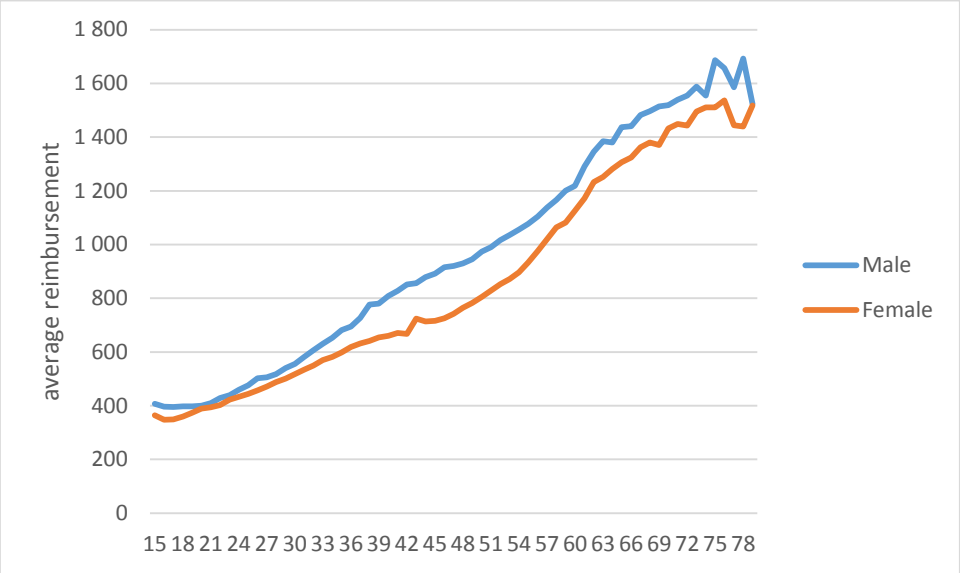


Figure 3.4. Inpatients, rate>=2, average number of visits by insured, by age and sex, 2011−13

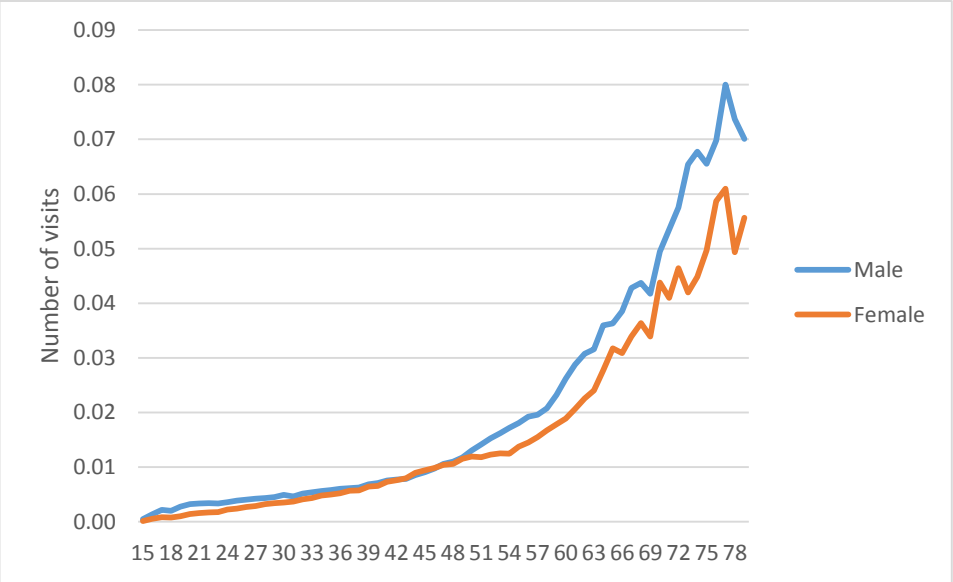


Figure 3.5. Inpatients, rate>=2, average length of stay per visit of insured, by age and sex, 2011−13

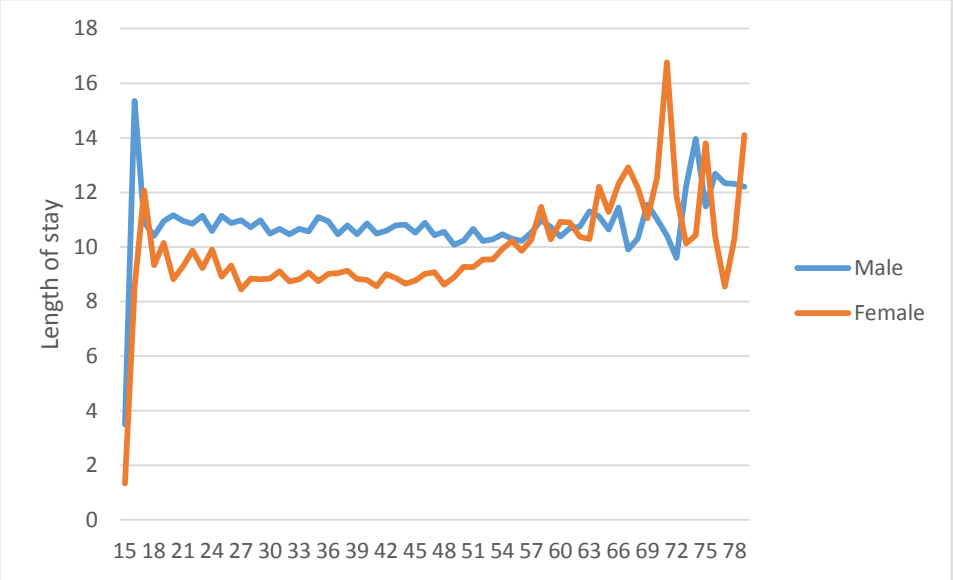


Figure 3.6. Inpatients, rate>=2, average reimbursement by day, by age and sex, 2011−13 (THB)

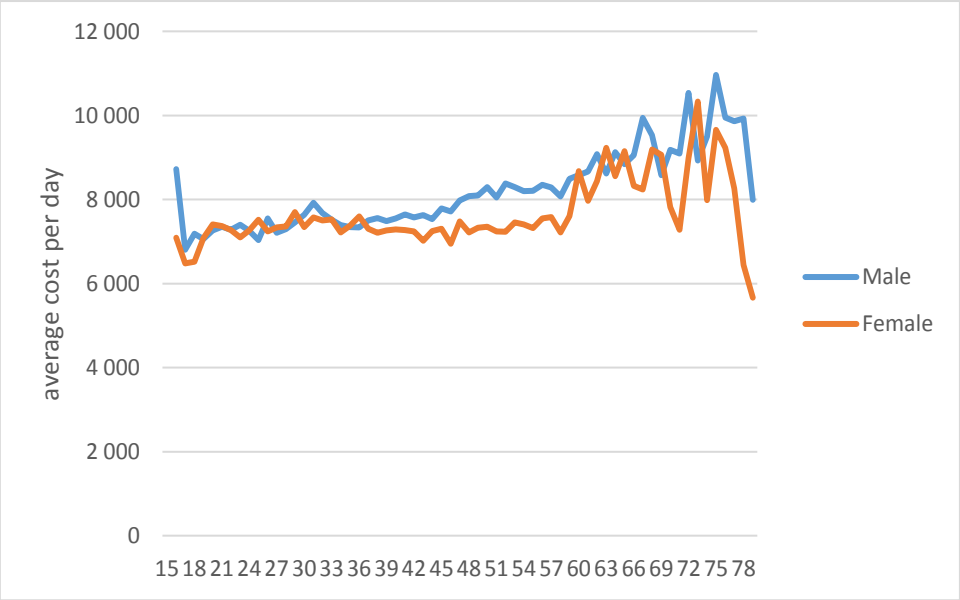


Figure 3.7. Inpatients, rate<2, average number of visits by insured, by age and sex, 2011−13

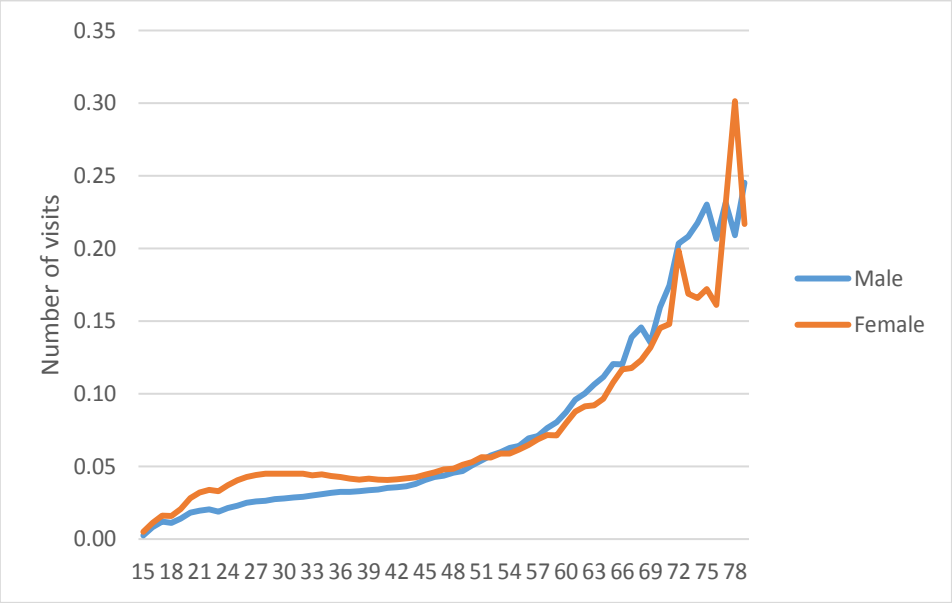


Figure 3.8. Inpatients, rate<2, average length of stay per visit of insured, by age and sex, 2011−13

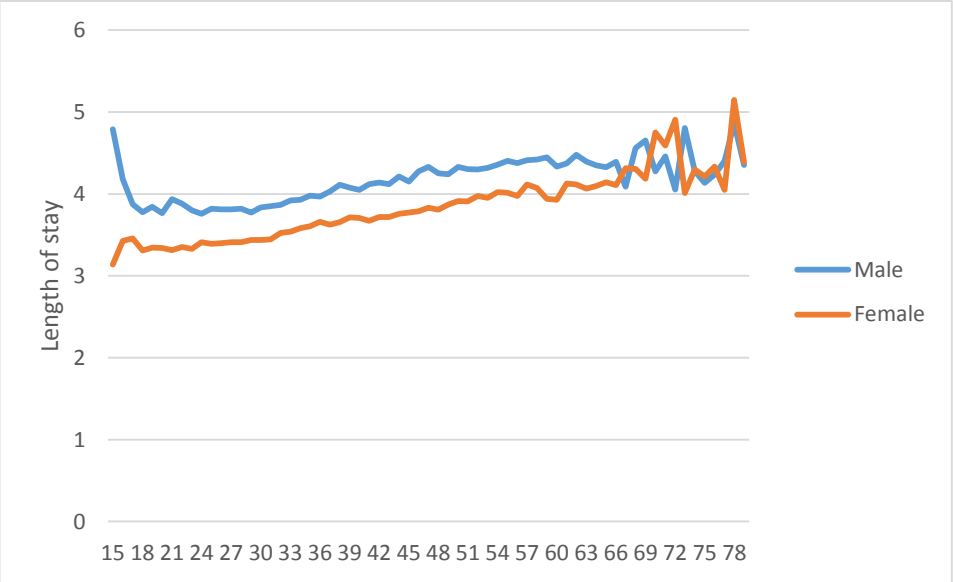
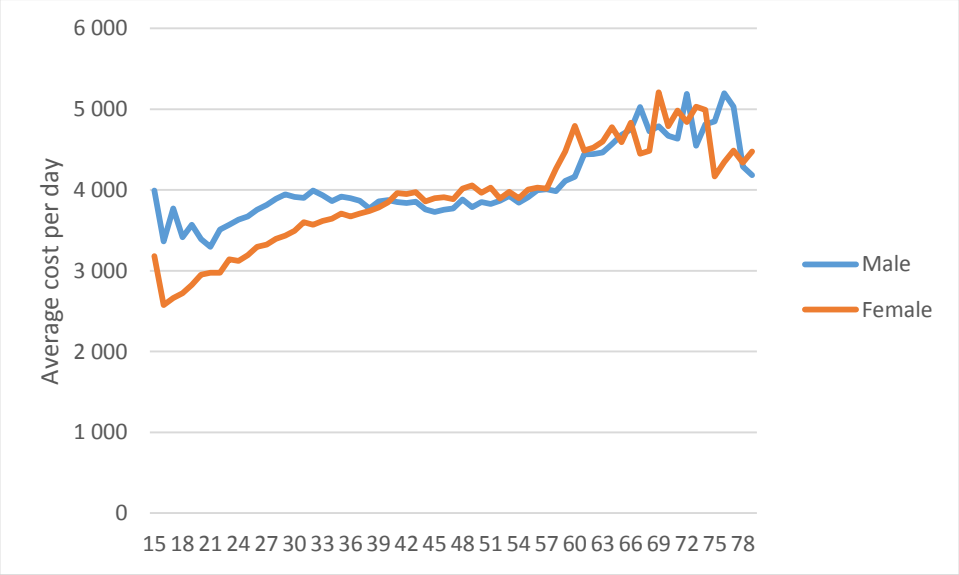


Figure 3.9. Inpatients, rate<2, average reimbursement by day, by age and sex, 2011−13 (THB)



Each category has been projected separately. Where possible and applicable, utilization rates, length of stay and average cost by age and are used in the projections. However, the same methodology has not been applied to each category, for the following reasons:

- The availability of information and its quality were not the same for all categories;
- Some categories such as inpatient adjusted RW have been implemented only for two years.

According to the amended Social Security Act (No. 4, 2015), the health benefits paid will include allowances in the case that an insured person is damaged during medical services provided by a hospital. This new benefit will be provided from 20 October 2015.

The SSO is also expected to provide promotion and prevention benefits, and rehabilitation benefits. For the SSO's members, these benefits are currently provided under the Universal Coverage Scheme (UCS). These new benefits are included in the projection to the extent information is available. Prevention and promotion benefits will be covered by the SSO starting in October 2017. The benefit package has however not yet been decided.

Key assumptions, such as the evolution of the insured population, inflation and salary increases, to project the sickness cash benefits are the same as those explained in the section related to long-term old-age benefits. The following methodology is applied:

- Capitation: the level of capitation in 2014 (THB 1,460) is projected based on the use of inpatient and outpatient services. The projection takes into account increase in utilization, demographic shift of the population and increase in cost. Data is available by age and sex.

- Adjusted RW >= 2: the projection takes into account increase in utilization, demographic shift of the population and increase in cost. Data is available by age and sex.

- Risk adjustment: capitation is paid to the hospital. Estimations are made in proportion to the capitation system.

- Haemodialysis and Erythropoietin: an average annual cost increase of 20 per cent has been applied since limited information is available.

- Bone marrow transplant, HIV/AIDS, Peritoneal dialysis, Kidney transplant and Cornea: simple linear regression on global utilization rates has been applied since no information on the number of cases by age and sex is available.

- Emergency, Accident, Medical instruments and Dental: the projection takes into account increase in utilization, demographic shift of the population and increases in costs.

- High cost: data by age and sex were available were available for only two years. The projection takes into account increase in utilization, demographic shift of the population and increase in cost. Data by age and sex are available for only two years.

- HA: adjusted to inflation each year.

- High-cost drugs: estimation since no information is available.

- Promotion and prevention: per capita cost of the UCS, adjusted each year.

- Mistreatment at hospital: 200 per cent of the global average utilization rate and 100 per cent of the average cost of the UCS, adjusted each year.

Table 3.9 summarizes the main assumptions used for each category of health services.

Table 3.9. Assumptions used for each category of health expenditure

Category	Utilization (%)	Increase in cost	Comments
Capitation	0.5	Increase in salary	Capitation in 2014: THB 1,460
Risk adjustment			A proportion of capitation
Hospital accreditation		Inflation	Capitation rate in 2013: THB 66
Adjusted RW >= 2	1	Inflation + 9% on average	
High-cost special service	0	Increase in salary	
Emergency	0	Increase in salary	
Accident	0	Inflation + 2.4% on average	
Medical instruments	8	Inflation + 5.9% on average	
Dental	0	Inflation	
Haemodialysis and Erythropoietin			20% of the total cost by year
Bone marrow transplant		Inflation + 10%	Average incidence rate: 0.0004%
HIV/AIDS		Inflation + 1%	Average incidence rate: 1.11%
Peritoneal dialysis	14 on average	Inflation + real increase in salary/2	
Kidney transplant		Inflation + 1%	Average incidence rate: 0.05%
Cornea		Inflation + 1%	Average incidence rate: 0.0004%
High-cost drugs			Proportion of 1.4% of all cost without drugs
Promotion and prevention		Inflation + 10%	Use the average cost per capita of THB 286.4 for year 2015
Mistreatment		Inflation + 15%	

The results of the projection of health costs is shown in table 3.10.

Table 3.10. Sickness in kind benefits expenditure (health care): Results of the projection, 2014−18 (THB millions)

Year	Capitation	Emergency	Accident (Adj	Inpatient RW >= 2)	HA	Risk adjust	High cost	Medical instruments	Dental care	Bone marrow	Hemodialysis	HIV/AIDS	Peritoneal dialysis	Kidney transplant	Cornea	Erythropoietin	High cost drugs	Prevention and promotion	Mistreatment	Total
2014	16 587	331	154	6 362	773	4 741	416	53	565	17	1 617	1 131	46	205	1	458	327	-	-	33 781
2015	17 347	404	169	7 096	758	5 107	473	65	606	45	1 941	1 352	58	235	1	550	471	-	33	36 710
2016	18 786	421	182	8 068	782	5 531	513	76	628	50	2 329	1 486	69	272	1	660	598	-	158	40 608
2017	20 338	438	195	9 153	803	5 988	556	88	650	58	2 794	1 617	82	310	1	792	724	1 223	187	45 998
2018	21 900	454	208	10 326	819	6 448	599	103	669	65	3 353	1 738	94	350	1	951	841	5 524	221	54 664

Table 3.11 summarizes the PAYG rate for both sickness cash benefits and in kind (health care) benefits. The cost, without administrative expenditures, is on average 2.89 per cent in 2014–18. Without the inclusion of prevention and promotion, the cost would have been 2.79 per cent during the same period. In 2018, according to the assumptions used it is expected that the introduction of the prevention and promotion benefits will increase the cost by 0.38 per cent (from 2.95 to 3.33 per cent). Because the design of the prevention and promotion benefits is not yet decided, it is suggested not to include them in the contribution rate, and to adjust the contribution rate in the next actuarial valuation according to information available at that time. The suggested contribution rate for sickness benefits is consequently 2.8 per cent.

Table 3.11. Projection, sickness benefits (cash and in kind), 2014−18

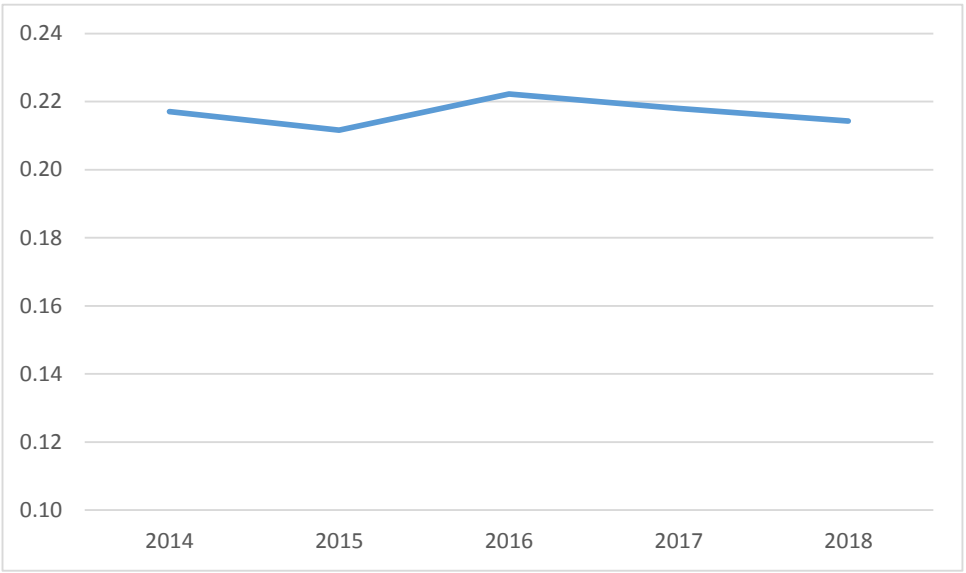
	2014	2015	2016	2017	2018
Sickness cash benefit					
Total expenditure (THB millions)	278	300	323	348	372
Sickness in kind benefits (health)					
Total expenditure (THB millions)	33 781	36 710	40 608	45 998	54 664
Variation of reserve					
Total expenditure (THB millions)	886	780	1 023	1 400	2 219
Total expenditure (THB millions)	34 946	37 790	41 955	47 745	57 255
PAYG (%)	2.67	2.69	2.79	2.96	3.33

Note: Prevention and promotion benefits are included in the projection.

3.1.4. Death benefits

The funeral benefits have been calculated based on the ILO-Pens model. Figure 3.10 shows the PAYG cost rate over the next five years, 2014−18. The cost includes the funeral grant, the survivors' grant and the old-age death grant. Over the period analysed, PAYG is 0.21 per cent and is the recommended rate.

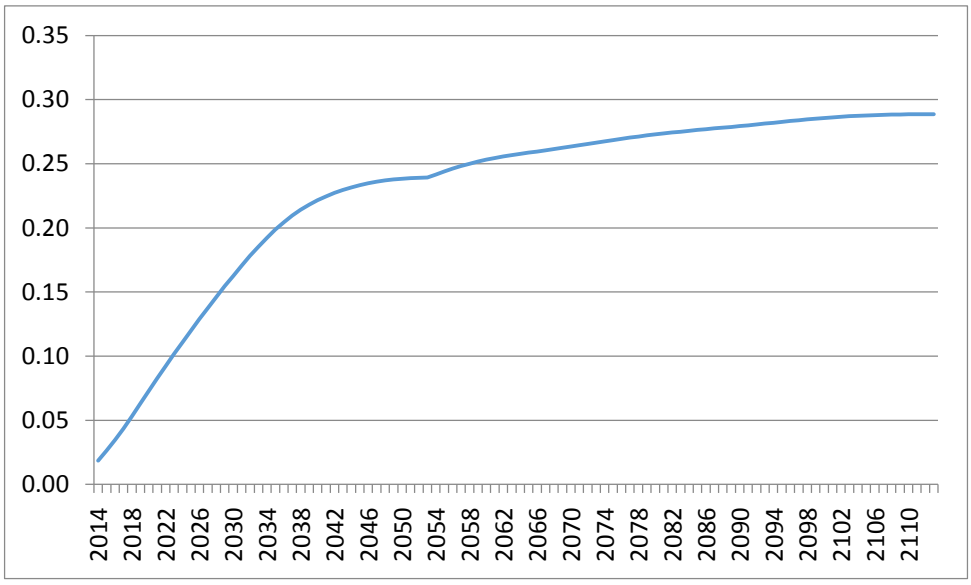
Figure 3.10. PAYG cost, funeral benefits, 2014−18 (percentage)



3.1.5. Disability benefits

Disability benefits have been calculated based on the ILO-Pens model. Lump-sum disability benefits (old-age type) have been included in the disability pension. Figure 3.11 shows the PAYG cost rate over the projection period 2014–2110 as an upward trend during the entire period. In the past, the number of new invalids each year has been very low (around 1,050 cases on average) but little credibility can be given to this experience. As the scheme becomes increasingly mature, a more in-depth analysis could be undertaken. Over the projection period, the general average premium (GAP) is 0.26 per cent. This is the recommended rate. From a risk analysis and a risk management point of view, it is recommended to group all pension benefits together. Disability benefits should be pooled with old-age benefits, and child allowance benefits should be merged with the four benefits type (maternity, sickness and death benefits).

Figure 3.11. PAYG cost, disability benefits, 2014−2110 (percentage)



3.1.6. Summary of the four benefits type branch

Table 3.12 summarizes the results for the four benefits type branch.

Table 3.12. Total contribution rate, four benefits type branch

	Contribution rate
Maternity	0.66
Sickness (cash and in kind)	2.80
Disability	0.26
Funeral	0.21
Administrative and other expenditures	0.30
Total	4.23
Recommended contribution rate	4.25

Note: The contribution rate excluded the inclusion of the promotion and prevention benefits.

Contribution rates for the four benefits have not been increased since the inception of the scheme. According to our projection, the contribution rates are adequate for the next five years − in fact, the required total contribution rate is 4.25 per cent compared to the current one of 4.5 per cent. The introduction of promotion and prevention benefits will however increase the cost; the magnitude of this increase will be analysed when better information on the design becomes available. Of course, the contribution rate is also dependent on the negotiations between the SSO and the different providers of services regarding capitation. Any excess of contribution for the four benefits type branch can be used to finance the pension branch.

We have been requested to comment on the use of the diagnosis-related group (DRG) system regarding the payment of benefits to hospitals. The use of the DRG system is quite new at the SSO, which began to use this system in 2012 to reimburse inpatient services. It is understandable that such complex mechanisms are always difficult to tame at the beginning. Normally such a system, depending on the way it is structured, reflects the complexity and cost of treatment that each patient receives.

A DRG system is a classification system that helps to benchmark hospital expenses, compare providers and determine the price of services. In essence, therefore, a DRG system can support the cost-efficient operation of the SSO. To perform well, a DRG system should be based on good data, a good classification system and on sound financial information on a hospital`s operations. There is no unique model of DRG; many countries have adopted a DRG relevant to their own context, but there is no common standard that could be applied everywhere. Each DRG model is thus country-specific, and it would go beyond the scope of this valuation report to present in a comparative exercise the different models which exist worldwide. In general, investing in education and training of staff involved in the DGR process could be one way to improve the DGR system at the SSO.

3.2. The two benefits type

3.2.1. Child allowances

Key assumptions, such as the evolution of the insured population, inflation and salary increases, to project the child allowance benefits are the same as those explained in the section related to long-term old-age benefits. Table 3.13 displays key statistics regarding child allowance benefits for 2009−13.

Table 3.13. Child allowance benefits, key statistics, 2009−13

	Number of new claims awarded per 1,000 insured aged under 50	Total number of claims awarded per 1,000 insured aged under 50
2009	23.7	120.2
2010	21.5	118.6
2011	22.5	118.8
2012	23.7	120.0
2013	23.7	122.4

Table 3.14 shows the number of cases, the expenditure and the PAYG rate for the next five years, 2014−18. The projection takes into account that, starting in October 2015, the maximum limit in the number of children increases from 2 to 3. Over the projection period, the average PAYG rate is expected to fluctuate between 0.50 and 0.56 per cent. The required contribution rate, after the increase in the limit in the number of children, is 0.55. An additional 0.1 per cent should be added to take into account administrative and other expenditures. The recommended contribution rate for the child allowances benefit is then 0.65 per cent

Table 3.14. Child allowances (benefits only), projection 2014−18

	2014	2015	2016	2017	2018
Number of child allowance benefit cases	1 462 691	1 518 038	1 571 360	1 616 784	1 640 543
Expenditure (THB millions)	6 386	6 842	8 059	8 491	8 814
Variation of reserve (THB millions)	87	138	329	134	107
Cost (%)	0.50	0.50	0.56	0.54	0.52

3.2.2. Old-age pension

Because of the complexity and the financial stakes related to this branch, a more comprehensive analysis is devoted to the old-age pension benefit in section 3.4. The contribution rate that will be used for the projection is the rate levied for the two benefits type, 7 per cent in 2014, less the rate that applies for child benefit, 0.65 per cent. The contribution rate for the old-age pension benefit is consequently 6.35 per cent. When this report was produced, the Government was late in the payment of their contributions except for sickness benefits in kind (health care). For the other benefits, the most recent Government contributions were made in 2012. If the Government decides not to pay for the old-age pension branch, this represents a decrease of 1 per cent in the contribution rate, which could then be 5.35 instead of 6.35 per cent.

3.3. Unemployment benefits

Key assumptions, such as the evolution of the insured population, inflation and salary increases, to project the unemployment benefits are the same as those explained in the section related to long-term old-age benefits. Tables 3.15−3.18 display key statistics concerning the unemployment benefits for the years 2009−13. Statistics are shown both for those laid off and for voluntary resignations.

Table 3.15. Unemployment benefits, males laid off, 2009−13

	Number of claims awarded per 1,000 insured	Average benefit duration (days)	Average daily benefit (THB)
2009	14.6	109.0	156
2010	8.0	99.5	170
2011	5.1	127.8	165
2012	5.1	125.7	175
2013	3.8	130.3	190

Table 3.16. Unemployment benefits, females laid off, 2009−13

	Number of claims awarded per 1,000 insured	Average benefit duration (days)	Average daily benefit (THB)
2009	18.3	108.8	137
2010	8.3	94.7	145
2011	6.6	130.7	136
2012	7.7	128.7	148
2013	5.3	135.2	162

Table 3.17. Unemployment benefits, male voluntary resignations, 2009−13

	Number of claims awarded per 1,000 insured	Average benefit duration (days)	Average daily benefit (THB)
2009	40.4	65.2	82
2010	32.1	66.1	86
2011	33.0	66.2	88
2012	30.5	65.8	97
2013	30.8	66.4	106

Table 3.18. Unemployment benefits, female voluntary resignations, 2009−13

	Number of claims awarded per 1,000 insured	Average benefit duration (days)	Average daily benefit (THB)
2009	51.5	66.5	73
2010	41.1	68.0	77
2011	43.1	67.8	79
2012	42.6	67.1	89
2013	42.4	67.8	99

Table 3.19 shows the number of cases, the expenditure and the PAYG rate for the next five years, 2014−18. During this period, the average PAYG rate is expected to be 0.49 per cent. An additional 0.05 per cent should be added to take into account of administrative and other expenditures. The contribution rate for unemployment benefits is thus 0.55 per cent (rounding up (0.49 + 0.05)).

Table 3.19. Unemployment benefits (benefits only), projection 2014−18

	2014	2015	2016	2017	2018
Laid off					
Number of cases	99 116	102 013	103 442	104 378	104 797
Total expenditure (THB millions)	2 182	2 255	2 416	2 582	2 759
Voluntary					
Number of cases	459 581	472 886	479 859	484 741	487 334
Total expenditure (THB millions)	3 133	3 352	3 583	3 832	4 079
Total expenditure (THB millions)	5 315	5 607	5 999	6 413	6 838
Variation of reserve (THB millions)	399	850	886	953	944
Cost (%) for the benefits	0.47	0.50	0.50	0.50	0.49
Administrative and other expenditures (%)	0.05	0.05	0.05	0.05	0.05
Total cost (%)	0.52	0.55	0.55	0.55	0.54

The current contribution rate for the unemployment benefits branch is 1.25 per cent, which is higher than the calculated PAYG. It is important to bear in mind that the contribution rate has been calculated using the period 2009−13 and that during this period the unemployment rate decreased considerably, from 1.5 to 0.7 per cent. It is recommended to begin to decrease the contribution rate of the unemployment branch by 0.50 per cent and to transfer this part of the contribution rate to the long-term pension branch. The recommended unemployment contribution rate for the next few years is 0.75 per cent. This is still higher than the calculated rate and is a safeguard against undesirable economic downturn.

3.4. Results of the valuation of long-term old-age benefits

This review deals with expenditures and income. Long-term benefits will attain a mature state only after the youngest people of the first generation of contributors have become pensioners, have died and all survivors' pensions paid on their behalf have ceased. This requires that the situation of the scheme be analysed over a period that is long enough. For the current valuation, the projection period is 100 years, from 2014 to 2113.

The general methodology of an actuarial valuation is described in Appendix 4. For the present valuation, a basic scenario was produced based on best-estimate assumptions. Also, additional scenarios were created to better understand major factors that have an impact on the financial soundness of the SSO and to assess uncertainties concerning possible modifications to the scheme that could be part of a future potential reform of pensions.

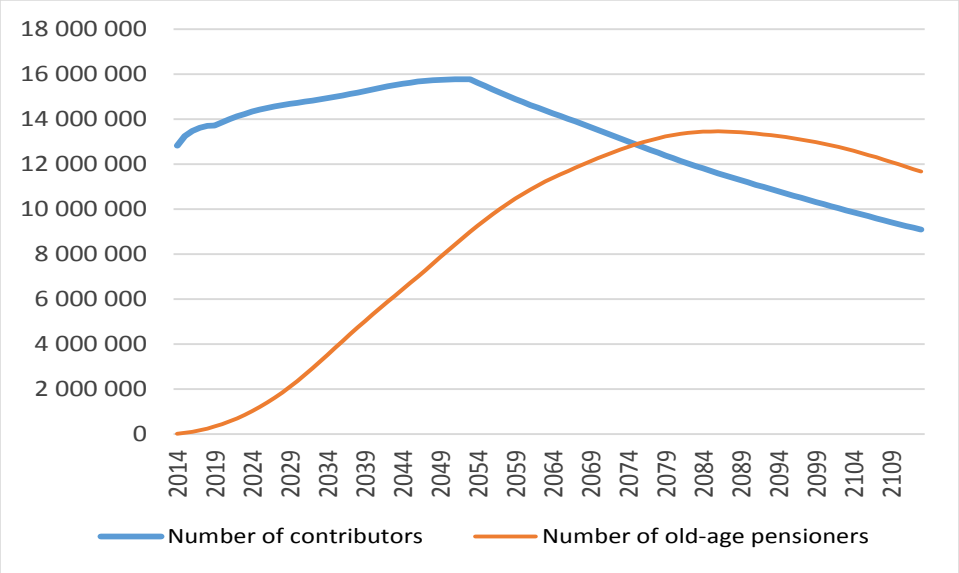
The main purpose of the valuation is to find out whether the financing of the SSO is on track in the long run, not to exactly forecast numerical values. For example, in past years there were no new old-age pensioners, since it was in 2014 that the first old-age pensions have been paid. As experience is gained, retirement patterns for new pensioners will become known and can be analysed. The current absence of experience creates some uncertainties regarding the number of retirees and the moment of retirement. Inactive members (those who have already contributed to the scheme but not in the last year preceding the actuarial valuation) are also a source of uncertainty. But the uncertainties are decreasing as people accumulate a few years of service. Emerging experience will allow analysis of the inactive population. Due to the long-term nature of assumptions, absolute figures include a high degree of uncertainty. Therefore, results have to be interpreted

carefully and future actuarial reviews will have to be undertaken on a regular basis to revise the assumptions in light of the actual experience of the scheme.

3.4.1. Demographic projections

The coverage rate (ratio of the covered population to the employed population) at the beginning of the projection period is 29 per cent, and around 49 per cent in the last years. Figure 3.12 shows the evolution of the numbers of contributors and pensioners. The total number of contributors follows a rate of growth derived from the projection of the general population, the labour force and the employed population as described in Section 2. The number of contributors increases for the first 40 years and decreases thereafter. This is because of the assumption used for the covered population. After 40 years, the decrease in the number of contributors follows the decrease in the general population available to work. The number of pensioners grows rapidly during the projection period. This is due to the fact that the scheme is not yet mature.

Figure 3.12. Demographic projections, numbers of contributors and pensioners, 2014−2113

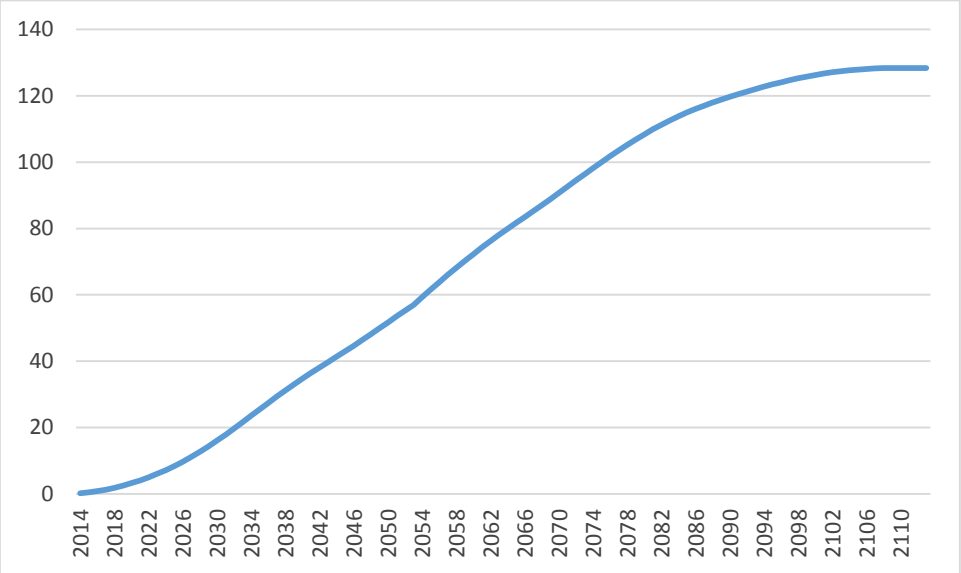


Results of demographic projections are also shown in the figure 3.13. The demographic ratio is the ratio of pensioners to active participants (contributors). The demographic ratio grows from 0.2 per cent in 2014 to 128.4 per cent in 2113. Toward the end of the projection period, the old-age benefits demographic ratio becomes more stable as the scheme enters into a more mature state. Factors that affect the shape of the curve of the demographic ratio include:

- increase in coverage rate (positive effect tending to lower the ratio);
- decrease in the fertility rate and low level of fertility rates (negative effect tending to raise the ratio); and
- increase in life expectancy (negative effect tending to raise the ratio).

The ratio of pensioners to contributors is normally a good indicator of the increasing cost of a partially funded scheme such as the SSO. This directly affects the PAYG cost of the scheme, as presented in section 3.4.2.

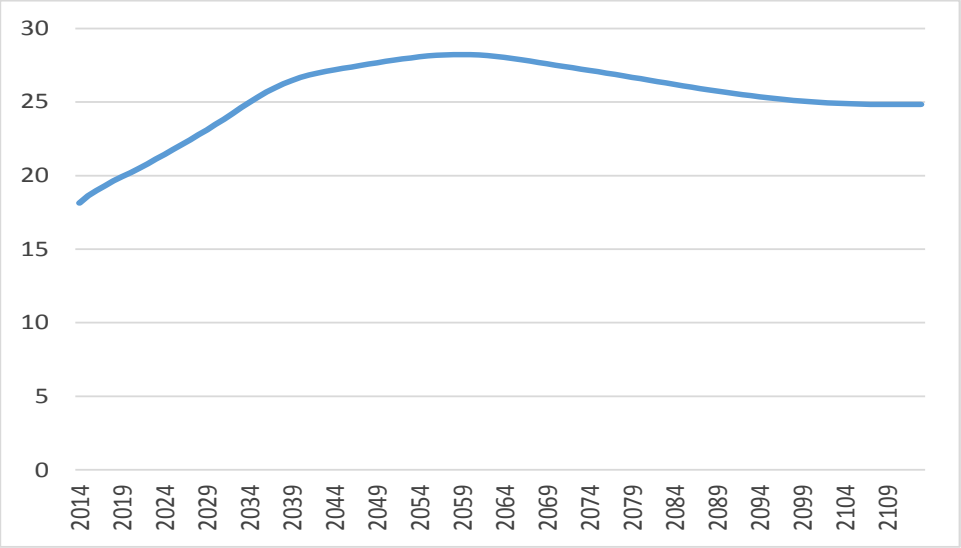
Figure 3.13. Demographic ratios, old-age pension, 2014−2113 (percentage)



3.4.2. Financial projections

Figure 3.14 shows the evolution of the system replacement ratio for the old-age pension. This ratio is defined as the average benefit for pensioners over the average salary of active members. The old-age replacement ratio increases for the first 50 years of the projection. This is due to the fact that future generations of new pensioners are going to have more years of service on retirement; in fact, they are going to have the opportunity to contribute over their entire working life. This is not the case for the current generation of new pensioners who have accumulated only 15 years of service for the calculation of benefits in 2014. The replacement ratio will decrease and stabilize in the second half of the projection period due to increases in salaries. The expected average salary increase is higher than the expected inflation. For a majority of contributors the low retirement age is a good thing because they have access to their money sooner, but it is important to understand that the low retirement age also has the negative effect of preventing people from accumulating more years of service on retirement and having more income.

Figure 3.14. Old-age pension, system replacement ratio, 2014−2113



As shown in figure 3.15, the PAYG rate rises from 0.7 per cent in 2014 to 32.1 per cent in 2113. This rate is the total expenditures as a percentage of total insurable earnings.

It represents the contribution rate that would be required to pay all the expenditures of the scheme (benefits, administrative and other expenses), year after year, in the absence of a reserve**.** This high increase in the PAYG rate is mainly due to the increase of the demographic ratio, as explained in the previous section: more pensioners are receiving benefits, while the number of contributors is not growing as fast.

Figure 3.15. Projected PAYG rates, 2014−2113

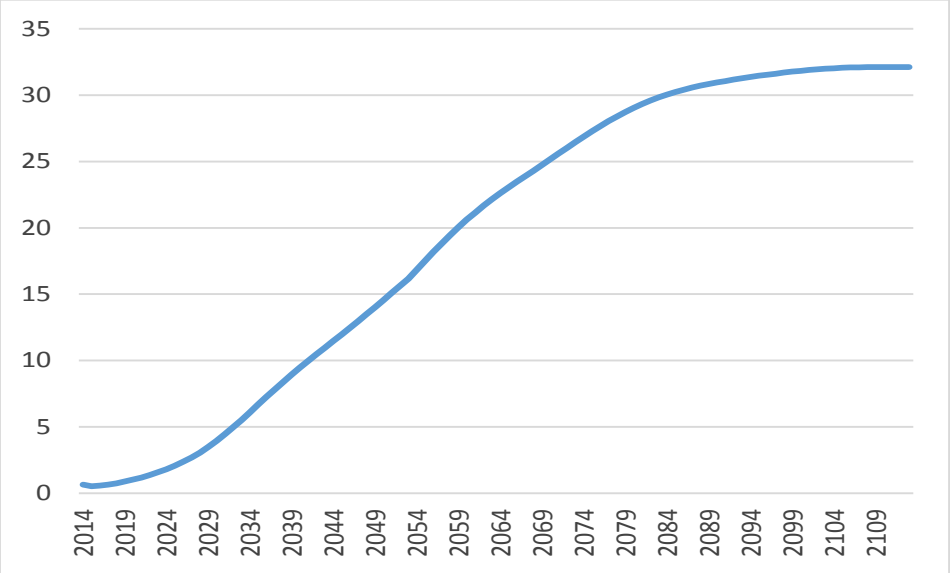


Table 3.20 shows the results of the financial projections in terms of cash flows and reserves. For the projection of the old-age pension branch, a 6.35 per cent contribution rate and a reserve of THB 1,130,798 million at the beginning of the projection period are used. The contribution rate is derived by subtracting from the global contribution rate of the two benefits type branch for 2014 (7 per cent) the contribution rate recommended for the child allowance branch, which is 0.65 per cent. A similar process is applied for the allocation of reserves. It is recommended to read the section related to each benefit for a better understanding of the technical approach.

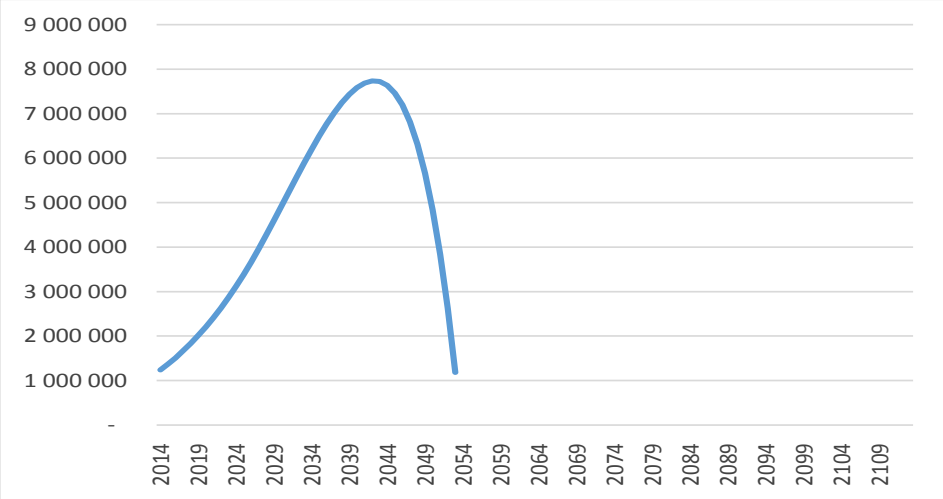
Table 3.20 and figure 3.16 show the evolution of the reserve over the projection period. The main observations are:

1) Contributions are sufficient to pay for all annual expenditures until the year 2034.
2) Starting in 2035, investment income must be used to pay for annual expenditures. The reserve still grows, but at a slower pace.
3) Starting in 2043, total income (contributions, investment income and other income) is no longer sufficient to pay for annual expenditures. The reserve starts to decrease.
4) During the year 2054, the reserve drops to zero.
5) Starting in 2054, the required annual contribution rate to pay for all expenditures becomes the PAYG rate. As an illustration, this rate is 16.8 per cent in 2054.
6) The reserve ratio, which is the ratio of the end-of-year reserve over the annual expenditures for the year, moves from 148.9 to 0 between 2014 and 2054 (see figure 3.17). This ratio can be interpreted as the number of years during which annual expenditures can be paid by the reserve if there were no contributions, no investment income and no other income.

Table 3.20. Financial projections, cash inflows, cash outflows and reserve, 2014−2113, contribution rate of 6.35 per cent

Years	Income			Expenses		Surplus (deficit)	Reserve (end year)	PAYG %	Reserve ratio
	Contributions	Investment earnings	Others	Benefits	Administrative expenses				
2014	82 165	30 402	739	7 004	1 294	105 008	1 235 806	0.6	148.9
2015	87 994	51 749	792	5 701	1 386	133 448	1 369 254	0.5	193.2
2016	94 259	54 003	848	6 812	1 484	140 813	1 510 067	0.6	182.0
2017	100 968	65 310	909	8 600	1 590	156 996	1 667 062	0.6	163.6
2018	107 665	71 994	969	10 835	1 696	168 097	1 835 160	0.7	146.5
2019	114 157	79 118	1 027	14 154	1 798	178 351	2 013 510	0.9	126.2
2020	122 249	86 700	1 100	17 707	1 925	190 417	2 203 927	1.0	112.3
2021	131 015	97 043	1 179	22 076	2 063	205 098	2 409 025	1.2	99.8
2022	140 336	108 397	1 263	27 841	2 210	219 945	2 628 970	1.4	87.5
2023	150 235	120 812	1 352	35 141	2 366	234 892	2 863 862	1.6	76.4
2028	210 055	200 694	1 890	97 455	3 308	311 876	4 271 769	3.0	42.4
2033	289 328	279 382	2 604	246 524	4 556	320 233	5 888 982	0.0	23.5
2038	396 313	348 023	3 566	517 774	6 241	223 888	7 247 426	8.4	13.8
2043	544 231	377 012	4 898	932 146	8 571		7 721 486	11.0	8.2
2048	741 528	320 300	6 673	1 563 591	11 678		6 311 011	13.5	4.0
2053	999 217	93 191	8 992	2 528 080	15 736		1 184 285	16.2	0.5
2058	1 275 389		11 477	3 885 116	20 085			19.4	
2063	1 633 781		14 703	5 674 001	25 729			22.2	
2068	2 093 988		18 844	7 981 721	32 976			24.3	
2073	2 672 837		24 053	11 092 629	42 092			26.5	
2078	3 404 941		30 642	15 171 159	53 621			28.4	
2083	4 343 952		39 092	20 339 278	68 409			29.8	
2088	5 553 801		49 979	26 774 950	87 461			30.7	
2093	7 107 359		63 960	34 887 079	111 927			31.3	
2098	9 093 875		81 837	45 254 603	143 211			31.7	
2103	11 630 711		104 666	58 409 625	183 161			32.0	
2108	14 875 175		133 864	74 998 985	234 255			32.1	
2113	19 034 167		171 291	95 960 998	299 751			32.1	

Figure 3.16. Projection of the reserve (THB millions)



Another very important result of the financial projection is the general average premium (GAP). This can be calculated in two ways:

1) The annual contribution, as a percentage of insurable earnings, necessary to pay for all expenditures over the entire projection period, without considering the reserve. In the current valuation, this GAP is 21.1 per cent. Figure 3.17 shows the evolution of the reserve-to-expenditures ratio (RER) if a contribution rate of 21.1 per cent is used throughout the projection period. At the end of the projection period, there is a positive reserve and the reserve ratio is 1.4.

2) The annual contribution, as a percentage of insurable earnings, necessary to pay for all expenditures over the entire projection period, but assuming that the initial reserve will be exhausted at the end of the projection period. In the current valuation, this GAP is 20.6 per cent. The problem with this definition of the GAP is that by financing the scheme at a contribution rate of 20.6 per cent, there would be no reserve left in 2113, meaning that the contribution rate would have to increase instantly to around 32 per cent (the PAYG rate) in that year. Such an increase would not be viable for the scheme.

Figure 3.17. Projection of the reserve-to-expenditures ratio (RER), contribution rate of 21.1 per cent

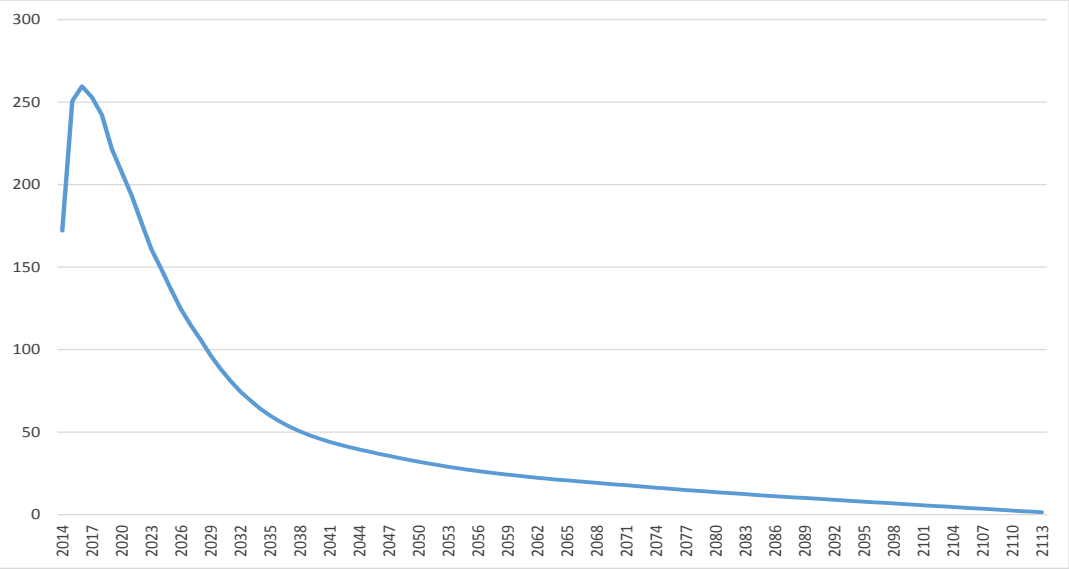


Table 3.21 shows the actuarial balance of the scheme, based on the second definition above. Taking into account the initial reserve and the present value of future contributions and benefits, there is a cumulative shortfall, in present value of THB 36,925 billion. By increasing the contribution rate by 14.2 per cent (which means a total contribution rate of 20.6 per cent), there would be no shortfall, as the present value of future contributions and the initial reserve would be sufficient to pay for the present value of future benefits.

Table 3.21. Actuarial balance, financial projection 2014−2113 (THB billions)

	2013 year-end reserve	1 131
Plus	Present value of future contributions	14 679
Minus	Present value of future expenditures	48 689
Equal	Present value of future surplus (shortfall)	(32 879)
	Actuarial balance (% of present value of future insurable earnings)	-14.2%

4. Sensitivity analyses

In this section, additional scenarios are performed to better understand the risks of the scheme. Only one additional scenario is presented for short-term benefits; it is related to the arrival of an important number of migrants into the scheme. All the other scenarios are related to the long-term pension branch because of the importance of this branch in the increasing cost of the social security system in the future.

4.1. Sensitivity analysis for short-term benefits

An exercise is currently under process in Thailand to legalize an important number of migrants in the country. According to the information transmitted, up to 1.6 million of migrants are expected to be insured by SSO over the coming years. The targeted migrant population comes from Myanmar, Cambodia and Laos and also from Viet Nam in a second phase. All these potential new insureds are working for an employer. Due to the importance of this potential new insured population, an analysis is performed to see if their utilization rates for different benefits and their costs are greater than those of the Thai population.

The data and information on which this analysis is based come from SSO. Only the data for the benefits related to the years 2010−13 have been transmitted. No data have been transmitted for inpatient and outpatient services, due to the unavailability of the information. No information has been gathered by age or sex. According to the information obtained, this population of migrant workers is part of the low-skilled category of workers. It is consequently assumed that the average monthly wage in 2013 is THB 6,000. Old-age benefit is voluntary omitted from this exercise due to the long-term nature of this branch and to the fact that there is not enough information. Two relative exercises have been carried out:

- comparison of the experience 2010−13 of migrants coming from Myanmar, Cambodia and Laos with that of the Thai population; and
- comparison of the experience 2010−13 of all migrants with that of the Thai population.

Table 4.1 shows the insured population by nationality for the years 2008−15.

Table 4.1. Number of insured by nationality, December 2008−December 2015

Year	Nationality						Proportion of migrants (%)
	Myanmar	Cambodia	Laos	Thai	Other	Total	
2008	1 044	7 702	5 527	9 220 935	58 345	9 293 553	0.8
2009	1 006	7 297	6 561	9 289 717	55 478	9 360 059	0.8
2010	10 110	16 558	6 338	9 612 911	56 832	9 702 749	0.9
2011	57 885	29 280	8 410	9 753 638	60 734	9 909 947	1.6
2012	124 480	49 521	9 549	10 160 275	66 411	10 410 236	2.4
2013	239 084	70 436	11 300	10 457 159	77 345	10 855 324	3.7
2014	293 397	87 768	12 472	10 699 218	61 687	11 154 542	4.1
2015 (as of September)	312 214	87 757	11 974	10 915 052	86 554	11 413 551	4.4

Source: SSO.

Tables 4.2−4.5 show the utilization rates of the migrant population compared to the Thai population, as well as their relative costs. A ratio under 100 per cent means that the utilization by or the costs for the migrant population is lower than those of the Thai population. In all cases, migrant utilization rates and costs are below those of the Thai population. This means that if new migrants have the same consumption profile as those currently insured by the SSO, the contribution rate should not be increased. For prudence, it is advisable not to change the contribution rate until actual experience emerges. Only the maternity benefit branch shows a clear upward trend in the utilization and cost patterns of migrants compared to the Thai population. But the total cost for migrants is still below that for the Thai population.

Table 4.2. Ratios of utilization rates for short-term benefits of migrants from Myanmar, Cambodia and Laos compared to the Thai population, 2010−13

	2 010	2 011	2 012	2 013	Average
Sickness	8.1	7.7	5.6	7.1	7.1
Maternity	41.6	28.7	47.0	62.4	44.9
Invalidity	-	-	-	-	-
Death	36.7	34.9	28.3	30.8	32.7
Child allowance	3.9	2.2	2.9	5.5	3.6
Unemployment	2.5	0.3	0.6	1.8	1.3

Table 4.3. Ratios of utilization rates for short-term benefits of all migrants compared to the Thai population, 2010−13

	2 010	2 011	2 012	2 013	Average
Sickness	10.2	9.0	6.5	7.9	8.4
Maternity	37.1	31.7	44.1	57.7	42.6
Invalidity	11.7	4.1	2.9	2.0	5.2
Death	39.6	38.8	37.3	32.8	37.1
Child allowance	12.6	9.6	7.7	8.6	9.6
Unemployment	5.5	1.2	2.4	6.2	3.8

Table 4.4. Ratios of costs for short-term benefits of migrants from Myanmar, Cambodia and Laos compared to the Thai population, 2010−13

	2 010	2 011	2 012	2 013	Average
Sickness	3.9	2.7	2.1	2.7	2.8
Maternity	60.1	42.1	68.9	90.7	65.4
Invalidity	-	-	-	-	-
Death	41.9	37.3	29.2	29.4	34.5
Child allowance	5.5	2.6	3.1	6.6	4.5
Unemployment	3.7	0.3	0.5	10.3	3.7

Table 4.5. Ratios of costs for short-term benefits of all migrants compared to the Thai population, 2010−13

	2 010	2 011	2 012	2 013	Average
Sickness	9.7	7.5	4.7	3.7	6.4
Maternity	55.5	46.1	64.8	83.2	62.4
Invalidity	15.1	8.9	6.2	5.5	8.9
Death	61.3	50.2	48.0	35.1	48.6
Child allowance	20.8	14.6	11.9	12.6	15.0
Unemployment	17.4	3.9	6.0	12.0	9.8

4.2. Sensitivity analyses for the pension benefit branch

In section 3.4 it was shown that, under the basic scenario, a contribution rate of 21.1 per cent is necessary to pay all the expenditures of the pension branch for the next 100 years, without taking into account the initial reserve. This section discusses some other scenarios built to better understand the risks and what is at stake for the SSO. The scenarios discussed here are the following:

1) Return on assets

2) Population growth

3) Growth in the covered population

4) Mortality rates

5) Average salary increase

6) Inflation rate

7) Adjustment to pensions in payment

4.2.1. Return on assets

The assumption regarding the return on investments has been retained in regard to the current investment policy. The assumption concerning the real return on assets in the base scenario is 2.0 per cent. This gives a nominal return at the beginning of the projection period of 2.6 per cent, increasing to the ultimate level of 5.0 per cent after 15 years. Table 4.6 shows the impact of having a return 1.0 per cent lower and 1.0 per cent higher than the one in the base scenario. A change in the return on assets has no impact on the PAYG rate because investments are not taken into account when calculating this rate.

Table 4.6. Sensitivity analysis, return on assets

Scenarios	GAP (%)	PAYG 2113 (%)	Year reserve = 0
Base	21.1	32.1	2054
+1.0%	18.3	32.1	2057
-1.0%	23.6	32.1	2052

Having a higher return on assets of 1.0 per cent will only slightly affect the moment of depletion of the reserve, but in terms of the contribution rate (GAP), it will have an important effect: the contribution rate goes down by 2.8 per cent, from 21.1 to 18.3 per cent. If the SSO continues not to adapt the investment policy to a long-term outlook and receives the same real investment return on assets as in past years, the GAP could increase to around 24 per cent. This scenario shows the importance of having a long-term strategy in terms of investment.

4.2.2. Population growth

The PAYG rate is very sensitive to the assumption related to population growth. Two sets of sensitivity analyses have been performed, assuming a higher or a lower population growth throughout the projection period. All other assumptions used in the actuarial valuation stay the same.

In the low population growth scenario it is assumed that:

- the fertility rate falls to reach 1.3 in 2040; and
- there is no migration.

In the high population growth scenario it is assumed that:

- the fertility rate rises to reach 1.7 after 20 years of projection; and
- net migration is 80,000 per year rather than the 40,000 in the base scenario.

In our base scenario, the insured population grows at an annual rate of - 0.3 per cent over the projection period. In the low population scenario, this growth is - 0.8 per cent, while in the high population scenario it is 0.0 per cent.

In all scenarios the GAP is around or higher than 20 per cent and the PAYG rate is very high 100 years later. Important modifications in the fertility rate and the level of migration are not sufficient to change the upcoming trend but they can mitigate the impact. This is well illustrated in the scenario where the fertility rate and the level of migration are higher, as shown in table 4.7. In both high and low scenarios, the moment when the reserve reaches 0 is close to that in the base scenario.

For the assumption related to fertility rates, the effect on the contribution rate is delayed by 20 years, as those who are born now will enter the labour market approximately 20 years from now. For migration the effect is immediate, but also depends on how migrant workers are integrated into the labour market and how they are covered by the scheme.

It is very important to understand the impact of population growth in a pension scheme such as the SSO. The effect of an increase in the labour force participation rate or in the coverage rate in the coming years is not going to last forever. It will be good in the short and medium terms, but in the long term there will be few changes. This situation is shown in table 4.7. But continual increases in fertility rates or the number of migrants can affect the scheme forever, all other parameters being equal. The cost can be lower in the long run. However, modifications to the scheme are still needed in the future to make the scheme more sustainable.

Table 4.7. Sensitivity analysis, population growth

Scenarios	GAP (%)	PAYG 2113 (%)	Year reserve = 0
Base	21.1	32.1	2054
Low population	22.8	39.9	2054
High population	19.5	27.4	2055

4.2.3. Growth of the covered population

A sensitivity analysis has been undertaken to show the financial impact of a change in the covered population. In the base scenario the ratio of covered population over the employed population increases from 29 per cent at the beginning to around 50 per cent 40 years later. The two scenarios are the following:

- High coverage growth: the coverage rate 40 years later is 70 per cent instead of 50 percent.
- Low coverage growth: the coverage rate 40 years later is 36 per cent instead of 50 percent.

As was mentioned in the previous section, the impact is higher in the short and medium term but is lower in the very long term. In fact, the difference between the PAYG rates in 2113 for all three scenarios is not material (see table 4.8).

Table 4.8. Sensitivity analysis, growth in insured population coverage

Scenarios	GAP (%)	PAYG 2113 (%)	Year reserve = 0
Base	21.1	32.1	2054
Low	21.6	32.1	2053
High	20.3	31.9	2057

4.2.4. Mortality rates

In the base scenario, the mortality rates have been adjusted to take into account the fact that the insured population is supposed to have a higher life expectancy than the general population. This is usually the case for social pension schemes in other countries. It is important to bear in mind that there is much uncertainty regarding this assumption, and that no experience currently exists to analyse and compare the mortality of old-age pensioners with the mortality of the general population. The next two scenarios show the impact on the projection of having higher or lower mortality rates:

- Low mortality scenario: it is assumed that the mortality rates of the insured population are the same as in the general population.
- High mortality scenario: In the base scenario, the adjustments to the mortality rates decrease with age. In this scenario it is assumed that they are constant.

Table 4.9 summarizes the life expectancy at age 55 used in each scenario.

Table 4.9. Life expectancy at age 55, male and female, 2014

Scenarios	Male	Female
Base	25.4	28.4
Low mortality rates	28.2	31.0
High mortality rates	23.7	26.9

Table 4.10 shows that the mortality rate can considerably affect the contribution rate.

Table 4.10. Sensitivity analysis, mortality rates

Scenarios	GAP (%)	PAYG 2113 (%)	Year reserve = 0
Base	21.1	32.1	2054
Low mortality rates	22.1	34.0	2054
High mortality rates	20.3	31.1	2055

4.2.5. Average salary increase

Very often in pension plans, pensions are indexed annually according to the increase in inflation, while salaries increase faster − according to inflation plus a productivity component. The fact that the annual increase in salaries is higher than the pension adjustment has the effect of lower PAYG costs in the future. Contributions increase more rapidly than the average amount of benefits. It is not stipulated in the legislation that pensions in payment are adjusted annually according to inflation, but this is the assumption made in this actuarial valuation. In the base scenario, it is expected that in the long run increases in the average salary will be 3 per cent higher than the inflation rate. A sensitivity analysis has been produced to show the financial impact of an increase in real salaries that is 1.0 per cent higher or lower than the base scenario. Table 4.11 shows the results.

Table 4.11. Sensitivity analysis, salary increase

Scenarios	GAP (%)	PAYG 2113 (%)	Year reserve = 0
Base	21.1	32.1	2054
+1.0%	20.6	27.6	2054
-1.0%	21.0	37.8	2055

4.2.6. Inflation rate

A sensitivity analysis has been undertaken to show the financial impact of an increase in inflation that is 1.0 per cent higher or lower than the base scenario. Table 4.12 shows the results.

Table 4.12. Sensitivity analysis, inflation rate

Scenarios	GAP (%)	PAYG 2113 (%)	Year reserve = 0
Base	21.1	32.1	2054
Low	21.6	32.9	2054
High	20.6	31.4	2055

4.2.7. Adjustment to pensions in payment

A sensitivity analysis has been undertaken to show the financial impact of increasing pensions in payment at a lower or higher rhythm than in the base scenario (see table 4.13). In the base scenario, it is presumed that pensions in payment are adjusted each year according to inflation. Such increases are important for keeping confidence in the scheme. The scheme should play a role in protecting the purchasing power of individuals. The two scenarios are the following:

- Low adjustment of pensions in payment: instead of adjusting at 100 per cent of the inflation rate, this scenario adjusts at 50 per cent;
- High adjustment of pensions in payment: in this scenario, pensions are adjusted annually according to inflation + half the real salary increase.

Table 4.13. Sensitivity analysis, adjustment to pensions in payment

Scenarios	GAP (%)	PAYG 2113 (%)	Year reserve = 0
Base	21.1	32.1	2054
Low	17.8	26.5	2057
High	25.3	39.7	2052

4.2.8. Delay in the retirement age

A sensitivity analysis has been produced to show the financial impact of delaying the retirement age (see table 4.14). In the base scenario, it is presumed that individuals take their pensions at around 57 years of age. In the sensitivity analysis, an assumption is made that people delay their retirement by about five years.

Table 4.14. Sensitivity analysis, delaying the retirement age

Scenarios	GAP (%)	PAYG 2113 (%)	Year reserve = 0
Base	21.1	32.1	2054
Delay	19.5	28.2	2062

4.2.9. Accumulating a reserve at the end of the projection period

A sensitivity analysis has been produced to show the increase in the contribution rate if different levels of reserve ratio are targeted at the end of the projection period (in 100 years). Only the base scenario is considered in this test. Table 4.15 shows different combinations of the GAP and reserve ratio.

Table 4.15. Sensitivity analysis, targeted reserve ratio in 100 years

Scenarios	GAP (%)	Reserve ratio in 2113
Base	20.0	0
Base	21.1	1.4
Base	21.6	3.0
Base	22.3	5.0
High	24.1	10.0

5. Reform options and other issues

5.1. Old-age benefits in an ageing society

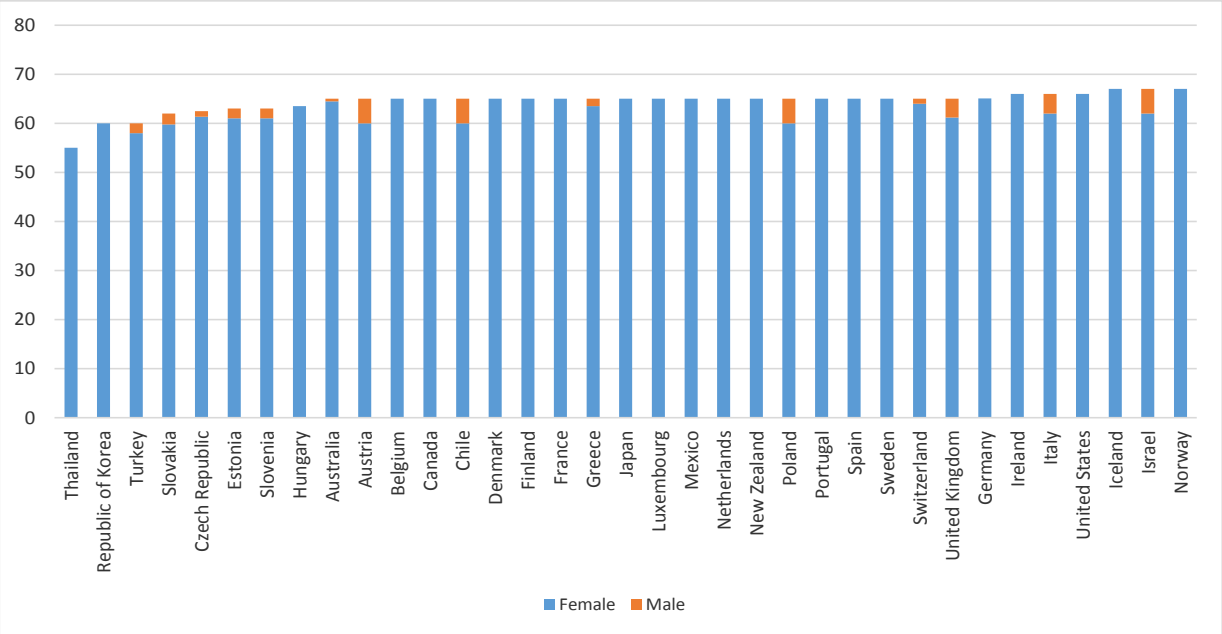
Thai society is going to age, just as many other societies have done or are going to do. The speed and magnitude of such changes, however, vary from one society to another. Even though the old-age pension system in Thailand is far from its maturity stage, potential problems or pressures are foreseeable. Because the scheme is partially funded, low fertility rates in Thailand as well as low migration, combined with increased life expectancy, will drive the future cost of the pension system. In the pension field, the longer the delay in implementing solutions (in the shape of reforms) the more drastic reform measures have to be in the future. Because the pension system is relatively young in Thailand, there is still room to solve the challenges with less drastic measures. There are however no magic tools. To decrease the pressure, the only options are: implementing changes on the contributions side, and/or modifying the benefits side, and/or optimizing the system.

5.1.1. Increase in the retirement age

While the retirement age of some neighbouring countries is similar to Thailand (age 55 for Indonesia and Malaysia; 55 for women and 60 for men in Mongolia and Viet Nam) the current retirement age in force in Thailand is very low compared to the OECD average and to some other countries in Asia. In the Philippines, one can retire at age 60 if one stops working. In the Republic of Korea, an increase in the retirement age has begun and will reach age 65 by 2034. In Indonesia, a new defined benefits pension scheme has been implemented since July 2015, whereby an increase in the retirement age is scheduled from 56 to 65 over three decades.

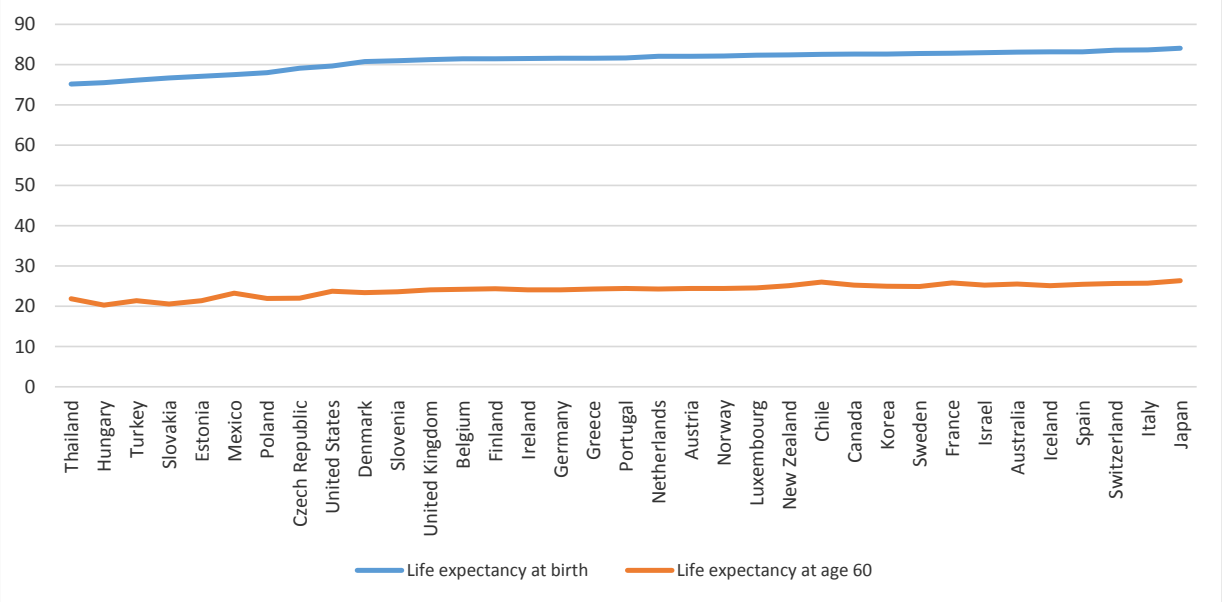
The average retirement age of OECD countries is 64, nine years higher than in Thailand (see figure 5.1). For a better comparison, life expectancy also needs to be taken into account. Life expectancy at birth is at around 81 years on average in OECD countries while in Thailand it is 75 years, a difference of six years. Life expectancy at age 60 provides a more accurate indicator in this respect. The average life expectancy at age 60 is 24 years for OECD countries while in Thailand it is about 22 years, a difference of only two years (see figure 5.2).

Figure 5.1. Retirement age, OECD countries and Thailand



Source: OECD, 2012.

Figure 5.2. Life expectancy at birth and at age 60, OECD countries and Thailand



Note: Life expectancy 50% male and 50% female.

Source: UN DESA, *World Population Prospects 2015*.

The current retirement age in Thailand is thus low compared to other countries. Even if the life expectancy at age 60 in Thailand is slightly lower than in OECD countries, an increase in retirement age can be considered as a way to decrease the financial pressure in the long run. Such increase should normally be planned over a long enough period so as not to affect the current population which is close to retirement. An increase in retirement age is inevitable. The longer the period over which it is planned, the better it is for society.

A sensitivity analysis has been performed showing an increase in the retirement age to age 65 planned over the next 50 years. Under this scenario the retirement age will move by one year every five years. Over that period of 50 years, according to the base scenario, life expectancy at birth is expected to increase by about nine years for males and six years for females. Of course, discussions between stakeholders can conclude a different schedule of retirement age increase. Table 5.1 summarizes the effect of an increase in the retirement age and shows how important the impact of such an increase can be on the scheme.

Table 5.1. Sensitivity analysis, increase in the retirement age from 55 to 65 over 50 years

Scenarios	GAP (%)	PAYG 2113 (%)	Year reserve = 0
Base	21.1	32.1	2054
Increase in retirement age	16.2	26.3	2063

Note: No modifications to the labour force participation rate or coverage rate have been made in this scenario. The goal is to see the impact on an increase in retirement age only.

A modification in the retirement age can also be accompanied by the application of early retirement reduction factors based on actuarial equivalence. This can be done, for example, when the normal retirement age attains age 60. At that point, and even if the normal retirement age is still increasing above age 60, people will be allowed to take their retirement at 60. Their pensions will however be decreased by a proportion based on the early retirement age factor. This will create more equity in the system between those who retire early and those who retire at higher ages.

5.1.2. Increase in the contribution rate

It is impossible to expect that the contribution rate for the old-age pension branch will stay at such a low level. To receive pension benefits at 50 per cent of the last five years of average salary with a contribution rate of 6.4 per cent would be a bargain. Pension benefits with this level of income replacement can, through individual investments, only be achieved with contribution rates as high as 20−25 per cent, depending on the return on invested assets. The contribution rate of 6.4 per cent is a bargain that future generations will have to pay for, if current generations refuse to accept an increase in contribution rates.

One way to decrease the financial pressure for future generations and to address the looming ageing problems is to start increasing the contribution rate in the next few years. The PAYG rate for the old-age pension branch is currently very low. It is time to accumulate assets and invest them with a long-term view.

The effect of increasing the contribution rate has been modelled according to four scenarios. These demonstrate that there is no unique solution to the problem.

1) Base scenario: increasing the contribution rate by 2 per cent every five years starting in 2018. In this scenario, the contribution rate stops increasing in 2048 to remain at 18.4 per cent. The reserve ratio in this scenario reaches zero in 2089.

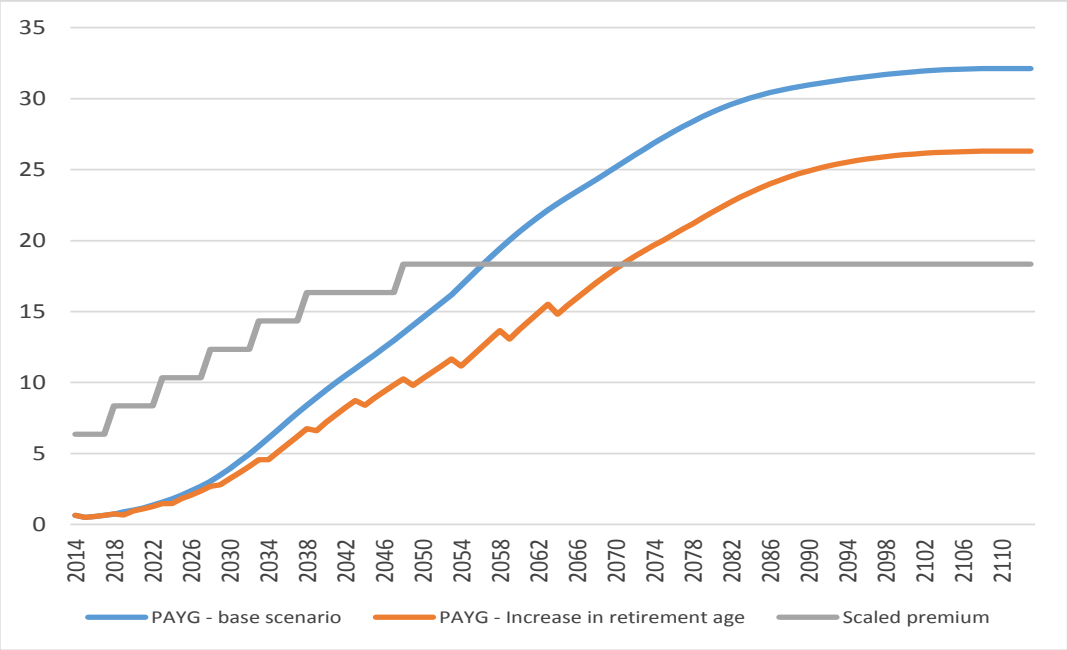
2) Same increase in the contribution rate as in the base scenario, but the assumption related to the return on investment is 1.0 per cent higher. In this scenario, the ultimate contribution rate is 18.4 per cent and the reserve ratio becomes 0 in 2102.

3) Same increase in the contribution rate as in the base scenario, with an increase in the retirement age to 65 during the first 50 years of projection. The ultimate contribution rate is 18.4 per cent and the reserve ratio is around 5 at the end of the projection period.

4) This scenario combines all the three preceding ones: Same increase in the contribution rate as in the base scenario; the assumption related to the return on investment is 1.0 per cent higher and the retirement age is increased to age 65 during the first 50 years of projection. The ultimate contribution rate is 18.4 per cent and the reserve ratio is around 18 at the end of the projection period.

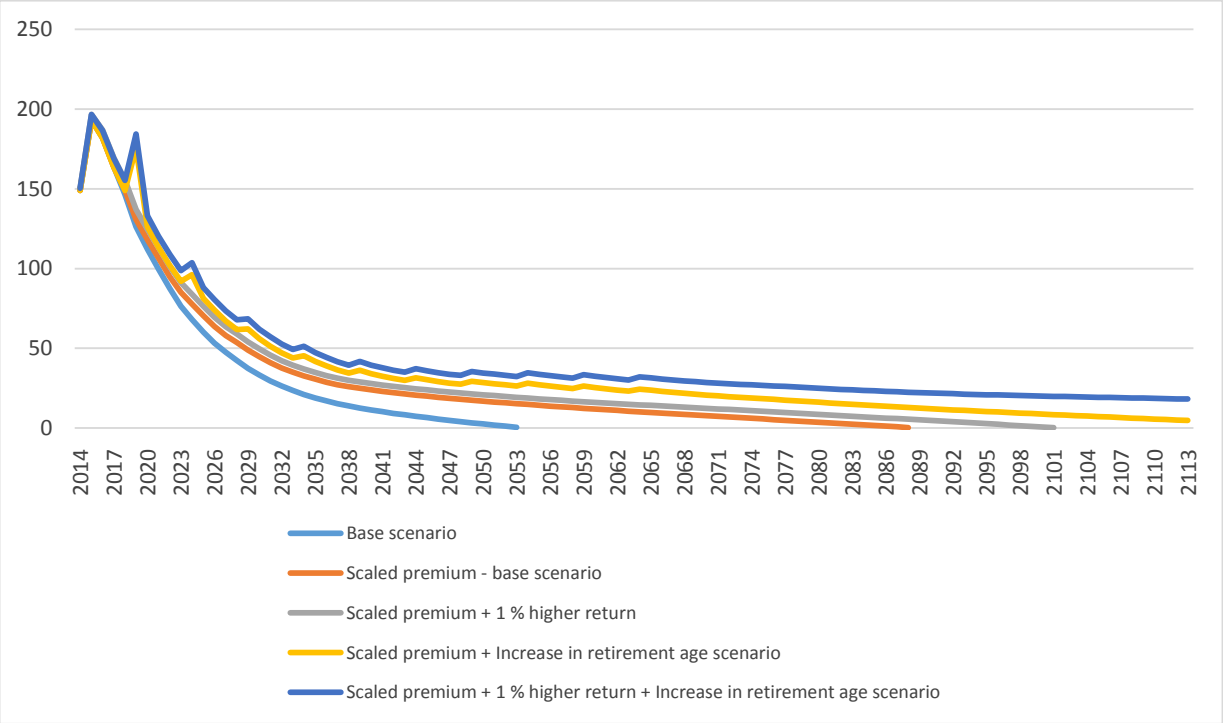
The examples shown in figures 5.3 and 5.4 show the importance of adopting a funding policy for the scheme where all aspects of the pension plan are taken into account: investments, financing, funding objectives and modifications to the benefits.

Figure 5.3. Scenarios of contribution rate increases (percentages)



These scenarios illustrate that the sooner an increase in the contribution rate takes place, the better it is for future generations. If the increase is accompanied with modifications to the benefits and with modifications in the investment policy to better reflect long-term objectives, it will be beneficial to future generations.

Figure 5.4. Scenarios of contribution rate increases combined with modifications to investments and the retirement age, showing levels of the reserve ratio



There are infinite combinations of contribution rate increases, increases in retirement age and modifications to the investment policy. It is in the hands of the stakeholders to design the most appropriate mix.

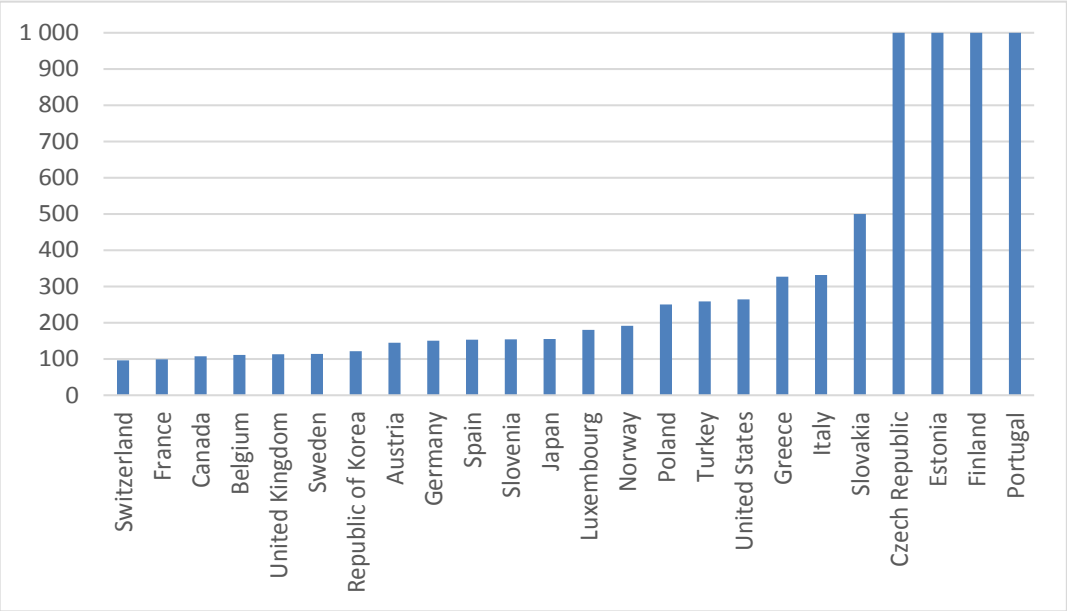
The choice of the financing strategy will considerably affect the amount of assets held in the fund. When implementing a schedule of contribution rate increases, it will therefore be important to answer crucial questions, such as: What is the maximum level of assets that can be efficiently and gainfully invested? What amount of assets is sociably acceptable? What is the maximum contribution rate that a society can afford? Answering these questions will help in implementing a contribution schedule that will meet the objectives and constraints.

5.2. Minimum and maximum earnings

Minimum and maximum insurable earnings were established in Thailand in the 1990s and have remained unchanged since. Their monthly amounts are THB 1,650 and 15,000 respectively. In the database provided for the actuarial valuation, few people have insurable earnings as low as the minimum; while the minimum wage is so close to zero as to play no part in the scheme. In 2012−13, a new minimum wage of THB 300 per day was adopted in Thailand. If it is assumed that people work five days a week, this gives a minimum wage of about THB 6,500 per month (or THB 5,200 per month for four days a week). The current minimum insurable earnings of THB 1,650 is thus much lower than the new minimum monthly wage and there is therefore no need for such low minimum insurable earnings at the SSO. Depending on the number of days used in the calculation, a basis of THB 4,800 per month for those under Article 39 is more in line with the new minimum wage.

Regarding maximum contributory earnings, there is no universal rule, as shown in figure 5.5.

Figure 5.5. Ceilings on pensionable earnings (% of average earnings), public scheme, selected countries



Note: for illustrative purposes only, countries where there is no maximum have been attributed the value of 1,000.
Source: OECD: Pensions at a glance: OECD and G20 indicators (Paris, 2013):

Average monthly earnings can be summarized from the database of the actuarial valuation (table 5.2).

Table 5.2. Average monthly earnings, with and without the ceiling on maximum insurable earnings, 2013

	Average salary	Ratio ceiling / average salary (%)
With ceiling	9 422	159
Without ceiling	12 700	118

If the situation of the SSO is compared to that prevailing in a sampling of other countries, it is observed that the SSO is on the lower side of the distribution regarding the ratio of maximum insurable earnings to average earnings. For countries that have a maximum, the ceiling is about 190 per cent of the average salary, while for the SSO it is estimated at 118 per cent.

Table 5.3 shows the impact of raising the monthly ceiling from THB 15,000 to 20,000. The effect is not really material and would not affect the sustainability of the scheme.

Table 5.3. Sensitivity analysis, increase in the ceiling to THB 20,000 at the beginning of the projection period

Scenarios	GAP (%)	PAYG 2113 (%)	Year reserve = 0
Base	21.1	32.1	2054
Increase in the ceiling	21.2	32.3	2053

Increasing the ceiling can also affect the contribution rate for those benefits not related to earnings. This is the case for health benefits: if monthly maximum insurable earnings are increased from THB 15,000 to 20,000, the contribution rate related to health care benefits (sickness in kind, see section 3.1.3) falls from 2.8 to 2.64 per cent.

One thing is certain with regard to the ceiling level: it should be adjusted each year according to an index; it cannot remain at the same level over a long period without adjustment. Usually, maximum insurable earnings should be adjusted annually relative to the increase in the average salary. Without such adjustment, the social security system can lose support and trust. It is therefore recommended to adjust the ceiling each year according to the increase in the average wage.

5.3. Adequacy of pension formula

5.3.1. The pension formula

Old-age and disability benefits in Thailand are in line with the minimum standards set by the ILO Social Security (Minimum Standards) Convention, 1952 (No. 102) with respect to type of coverage, eligibility conditions and duration of benefits (see table 5.4). For example, under Convention No. 102 the minimum replacement rate for old age is 40 per cent for 30 years of contributions. For the SSO, 30 years of contributions will lead to a replacement rate of 42.5 per cent, while for disability benefits the income replacement rate is 50 per cent if the insured has contributed for at least three months during the last 15 months. There is, however, no compliance with the ILO standard concerning survivors' benefit: no pensions are payable to survivors (spouse or children) in case of death of the breadwinner; only lump sums are payable.

Table 5.4. ILO Convention No. 102, minimum standards for old-age, disability and survivors' benefits

Type of benefit	Income replacement level (%)	Condition of eligibility	Duration of benefit
Old age	40	30 years	Lifetime
Disability	40	15 years	Lifetime or until old-age pension is paid
Survivors	40	15 years	Lifetime

Table 5.5 presents a sensitivity analysis on the impact on the contribution rate of the pension branch if a survivors' pension satisfying ILO Convention No. 102 is introduced. In this analysis, survivors – defined as widows/widowers and orphan of insured persons and pensioners − receive a pension if the deceased has 15 years of contributions If the insured does not satisfy the eligibility condition, a funeral benefit is paid.

Table 5.5. Sensitivity analysis, introduction of a survivors' pension

Scenarios	GAP (%)	PAYG 2113 (%)	Year reserve = 0
Base	21.1	32.1	2054
Introduction of survivors' pension	22.3	34.0	2053

It is not the goal of this report to present a global reform of the pension system. Many studies have analysed the Thai pension system and proposed solutions. However, in the preparation of this actuarial report, the analysis of the pension system has shown that some improvements can be made:

- New old-age pensioners entering retirement receive very low pension amounts because they have accumulated only a few years of service. It is possible to design a "grandfathering" provision that would not jeopardize the scheme. In a sensitivity test undertaken on a hypothetical grandfathering provision, free years of service are credited to members who are contributing to the scheme on the actuarial valuation date: 12 additional years of service for those at and above the pensionable age (55), 11.5 years of service for those aged 54, 11 years of service for those aged 53, and so on. Under this sensitivity analysis, the GAP over the period increases from 21.1 to 21.6 per cent. This illustrates that it is possible to give better pension benefits to new pensioners, in recognition of the fact that they have not had the opportunity to contribute during their whole working life. Of course, this improvement can be combined with measures to decrease future pressures on the scheme. The grandfathering provision can be assorted with various eligibility conditions. For example, people should have contributed to the scheme over a given number of years of service to be eligible for the grandfathering provision. Increasing the level of the minimum pension can also play a role in giving better pensions to current new pensioners.

- There is no automatic adjustment to pensions in payment to cope with the increase in the cost of living. With old-age pensions beginning to be paid, this important missing feature of a well-designed pension system can impoverish people on retirement and make them lose confidence to the system.

- Minimum universal old-age protection has been introduced in December 2013. Everyone is eligible to receive the Non-contributory Social Allowance (the elderly of 60−69 years of age now receive a monthly allowance of THB 600; those aged 70−79 receive a monthly allowance of THB 700; those aged 80−89 receive a monthly allowance of THB 800; and those 90 years old and older receive THB 1,000 per month). These amounts should be adjusted each year according to at least the inflation rate.

- The structure of the Thai pension system is complex. In 2011, modifications were introduced to give workers in the informal sector the opportunity to contribute to two old-age options: the old-age lump sum and the old-age pension (the defined contribution (DC) plan with a pension on retirement). It has been recently decided to transfer the pension part of Article 40 to the National Saving Fund (NSF), giving them the authority to collect contributions and pay benefits. In 2014, about 570,000 people have contributed to the lump sum old-age benefit and 845,000 to the pension benefit under this voluntary system. The coming years will be crucial for the success of these new benefits, given the performance difficulties of the voluntary system. The transfer to the NSF will probably decrease the complexity of the system but does not guarantee its success. Implementing an optimal system where fees are low and the return on investment maximized, and putting in place better education of individuals, are going to be the key to its success.

- The pension system in Thailand does not recognize the fact that during their working life people can contribute according to Articles 33, 39 or 40, or to the government pension scheme, or to the National Saving Fund. On retirement, this lack of integration in the system can affect the income of individuals in old age. There is no portability from one scheme to another.

- The old-age pension is based on the last five years of salary. This can create an undesirable effect. The case of a salaried worker who has earned the average salary during his working life and has contributed under Article 33 can be taken as an illustration. During the last five years of work he has worked as self-employed and has contributed under Article 39. The last five years of salary used in the pension

formula are those declared under Article 39, but are lower than the earnings declared under Article 33. This is an inequitable situation, decreasing the worker's level of pension. A career-indexed pension plan would better address this kind of situation. In a career-indexed pension plan, the pension is based on all the salaries that have been declared throughout the working life of the members. The salary declared each year is also adjusted to the increase in the average salary from the moment it has been earned to the retirement age. An analysis of the magnitude of such conditions could be undertaken.

5.3.2. Minimum pension

The current minimum pension of THB 720 has been established according to the following formula:

- 300 x 12 x 20%
  - Where:
    - 300 is the minimum salary by day;
    - 12 is an assumed number of days worked during a month;
    - 20% is the minimum income replacement rate for someone having contributing 15 years to the scheme.

To establish a minimum pension, many things have to be taken into account:

- **The role of a minimum pension**. Normally, a minimum pension has a role of redistributing wealth among members. Those who have an uneven career, who were not able to save enough for retirement, can take advantage of a minimum income level. The minimum pension should consequently mean something to the people and play a certain role. The statistics forwarded for this actuarial valuation, however, do not bear this out: of those who retired in 2014, only 180 out of 24,084 were receiving the minimum pension. Less than 1 per cent of the population took advantage of the minimum pension.

- **Integration of the system.** It is important when designing a portion of the system to take the whole system into account. Consistency between each part of a system is very important and should be part of the objectives. Benefits provided by the SSO, combined with other benefits of the system, should be adequate to reach the target.

- **The poverty level in the country**. In 2011, the poverty line was THB 2,422 per month. Taking into account the inflation rate between 2011 and 2015, the poverty line is estimated to be about THB 2,650 in 2015. One of the goals of a minimum pension is to prevent poverty, and there should therefore be a link between the minimum pension and the poverty level. Currently, the minimum pension combined with the universal Non-contributory Social Allowance is around 50 per cent of the estimated poverty line. A higher level can be reached by either modifying the minimum pension of the SSO or increasing the social pension.

- **The state of the system**. Today, people arriving at retirement have only a few years of contributions. The minimum pension can play a more important role in assisting the transition between the current stage of the system and its maturity.

Table 5.6 shows the estimated impact of providing a minimum pension of THB 1,500 month, rather than THB 720. Despite more than doubling the minimum pension, the cost

on the scheme is not high. It should be borne in mind that the impact is rather difficult to evaluate due to the interaction of contributions made under both Articles 33 and 39.

Table 5.6. Sensitivity analysis, introduction of a higher minimum pension

Scenarios	GAP (%)	PAYG 2113 (%)	Year reserve = 0
Base	21.1	32.1	2054
Minimum pension at THB 1,500	21.7	33.1	2054

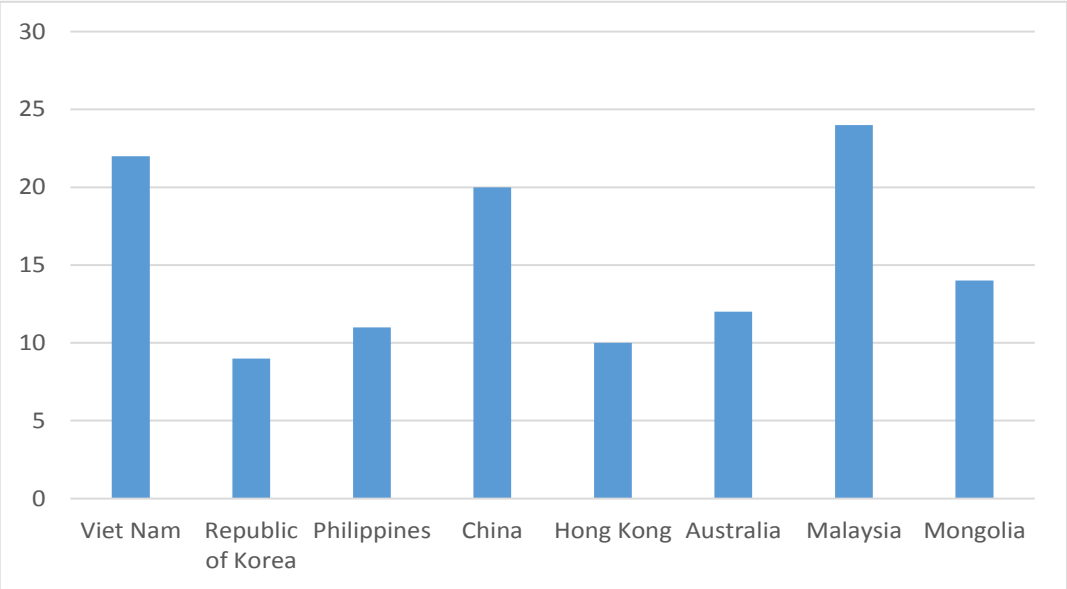
5.3.3. Solutions from other countries

During the mission undertaken for this actuarial valuation, it was requested to take the opportunity to discuss solutions that other countries have recently adopted to solve their problems associated with an ageing population, and more specifically the introduction of long-term care benefits. However, since there is currently a project being carried out by the ILO and other partners on long-term care and that the results have not yet been released, long-term care benefits are not discussed in this report.

There is no magic trick to solve the ageing problems of a society. Money should be available when there are needs, when there are more retired people compared to the size of the economy and the society is truly ageing. For the majority of people, it is difficult to understand that the actions taken today will be beneficial to the society of tomorrow. And tomorrow, in pension terms, can be as far away as in 40 years' time. There is need to start planning future contribution rate increases as well as an increase in the retirement age. As only a few pensions are currently paid, understanding of the importance of a well-functioning pension system is low. Educating the general public is therefore very important.

As previously discussed, many countries have higher retirement ages than in Thailand. Many countries, too, have opted to increase the retirement age in order to decrease the coming pressure on their pension system. It is also notable to see that Thailand has a contribution rate for its pension system that is very low compared to other countries, as shown in figure 5.6. More funds could be devoted to pensions.

Figure 5.6. Contribution rates, selected countries



Source: ILO: *Social security throughout the world* (Geneva, 2014).

5.4. Migrant workers [6]

Some migrant workers are covered by the SSO. If a migrant complies with the Alien Working Act or with the Memorandum of Understanding (MOU) and is an employee in the formal sector in an enterprise with more than one employee, he/she is legally covered. If migrants are registered they are insured under the Compulsory Migrant Health Insurance, where for a contribution of THB 1,900 they are entitled to health check-ups and insurance.

Problems encountered by migrants include the following:

- Undocumented migrants do not have access to social security protection.
- Even if they have coverage, they encounter difficulties in fully accessing benefits due to:
  - limited compliance with the law by employers; and
  - the fact that they have to leave the country within seven days after losing their job, making it difficult to go through the process of declaring their new status as unemployed to the Department of Employment and the Social Security Office. It is however difficult to claim unemployment benefit and even retirement benefit. The Department of Employment only accepts applications from Thai citizens, excluding therefore all migrant workers.

The Social Protection Assessment Based National Dialogue (ABND) exercise undertaken in Thailand in 2013 has recommended a review of social security coverage for migrant workers and to ensure that they receive the benefits for which they pay under SSA Article 33.

Solving the problems of migrants passes in part through modifications to the administrative system, to the enforcement on employers to pay the contributions, and the elimination of conditions that make it difficult to claim benefits.

Another question could also be raised: Do migrants need a separate benefit package to cover their needs? The system is already very complex and fragmented. Creating another benefit package may increase complexity and problems. As soon as they are covered by the Social Security Act, migrants should pay the same contribution rate as nationals and should be entitled to the same protection.

[6] Much information in this section comes from the Social Protection Assessment Based National Dialogue (ABND) exercise undertaken in Thailand in 2013.

6. Conclusion

This actuarial valuation of the Social Security Office of Thailand was carried out as at 31 December 2013. The methodology used for the pension branch is based on a model developed by the ILO for reviewing the long-term actuarial and financial status of national pension schemes. The model has been adjusted to fit the particular situation of the SSO. The data related to the SSO (contributors, beneficiaries, financial statements) and those related to the general population and labour force used in this actuarial valuation are complete and of good quality. The data concerning the health benefits is not complete but this does not affect the conclusions of this actuarial valuation.

An actuarial valuation requires many assumptions. These assumptions are adequate individually and coherent as a whole. They are established on a best-estimate basis and are selected to reflect long-term trends rather than giving undue weight to recent experience. It is not the objective of pension projections to forecast the exact development of the scheme's income and expenditures, but to verify its financial viability.

The social security system in Thailand is quite comprehensive, and is universal in the sense that those who are not able to qualify for a pension can receive assistance payments. This system should be preserved.

The actuarial valuation analysed each benefit separately, and an explicit contribution rate has been assessed for each branch, namely (1) the four benefits type (sickness, maternity, invalidity, death / funeral); (2) unemployment benefit; and (3) the two benefits type (old-age pension, child allowance).

This actuarial valuation of the SSO was carried out as of 31 December 2013 based on the ILO projection methodology which takes into account demographic, macroeconomic and labour market frames. The ILO's generic pension model was fine-tuned to carry out long-term demographic and financial projections of old-age pensions and lump-sum disability benefits.

(1) The four benefits type branch

All these benefits (except for disability) are short-term benefits. The pay-as-you-go (PAYG) cost rate, as a contribution rate to annually meet expenditure through contributions only, with additional small margins for accumulating contingency reserves, has been estimated. As for the disability benefits, the general average premium (GAP) for the projection between 2014 and 2110 has been assessed by taking into account the benefit nature of gradual and steady cost increases over the long term.

Table 6.1 summarizes the assessed contribution rate for each benefit of the four benefits type branch.

Table 6.1. Contribution rates for the four benefits type branch

	Contribution rate*
Maternity	0.66
Sickness (cash and in kind)	2.80
Disability	0.26
Funeral	0.21
Administrative and other expenditure	0.30
Total	4.23
Recommended contribution rate	4.25

* The contribution rate excludes the planned inclusion of promotion and prevention benefits.

The current contribution rate of 4.5 per cent for the four benefits type branch is assessed as adequate for the next five years. The planned introduction of promotion and prevention benefits will increase the cost and needs to be analysed once a more concrete design of the new benefits becomes available. It should be noted that the contribution rate required for health care depends on the capitation amount which has been and will be negotiated between the SSO and various health service providers.

(2) Unemployment benefits

The current contribution rate of 1.25 per cent for the unemployment benefits branch is substantially higher than the required contribution rate of 0.55 per cent, including administration costs. However, it is important to bear in mind that the required contribution rate of 0.55 per cent has been assessed by relying on experiences of the period between 2009 and 2013 when the unemployment rate considerably deceased from 1.5 to 0.7 per cent.

In order to have margins for economic downturns, it is recommended to decrease the contribution rate of the unemployment branch to 0.75 per cent and to transfer the 0.5 per cent to the two benefits type branch, which includes old-age pensions.

(3) The two benefits type branch

The two benefits type branch is comprised of child allowances and old-age pensions.

Child allowances. The assessed PAYG cost rate for child allowances, taking into account cost increases due to the change in the maximum number of children from two to three, is 0.55 per cent. The recommended contribution rate for child allowance benefit is 0.65 per cent, arrived at by adding the administrative cost of 0.1 per cent.

Old-age pensions. Old-age pensions began to be paid in 2014 and are projected to gradually and steadily increase in the future. The status-quo projections show that:

1) Contributions will be sufficient to meet all annual expenditures until the year 2034.

2) From 2035 to 2042, investment returns in addition to contributions will be used to meet annual expenditures. As a result, the amount of reserve will still grow but at a slower pace.

3) From the year 2043 onwards, the total income of the scheme will no longer meet annual expenditures and the amount of reserves will start to decrease.

4) In the year 2054, the reserve will be depleted.

5) After the depletion of the reserve in 2054, the required contribution rate will be the PAYG cost rate, for example, 16.8 per cent in 2054 and 32.1 per cent in 2113.

6) The general average premium (GAP), namely a flat contribution rate to balance the financing of the status-quo scheme for the whole projection period of 100 years from 2014 to 2113, is estimated at 21.1 per cent, which is substantially higher than the current contribution rate allocated to old-age pensions.

As seen in many other countries, gradual reforms of the pension scheme are unavoidable. Reforms include, as major elements, gradual increases in the pensionable age as well as the contribution rate. The main recommendations of this actuarial valuation include the following:

Recommendation 1: Increase in the pensionable age

It is necessary to gradually increase the current retirement age of 55. This will contribute to make the scheme financially sustainable in the long run. Pensionable age increases should be planned over a long period in the future so that the Government can formulate labour market policies and that workers, especially those near retirement, as well as employers, can have ample time to prepare for changes.

Recommendation 2: Increase in the contribution rate

It is recommended that the contribution rate of the pension branch should be gradually increased in phases. The excess contribution rate of 0.5 per cent of the unemployment benefit branch can be allocated to the pension branch.

Recommendation 3: A combined reform

As shown in section 5.1.2 of this actuarial valuation report, the financial sustainability of the old-age pension scheme can be maintained through the combination of several reforms. These include: (1) increase of the contribution rate by 2 per cent every five years from the year 2018; (2) increase of the pensionable age by one year every five years till it reaches 65; and (3) 1 per cent higher rate of return on investment due to more efficient investment management. It is therefore recommended to start an increase of the contribution rate by 2 per cent in 2018. This is a net 1.5 per cent contribution rate increase, provided that 0.5 per cent is transferred from the unemployment benefit branch.

Recommendation 4: Adoption of a financing and investment policy

No formal financing policy of the old-age pension branch exists at present. Such a policy would trigger necessary reforms, such as the pensionable age as well as the contribution rate increases in the future. It is therefore recommended that the SSO should adopt a financing and funding policy in order to:

(a) formalize the long-term funding objectives of the scheme: for example, targeting an appropriate level of reserve over the long term. This objective will be a major driver of the contribution rate increase and/or major scheme design reforms such as the pensionable age increase;

(b) better understand the risks and advantages of financing options;

(c) ensure that scheme reserves and future contributions are sufficient to deliver the promised benefits; and

(d) enhance scheme governance and increase transparency.

A financing policy should address the interests of stakeholders, namely:

- current as well as former scheme members as beneficiaries and contributors;
- employers as one of the main funders of the pension system; and

- the Government.

The financing policy usually specifies such elements as:

- contribution rates
- risks faced by the scheme and how these risks can be managed
- risk tolerance
- allocation of risks among members and employers
- funding objectives, such as contribution rate stability expressed as expected frequencies and the level of contribution rate increases and the ultimate contribution rate, and a targeted level of reserve
- frequency of actuarial valuations
- methods of actuarial projections, including actuarial assumptions and parameters of the scheme
- funding methods
- goals related to intergenerational equity
- all other funding issues

It is recommended that the SSO should hold discussions with stakeholders on the possibility of implementing a written financing policy, which will need to be periodically reviewed in the future in order to tackle future changes in the socio-economic environment.

The financing policy should be closely linked to the investment policy. The investment policy should take into account the result of the actuarial valuation and the clearly mention financial risk that the scheme will face. A specific and different investment policy should be adopted for each benefit branch. For the pension branch, the investment policy should reflect the long-term nature of the branch and hence the majority of the assets should be invested in long-term assets in order to obtain better and more stable investment returns in the long run. Investing a greater proportion in foreign investments should be also considered for the pension branch.

Other recommendations

- It is recommended to allocate administrative and other expenditures to each branch to assess the administrative efficiency of each branch.
- It is recommended to have a common long-term benefit branch for disability benefits and old-age pensions. It is recommended that child allowance should be merged with short-term benefits, namely maternity, sickness and funeral benefits.
- It is recommended to increase the pension amount in payment each year in line with inflation. It is recommended to adjust the amount of the maximum insurable earnings each year in line with the average salary increase.
- It is recommended to use a revalorized career-average salary for calculating a newly-awarded pension, instead of the current five-year simple average salary.

- It is recommended to implement a survivors' pension to better protect the family of a deceased contributor or pensioner.

- It is recommended to specify either in the Social Security Act or in the regulations that periodic actuarial valuations should be carried out. It is important that a frequency of actuarial valuations should be clearly stated, in such a form as: "at least once every three years and on top of a periodic requirement at any time major changes and reforms of the scheme are planned and implemented".

Appendix 1

Summary of contribution and benefit provisions

General provisions	
Membership	Employees in non-agricultural enterprises aged between 15 and 60 years are covered. Every employer who has at least one employee must register their employee(s) under the scheme. Regular migrant workers are also covered. An employee who has been registered before age 60 can be covered past age 60 years old. No new insured can be registered past 60. There are exceptions: ■ public officials, permanent employees, daily temporary employees and hourly temporary employees of Central Administration, Provincial Administration and Local Administration but excluding monthly temporary employees; ■ employees of foreign government or international organizations; ■ employees of employers who have offices in the country and are stationed abroad; ■ teachers or headmasters of private schools under the law on private school; ■ students, nurse students, undergraduates or interning physicians who are employees of schools, universities or hospitals; ■ other activities or employees as may be specified by royal decree; and ■ domestic workers. According to the amended SSA (No. 4, 2015) to be fully implemented on 20 October 2015, the following groups are no longer excluded: employees of employers who have offices in the country and are stationed abroad. An employee aged over 60 may continue to contribute to the scheme provided he/she has been continuously an employee before age 60. A person can on a voluntary (Article 39) basis opt to be an insured provided she/he has been covered for a period not less than 12 months and has ceased to be an employee. There is no coverage for unemployment benefits for people enrolled on a voluntary basis. Membership ceases in case of: ■ death; ■ resignation of coverage by the insured employee; ■ failure to pay required contributions; or ■ becoming an insured person under Article 33. When a person ceases to be employee, the coverage for injury and sickness benefits, maternity benefits, invalidity benefits and death benefits continue for a period of 6 months (may be extended up to 12 months by Royal Decree). Any person not insured can apply to be insured under Article 40. Such persons enjoy a different benefit package.

Contributions income	Minimum contribution = minimum wage (THB 1,650/month) times contribution rate. Maximum contribution = maximum wage (THB 15,000/month) times contribution rate. \ For those voluntarily insured under Article 39, the contribution is a percentage of the reference salary set at THB 4,800 per month. For those insured under Article 40, the contribution is a flat rate amount (THB 100−150 /month depending on the package). The contribution rates are displayed in the following way: [7] ■ Contribution rates up to 31 December 2013 / Contribution rates starting 1 January 2014 **Contribution rates for injury, sickness, invalidity, death and maternity benefits** Contribution rate applied on the monthly wage: ■ Employer: 0.5% / 1.5% ■ Employee: 0.5% / 1.5% ■ Government: 0.5% / 1.5% **Contribution rates for child and old-age benefits** Contribution rate applied on the monthly wage: ■ Employer: 3.0% / 3.0% ■ Employee: 3.0% / 3.0% ■ Government: 2.0% / 1.0% **Insurance against unemployment** Contribution rate applied on the monthly wage: ■ Employer: 0.5% / 0.5% ■ Employee: 0.5% / 0.5% ■ Government: 0.25% / 0.25% Those enrolled on a voluntary basis under Section 39 pay both the part of the employee and the part of the employer. Under Article 40 Package 1 the contribution of THB 100 is paid jointly by the worker (THB 70) and the Government (THB 30). Under Package 2 the contribution of THB 150 is paid jointly by the worker (THB 100) and the Government (THB 50). If an employer, at the inception of the SSO Act, was providing more generous benefits related to injury, sickness, invalidity, death, maternity and unemployment be than those provided by the SSO, he/she can receive a discount on the contribution rate.

[7] Different contribution rates were in force in 2012.

Other incomes	Other incomes include: ■ penalties on late contribution and non-payment of contributions; ■ investment returns; ■ donations or subsidies; ■ fees related to social certificate of registration or social security card; ■ fines; ■ contributions in excess not claimed by the employer and /or the employee within 1 year; ■ subsidies or money advanced by the Government; and ■ other incomes. In the case where the fund is not sufficient to cover expenses, the Government shall subsidize or provide advanced money as it deems necessary.
Contributory salary and pensionable salary	Wages for the purpose of calculating contributions are on a monthly basis. Wages include all types of money paid by an employer to an employee in return for normal working hours and days, including pay for holidays and leaves. The minimum wage is THB 1,650/month and the maximum wage is THB 15,000/month for mandatory insured persons under Article 33. The contribution base of voluntarily insured persons is THB 4,800/month.
Benefits	
Injury and sickness benefits (Articles 33 and 39)	
	Eligibility conditions: ■ apply to non-occupational injury or sickness; and ■ at least three months of contributions during the fifteen months just before the date of receiving medical services. **Benefits paid:** ■ medical examination expense ■ medical treatment expense ■ lodging, meals and treatment expenses in hospital ■ medicine and medical supplied expenses ■ cost of ambulance or transport for patient ■ other necessary expenses ■ prevention and promotion (starting in October 2015) ■ allowances in case of mistreatment (starting in October 2015) Note: According to the amended SSA (No. 4, 2015) to be fully implemented on 20 October 2015, the benefits paid will include these additional expenditures: promotion and prevention, rehabilitation and allowance in the case that an insured person is damaged from medical services provided by a hospital. A cash sickness benefit is paid at the replacement rate of 50 per cent for a period of up to 90 days for each injury: The benefit is subject to a maximum number of days of payment of 180 days during a calendar year (except for chronic disease where the maximum could be increased to 360 days); Income replacement begins on the first day of work-leave under the instruction of a doctor. Can continue at home on the approval of the doctor. The first 30 days of sickness are covered by the employer, according to the law.

Maternity benefits (Articles 33 and 39)

Eligibility conditions:

- at least seven months of contributions during the fifteen months just before the delivery date;
- the insured person can be herself, the spouse or the woman who cohabits publicly as wife according to regulations.

Benefits paid:

- lump sum of THB 13,000 on delivery of infant (maximum 2 children per each insured person);
- monthly cash benefit for maternity leave at the rate of 50% of wage for 90 days (only for female insured persons)

Note: On 20 October 2015, a new eligibility condition will apply (drop from seven months to five months) and the condition regarding the maximum number of children will be abolished.

Disability benefits (Articles 33 and 39)

Eligibility conditions:

- at least three months of contributions during the 15 months period before becoming disabled; and
- disability due to a cause unrelated to work.

Benefits paid:

- medical benefit
- OP: maximum THB 2,000 /month for private hospitals and no limitation for public hospitals
- IP: maximum THB 4,000 /month and no limitation for public hospitals
- rehabilitation: THB 40,000
- medical instruments:
- transport cost: THB 500/month
- funeral cost: THB 40,000
- death allowance:
  - for a contribution period of at least 3 years but less than 10 years: 50% * wage * 3
  - for a contribution period of at least 10 years: 50% * wage* 10
  - disability pension: 50% of wage until death

Income replacement benefits:

- 50 per cent of the wages payable during the invalidity period.
- The daily reference wage, as for all cash benefits except old-age pension, is calculated by summing the 3 months highest wage (within the last 9 months) and dividing it by 90.
- The income replacement can be reduced on recovery or if the person's condition improves after rehabilitation (new medical assessment). It is possible to receive a reduced invalidity pension and continue to work.

The member who is disabled also receives a lump sum for disability based of the formula used for old age:

- If there is less than 12 months of contributions: a lump-sum is paid equal to the accumulation of the individual's contribution.
- If there is more than 12 months of contribution: a lump-sum is paid equal to the accumulation of contributions (employers + employees) at the investment return.

Death benefits (Articles 33 and 39)

Eligibility conditions for funeral grant:

- at least one month of contributions during the six months period before death;
- not related to an injury or sickness due to work; and
- death is not the result of suicide.

Funeral grant:

40 000 Baht;

Eligibility conditions for funeral assistance benefits:

- at least 36 months but less than 10 years; or
- at least 10 years;

Funeral assistance benefits:

- 50% x average monthly wages x 3 (changing to 4 on 20 October 2015)
- 50% x average monthly wages x 10 (changing to 12 on 20 October 2015)

Disabled insured can receive both funeral grant and death allowance (survivors' grant) if they meet the qualifying conditions. For those who are disabled, the disability pension is used (instead of wages) to calculate the benefits.
The survivors of the member who has died also receive a lump sum on death of the insured, based on the formula used for old age:

- If there is less than 12 months of contribution: a lump sum is paid equal to the accumulation of the individual's contributions.
- If there is more than 12 months of contribution and less than 180 months: a lump sum is paid equal to the accumulation of contributions (employers + employees) at the investment return.

Child benefits (Articles 33 and 39)

Eligibility conditions:

- at least 12 months of contributions during the previous 36 months; and
- benefits cannot be paid for more than two children at the same time.

Benefits:

- THB 400 per month per child
- benefits cease when the child is 6 years old

Note: On 20 October 2015, the number of children eligible to receive child allowance at the same time increased from 2 to 3.

	Old-age benefits (Articles 33 and 39)
Normal retirement age (NRA)	55
Old-age pension (superannuation pension)	**Eligibility conditions:** ■ 180 months of contributions; ■ the status of being an insured person has terminated; ■ early retirement before NRA is not possible; ■ work after NRA: yes, insured can accumulate service over NRA. If a person entitled to old-age benefits subsequently becomes an insured person, payment stops until the insured status is terminated again. **Benefits:** If the insured is entitled to both an invalidity pension and an old-age pension, an invalidity pension is paid together with a superannuation gratuity. **Monthly pension:** 20% * average last five years of salary (for the first 180 months of contribution) + 1.5% * average last five years of salary (for each period of 12 months in excess of 180 months) In the case that a pensioner dies within the first 60 months of receiving a pension, the survivors receive a lump sum equal to 10 times the monthly pension. **Old-age grant:** If there is less than 180 months of contributions: ■ Less than 12 months of contributions: a lump sum is paid equal to the accumulation of the individual's contribution. ■ At least 12 months of contribution but less than 180 months: a lump sum is paid equal to the accumulation of contributions (employers + employees) at the investment return.
	Unemployment benefits (Article 33 only)
	Eligibility conditions: ■ at least 6 months of contributions during the last 15 months before becoming unemployed; ■ being able to work, being ready for a suitable job as provided, having no objection to job training and having been registered with the Government Employment Service Office at which his or her presentation is frequently required for not less than once a month; ■ no malperformance of duty, fraud, criminal offence; ■ not being entitled to old-age benefit; and ■ waiting period of 8 days. **Benefits:** ■ 50 % of the wage (maximum of THB 15,000) subject to a maximum period of 180 days per year ■ in the case of resignation, 30 per cent of the wage (maximum of THB 15,000) for not more than 90 days per year

Insured persons under Article 40

This applies to informal economy workers ages 15−60 insured on a voluntary basis (no medical benefits, which are covered under the Universal Coverage Scheme).

Branch	Level of benefits and qualifications	Option 1 (Flat rate contribution THB 150/month	Option 2 (Flat rate contribution THB 150/month	Option 3 (Flat rate contribution THB 200/month)	Option 4 (Flat rate contribution THB 300/month)	Option 5 (Flat rate contribution THB 350/month)
1. Sickness or injury/accident	Sickness cash benefit at the rate of THB 200/day, maximum 30 days per year Qualification: – inpatient for at least 1 day – contribution payment at least 3 of 4 months	√	√		√	√
2. Disability	Disability pension during 15 years at rates depending on contributory period: ■ THB 500 / month for contribution payment 6 of 10 months ■ THB 650 / month for contribution payment 12 of 20 months ■ THB 800 / month for contribution payment 24 of 40 months ■ THB 1,000 / month for contribution payment 36 of 60 months	√	√		√	√
3. Death	– Funeral grant THB 20,000 /person – Contribution payment at least 6 of 12 months	√	√		√	√
4. Old-age lump sum	– Lump sum; contribution + interest rate will be paid when insured person reaches age 60 – Minimum saving THB 50/month, insured person can save additional amounts not exceeding THB 1,000/month. – Retirement age: 60 years		√			√
5. Old-age pension	– Pension = individual savings/life expectancy at age 60 – Retirement age: 60 years – Individual savings = contributions from insured persons + contributions from Government + investment return – Minimum saving THB 100/month from the insured and THB 100/month from the Government – Insured person can save additional amounts not exceeding THB 1,000 /month.			√	√	√

Appendix 2

Methodology, data and assumptions

This actuarial review makes use of the comprehensive methodology developed at the Public Finance, Actuarial and Statistics Services Branch of the ILO (SOC/PFACTS) for reviewing the long-term actuarial and financial status of a national pension scheme. The review has been undertaken by modifying the generic version of the ILO modelling tools to fit the specific case of Thailand and the Social Security Office (SSO). These modelling tools include a population model, an economic model, a labour force model, a wage model, a long-term benefits model and a short-term benefits model.

The actuarial valuation begins with a projection of Thailand's future demographic and economic environment. Next, projection factors specifically related to social security are determined and used in combination with the demographic and economic framework to estimate future cash flows and the scheme reserve. Assumption selection takes into account both recent experience and future expectations, with emphasis placed on long-term trends rather than giving undue weight to recent experience.

1. Modelling demographic and economic developments

The general population has been projected with the information obtained from the National Economic and Social Development Board (NESDB) regarding the Thai population (table A2.1). An assumption has been made regarding the non-Thai population (A2.2) and by applying appropriate mortality, fertility and migration assumptions. The following tables describe those assumptions.

Table A2.1. Population of Thailand, by age and sex, Thai nationality, 2013

Age	Male	Female	Total
0- 4	1 920 597	1 832 104	3 752 701
5- 9	2 047 538	1 956 626	4 004 164
10-14	2 223 861	2 141 977	4 365 838
15-19	2 325 343	2 267 145	4 592 488
20-24	2 253 825	2 231 974	4 485 800
25-29	2 178 243	2 197 529	4 375 772
30-34	2 355 199	2 437 085	4 792 284
35-39	2 527 238	2 669 833	5 197 071
40-44	2 592 538	2 781 906	5 374 445
45-49	2 575 953	2 802 149	5 378 102
50-54	2 272 872	2 499 504	4 772 376
55-59	1 898 870	2 116 081	4 014 952
60-64	1 457 111	1 651 752	3 108 862
65-69	1 024 291	1 195 888	2 220 178
70-74	750 929	922 037	1 672 967
75-79	526 383	702 216	1 228 600
80-84	324 475	473 763	798 238
85-89	134 029	212 688	346 718
90 +	38 795	71 077	109 872
Total	31 438 285	33 184 760	64 623 045

Source: NESDB.

Table A2.2. Total population of Thailand, by age and sex, Thai nationality and migrants, 2013, used in the base scenario of the actuarial valuation

Age	Male	Female	Total
0- 4	1 928 390	1 841 714	3 770 104
5- 9	2 056 107	1 968 808	4 024 916
10-14	2 264 717	2 188 093	4 452 810
15-19	2 411 064	2 354 285	4 765 349
20-24	2 383 406	2 352 888	4 736 294
25-29	2 341 773	2 338 139	4 679 913
30-34	2 537 870	2 581 860	5 119 730
35-39	2 712 679	2 805 306	5 517 985
40-44	2 765 492	2 898 635	5 664 127
45-49	2 724 272	2 895 394	5 619 666
50-54	2 388 850	2 568 923	4 957 773
55-59	1 979 908	2 164 711	4 144 618
60-64	1 505 707	1 684 580	3 190 286
65-69	1 047 368	1 218 295	2 265 663
70-74	758 487	938 394	1 696 881
75-79	529 031	714 922	1 243 953
80-84	326 094	483 023	809 117
85-89	134 985	217 301	352 286
90 +	39 360	71 409	110 769
Total	32 846 134	34 308 106	67 154 240

The total fertility rate is assumed to start at 1.6, then decreases to 1.5 during the first 20 years of projection and remains constant at 1.5 during all the rest of the projection period. Table A3.3 shows age-specific and total fertility rates at the beginning of the projection period and in 20 years.

Table A2.3. Age-specific and total fertility rates, 2013 and 2033

Age group	2013	2033
15-19	0.04660	0.02964
20-24	0.08409	0.07659
25-29	0.08588	0.07828
30-34	0.06526	0.05797
35-39	0.03034	0.03670
40-44	0.00745	0.01686
45-49	0.00038	0.00396
TFR	1.60	1.50

Mortality rates in 2013 were estimated using the information obtained from the NESDB. Life expectancy at birth in 2013 has been assumed at 71.1 and 78.2 for males and females, respectively. Improvements in life expectancy have been assumed to follow the

"medium" rate as established by the United Nations. This mortality pattern is also used to estimate the mortality of old-age pensioners and to project survivors' benefits payable on a participant's death.

The life expectancies at birth, at age 20 and at age 60, and sample mortality rates for sample years are provided in tables A2.4 and A2.5 respectively.

Table A2.4. Life expectancy at different periods of time, by age and sex

Year	Men			Women		
	At 0	At 20	At 60	At 0	At 20	At 60
2013	71.1	53.0	19.8	78.2	59.3	22.6
2038	76.2	57.2	21.8	81.6	62.3	24.7
2063	80.1	60.8	23.7	84.3	64.8	26.5
2088	82.8	63.3	25.3	86.6	66.9	28.2

Table A2.5. Sample mortality rates, by age and sex, 2013, 2038 and 2063

Selected ages	Males			Females		
	2013	2038	2063	2013	2038	2063
0	10.5	5.3	3.4	8.7	4.9	3.4
5	0.6	0.3	0.2	0.3	0.2	0.1
10	0.9	0.4	0.2	0.4	0.2	0.1
15	1.2	0.6	0.3	0.4	0.3	0.2
20	2.0	1.1	0.6	0.5	0.3	0.2
25	2.4	1.4	0.8	0.9	0.6	0.4
30	3.2	1.9	1.0	1.3	0.8	0.5
35	4.1	2.4	1.3	1.6	1.0	0.7
40	4.8	2.9	1.6	2.0	1.3	0.9
45	5.9	3.7	2.2	2.7	1.8	1.3
50	7.0	4.6	2.9	3.4	2.4	1.7
55	10.1	6.8	4.5	5.9	4.1	2.8
60	13.2	9.3	6.4	8.1	5.6	3.9
65	18.7	13.5	9.6	11.7	8.3	5.9
70	29.8	21.9	16.1	20.0	14.2	10.3
75	47.5	36.5	28.0	32.6	24.2	18.4
80	68.0	55.0	43.8	53.6	39.7	30.1
85	118.8	100.9	84.7	100.9	79.2	63.3
90	219.8	195.4	172.3	194.8	163.9	139.7
95	401.2	374.2	347.2	374.3	337.4	306.6

Net migration (in minus out) is assumed to stay constant at 40,000 per year over the projection period.

2. Projection of the SSO income and expenditure

This actuarial review addresses all SSO revenue and expenditure items. For short-term (sickness, maternity, funeral and child allowances) benefits and employment injury benefits different models have been developed separately from the pension model. For the long-term benefits (old-age and disability pensions), projections are performed following a year-by-year cohort methodology. For each year up to 2113, the number of contributors and pensioners, and the THB value of contributions, benefits and administrative expenditure, are estimated. Once the projections of the insured (covered) population, as described in the next section, are complete, contribution income is then determined from the projected total insurable earnings, the contribution rate, contribution density and the collection rate. Benefit amounts are obtained through contingency factors based primarily on plan experience and applied to the population entitled to benefits. Investment income is based on the assumed yield on the beginning-of-year reserve and net cash flow in the year. The SSO's administrative expenses are modelled as a flat percentage of insurable earnings. Finally, the year-end reserve is the beginning-of-year reserve plus the net result of cash inflow and outflow.

Based on recent experience, the administrative and other expenses assumption is 0.47 per cent of total insurable earnings each year for all the branches. This level of administrative fees has been distributed among each branch according to an assumption related to the number of cases and the amount of benefits and contributions.

3. SSO population data and assumptions

The projection of the insured population requires a certain amount of information and a number of assumptions. Projections start with the number of contributors as at the date of the analysis. The growth of this population is mainly based on the growth of the employed population and on the assumptions regarding the increase in the coverage rate. Other assumptions of decrement are required, namely prevalence rate of disability and mortality rates by age and sex. Finally, the distribution of new entrants and new retired come from the evolution of the employed population. There are no explicit assumptions regarded these last two items.

3.1. Insured population as of the valuation date

Data on the insured population was obtained from the SSO. Validation of information transmitted was done to ensure that all the data are comprehensive and consistent. Table A2.6 shows the number of members who contributed during the last financial year preceding the valuation date, by age and sex. The distribution of the contributors in 2013 comes from extraction of the computerized system of the SSO. Adjustments have been brought to this population to reflect particularities of each branch. For each branch, those who are not required to contribute have been subtracted from the global population (for example, self-employed for unemployment benefit).

Table A2.6. Distribution of active members (contributors) by age and sex, all insured (Articles 33 and 39), 2013

Age	Males	Females	Total
15 - 19	264 228	226 793	491 021
20 - 24	894 545	984 653	1 879 198
25 - 29	1 109 136	1 236 808	2 345 944
30 - 34	1 148 192	1 208 599	2 356 790
35 - 39	940 851	944 457	1 885 307
40 - 44	728 150	729 303	1 457 453
45 - 49	555 243	542 971	1 098 214
50 - 54	367 455	343 183	710 638
55 - 59	199 931	163 636	363 567
60 - 64	75 374	57 126	132 501
65 - 69	23 613	16 854	40 467
70 - 74	7 438	4 310	11 748
75 - 79	2 282	983	3 265
Total	6 316 437	6 459 678	12 776 115

3.2. Projection of the insured population

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

The insured population was projected by applying coverage rates to the employed population (figures A2.1 and A2.2). The coverage rates increase during the first 40 years of the projection and are kept constant thereafter for the rest of the projection period. Mortality and disability rates are all estimated by age, sex and group.

Figure A2.1. Initial coverage rates (non-smoothed) of the insured population, Articles 33 and 39, in relation to the employed population, by age and sex, 2013 (percentage)

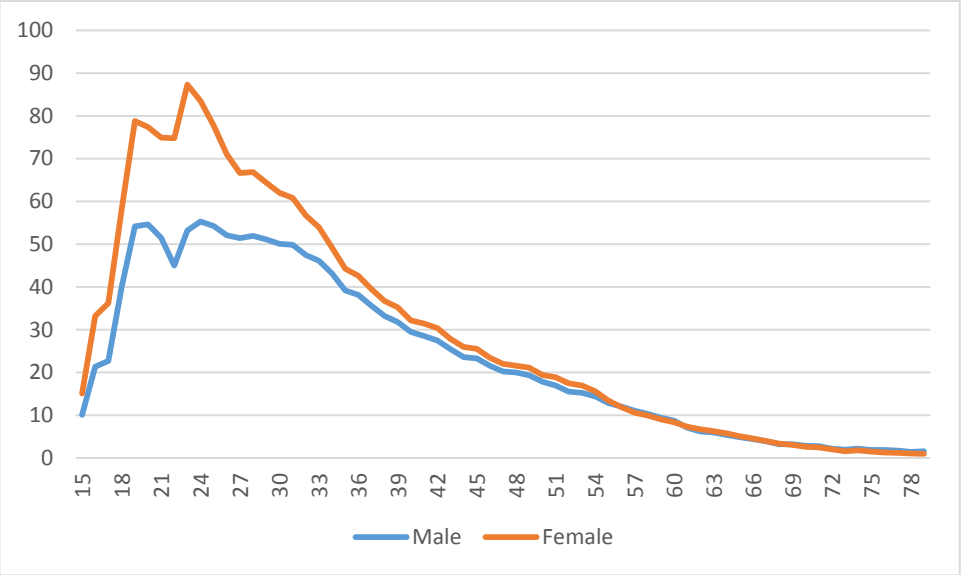
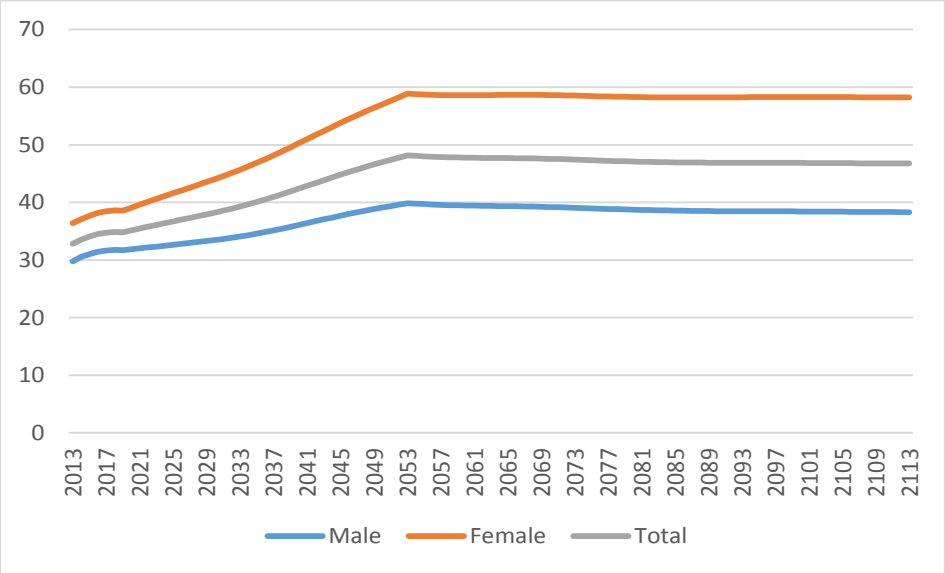


Figure A2.2. Coverage rates (non-smoothed) of the insured population, Articles 33 and 39, in relation to the employed population, by age and sex, 2013–2113 (percentage)



3.2.1. Growth of the insured population

The growth of the insured population reflects long-term trends in the evolution of the employed population, as shown in table A2.7. Over the short and medium terms, the growth of the insured population is higher because more people are entering the labour force.

Table A2.7. Insured population growth assumption, Articles 33 and 39, by sex

	2013–38	2038–63	2063–88	2088–2113	Average
	%	%	%	%	%
Males	0.5	-0.3	-0.9	-0.9	-0.4
Females	0.8	-0.2	-1.0	-0.9	-0.3
Total	0.7	-0.2	-0.9	-0.9	-0.3

3.2.2. Mortality rates of the insured population

Mortality rates of the insured population have been assumed to be different from the mortality rates of the general population. The life expectancies at age 20 and at age 60 for the insured population, and sample mortality rates for sample years, are provided in table A2.8 and A2.9 respectively.

Table A2.8. Life expectancy at different periods of time of the insured population, by age and sex

	Men		Women	
Year	At 20	At 60	At 20	At 60
2013	56.6	21.3	61.6	23.9
2038	60.0	23.2	64.2	25.8
2063	62.9	24.9	66.3	27.5
2088	65.0	26.3	68.2	29.0

Table A2.9. Insured population, sample mortality rates, 2013, 2038 and 2063, by age and sex

Selected	Males	Females

ages	2013	2038	2063	2013	2038	2063
15	1.7	0.9	0.5	0.5	0.3	0.2
20	2.1	1.2	0.7	0.6	0.4	0.3
25	2.7	1.6	0.9	1.0	0.6	0.4
30	3.6	2.1	1.1	1.4	0.9	0.6
35	4.4	2.6	1.4	1.6	1.1	0.7
40	5.2	3.2	1.8	2.1	1.4	1.0
45	6.4	4.1	2.5	2.9	2.0	1.4
50	8.2	5.4	3.5	4.1	2.9	2.0
55	11.3	7.7	5.2	6.5	4.5	3.1
60	14.9	10.6	7.4	8.8	6.1	4.3
65	22.4	16.3	11.7	13.8	9.8	7.0
70	35.3	26.4	19.7	23.6	16.9	12.3
75	54.0	42.3	32.9	37.5	27.8	21.0
80	83.4	68.8	56.0	66.1	50.0	38.5
85	152.1	131.6	112.6	128.0	103.5	85.0
90	279.7	253.5	228.0	248.5	215.2	188.4
95	512.2	486.7	460.6	482.1	447.0	417.0

3.2.3. Disability incidence rates

Table A2.10 shows the expected incidence rates of insured persons qualifying for invalidity benefit, which is assumed for all projection years.

Table A2.10. Disability rates per 10,000 population, Articles 33 and 39, by age and sex

Age	Males	Females
20	0.1	0.0
25	0.4	0.1
30	0.8	0.2
35	1.1	0.4
40	1.4	0.6
45	2.1	0.9
50	3.4	1.6
55	5.5	2.3
60	8.3	2.6

Disabled people generally have a higher mortality rate than active participants. The mortality rates assumed are ten times those of the insured population at age 20, falling to a ratio of 1 at age 70.

3.2.4. Retirement rates

Retirement rates are derived implicitly from the evolution of the employed population and the coverage rate.

3.2.5. Salary scale and density of contribution

Table A2.11 shows the salary scale used at the beginning of the projection period. Earnings are projected using the assumptions described earlier.

For the purpose of projection, the actuarial model distributes average wages into three sections (low, medium, high) with the aim of measuring the effect of the minimum pension and the ceiling. It is estimated that the dispersion observed in the distribution of the earnings will remain constant throughout the projection period.

Table A2.11. Distribution of monthly earnings, Articles 33 and 39, by age and sex, 2013 (in THB)

Age	Males	Females	Both sexes
15-19	6 347	6 073	6 221
20-24	8 039	8 113	8 078
25-29	9 695	9 706	9 701
30-34	10 232	10 014	10 120
35-39	10 242	9 703	9 972
40-44	10 178	9 437	9 807
45-49	9 955	9 125	9 544
50-54	9 635	8 802	9 233
55-59	9 228	8 366	8 840
60-64	8 252	7 518	7 935
65-69	7 561	7 130	7 381
70-74	7 374	7 046	7 254
75-79	7 506	7 191	7 411
Average	9 644	9 288	9 462

The density of contribution represents the proportion of the year during which participants pay contributions to the scheme. A high density of contribution means that participants will accumulate pension benefits quickly and that the proportion of those entitled to a pension will increase, to the detriment of those entitled only to a grant benefit. In the private sector, it is normal that the density of contribution be less than the one observed in the public sector, due to less stability in employment. The density of contribution assumed in this actuarial valuation for insured, mainly in the private sector, is shown in table A2.12 and is based on the analysis of the experience of the last five years.

Table A2.12. Density of contribution, Articles 33 and 39, by age and sex (percentage)

Age	Males	Females
15-19	50.8	49.3
20-24	69.1	72.6
25-29	84.5	87.6
30-34	89.1	91.5
35-39	90.8	92.7
40-44	91.8	93.5
45-49	92.5	94.0
50-54	93.0	94.6

55-59	91.4	92.8
60-64	92.3	94.0
65-69	95.0	96.3
70-74	94.7	95.9
75-79	94.7	95.9

3.2.6. Past service

Credited service for the active and inactive insured populations was transmitted by the SSO. Table A2.13 shows, for active members, the total years of contributions. Numbers are shown by age and sex.

Table A2.13. Average past contribution years, Articles 33 and 39, as at December 2013

Age	Males	Females
15-19	1.3	1.3
20-24	2.4	2.5
25-29	4.8	5.3
30-34	8.0	8.9
35-39	9.9	10.7
40-44	10.4	11.0
45-49	10.5	11.0
50-54	10.6	11.1
55-59	10.7	11.1
60-64	12.0	12.0
65-69	13.4	13.3
70-74	14.4	14.4
75-79	14.8	14.8

3.2.7. Inactive population

With the data transmitted by SSO, it is possible to extract over the last 15 years the structure of the inactive population (those who have not contributed during 2013 but have contributed to the scheme in the last 15 years). The experience of the inactive population related to their retirement pattern has also been analysed. Since there were no pensioners, it was impossible to analyse the proportion of new retirees each year that were inactive the year before. Using the inactive population in the actuarial valuation will not affect the results considerably, since the scheme is relatively young and those in the inactive population have not accumulated many years of service. Based on these analyses, the inactive population used in this actuarial valuation is shown in table A2.14.

Table A2.14. Distribution of inactive members used for the actuarial valuation, and their average years of past service, by age and sex

Ages	Males		Females	
	Number	Average years of past service	Number	Average years of past service
15-19	47 875	1.1	42 127	1.0
20-24	349 413	1.4	277 141	1.4
25-29	524 126	2.2	445 939	2.4

30-34	678 860	3.2	632 311	3.6
35-39	640 127	3.6	619 763	4.0
40-44	504 463	3.5	492 817	3.7
45-49	376 430	3.4	360 865	3.5
50-54	229 001	3.2	200 373	3.4
55-59	35 081	2.2	21 345	2.2
60-64	16 455	2.0	7 314	2.0
65-69	8 554	2.0	2 849	2.1
70-74	4 279	2.0	1 102	2.2
75-79	1 198	2.1	259	2.5

3.2.8. Pensioners at the valuation date

Table A2.15 shows the distribution of invalidity pensioners used for this actuarial valuation as at the valuation date. There are no old age pensioners and survivors' pensioners as at 31 December 2013.

Table A2.15. Invalidity pensions, by age and sex, December 2013 (in THB)

	Males		Females	
Age	**Number**	**Average monthly amount**	**Number**	**Average monthly amount**
0-4				
5-9				
10-14				
15-19	2	2 702		
20-24	70	2 602	13	2 241
25-29	289	2 772	68	2 972
30-34	682	2 911	173	3 030
35-39	905	3 033	274	2 993
40-44	996	3 209	298	3 092
45-49	935	3 479	354	3 285
50-54	975	3 609	352	3 161
55-59	826	3 655	269	3 135
60-64	678	3 632	170	3 027
65-69	330	3 733	81	3 050
70-74	156	3 555	51	3 129
75-79	60	3 600	14	2 876
80-84	18	3 560	10	3 898
85-89	7	4 776		
90-94				
95+				
Total	**6 929**	**3 358**	**2 127**	**3 111**

3.2.9. Family structure

Information on the family structure of the insured population is necessary for the projection of survivors' benefits. Assumptions have to be established on the probability of being married at death, the average age of spouses, the average number of orphans and their average age. These assumptions are not used in the based scenario but only to do sensitivity analysis on the cost of providing survivors' pension. Examples of the assumptions appear in Table A2.16.

Table A2.16. Family statistics

	Probability of being married		Average age spouse		Average number of dependent children		Average age of the children	
	Males	Females						
Age	%	%	Males	Females	Males	Females	Males	Females
15	0.0	0.0	15	18	0.0	0.0	0.0	0.0
20	13.9	25.8	17	23	0.1	0.4	1.0	1.3
25	33.0	47.3	22	28	0.6	0.9	3.9	4.3
30	51.1	62.9	27	33	1.1	1.4	5.5	6.2
35	64.6	72.6	32	38	1.5	1.5	9.0	13.5
40	74.2	76.9	37	43	1.3	1.0	10.9	15.3
45	79.7	77.2	42	48	0.8	0.5	12.0	15.5
50	82.5	75.2	47	53	0.3	0.1	12.9	15.5
55	84.1	71.6	52	58	0.1	0.1	13.9	15.5
60	83.7	66.0	57	63	0.1	0.1	14.0	15.5
65	81.5	58.8	62	68	0.1	0.1	14.0	15.5
70	77.2	50.1	67	73	0.1	0.1	14.0	15.5
75	71.6	40.8	72	78	0.1	0.1	14.0	15.5
80	63.9	30.6	77	83	0.1	0.1	14.0	15.5
85	55.1	20.1	82	88	0.1	0.1	14.0	15.5
90	35.4	10.1	87	93	0.1	0.1	14.0	15.5
95	5.3	0.3	92	98	0.1	0.1	14.0	15.5

3.2.10. Adjustment to pensions in payment and other parameters

Under the basic scenario, pensions in payment are assumed to be indexed in the future at a rate equal to the inflation rate. This assumption is made even if, in the SSO Act, there is no provision for a cost-of-living adjustment. The goal is to measure the financial soundness of the scheme in the context of maximizing the opportunities for pensioners to see their pension increase in the future according to some indicator. A social security pension scheme without such adjustments would not be viable.

It is also assumed in this actuarial valuation that all other parameters related to minimum pensions and funeral benefits are adjusted annually to inflation. The ceiling on salary is assumed to evolve according to increase in the salary.

Appendix 3

Concepts on the funding of social insurance

1. Pure assessment – pay-as-you-go system

Under this financial system, the contribution rate during a given period, for example, one year (annual assessment) or a few years, is determined in such a way that income from contributions during a period will just cover the expenditure of the scheme during the same period, with a small margin to allow the constitution of a contingency reserve. This is the system usually applied to finance short-term benefits such as sickness and maternity cash benefits. Annual benefit expenditure is expected to remain at a relatively constant level once the scheme has attained a certain maturity, unless the benefit provisions themselves have been changed. The contingency reserve enables coverage of unexpected expenditure due to temporary fluctuations of the risk factors involved. The reserve should, therefore, be maintained in a sufficiently liquid form so that it can be readily resorted to when necessary. If a pure assessment system were applied to a new pension scheme, it would involve frequent revisions of the contribution rate. The annual expenditure under a new pension scheme would begin at a comparatively low level and increase continuously over a long period of time. This is because there will be an increasing number of surviving pensioners. Another reason for escalating annual expenditure is that each new group of pensioners will be drawing higher rates of pension due to longer insurance periods compared to the previous generations of pensioners. Pure assessment is not appropriate for a new pension system. For a mature scheme, however, this financial system could be adopted.

2. General average premium system

A general average premium (GAP) system provides for a theoretically constant rate of contribution ensuring financial equilibrium *ad infinitum*. At any time, the present values of all probable future contributions income plus accumulated reserves should be equal to the present value of all probable future outlays, both in respect of the initial population and of future entrants. The contribution rate determined under this system would be relatively high and would lead to a formation of high reserves. Though theoretically constant, the contribution rate is likely, in practice, to be revised at periodic actuarial reviews. If this system were applied to a new pension scheme from the start, the rate of contribution would be relatively high and this could cause an undue burden on the economy and on the contributing parties.

3. Scaled premium system

It is possible to devise many intermediate systems of finance between the basically unfunded (PAYG) pure assessment system and the fully-funded GAP system. The following factors frequently lead to the adoption of an intermediate system of finance:

1) The contribution rate must not be excessive (with respect to the capacities of the members and the economy in general).

2) The initial, and any subsequent contribution rates established under the system of finance applied to the scheme, should remain relatively stable for reasonable periods of time. Increases in the contribution rate should be gradual, particularly when they are not accompanied by an improvement in benefits.

An example of an intermediate level of funding is the scaled premium system of finance. Under this system, a contribution rate is established so that during a specified period, which is known as the period of equilibrium, the contribution income and the interest income on the reserves of the scheme will, in each year, be adequate to meet the expenditure on benefits and administration in that year. In order to avoid a decrease in the reserves after the end of a period of equilibrium, the contribution rate must be revised prior to this and a new higher contribution rate applied during a new period of equilibrium. Thus, the financial equilibrium would be assured for limited periods, such as 20, 15 or 10 years, within each of which the contribution rate is supposed to remain stable. Subsequently, it would be increased by stages – 20, 15 or 10 years, respectively. There would be a moderate accumulation of funds, the amount of which depends on the length of the period of equilibrium. A short period of equilibrium would result in a low contribution rate, which would have to be increased rather frequently, and would bring about a low degree of accumulation of funds, thus approaching the system of annual assessment. However, a long period of equilibrium would result in a relatively high initial contribution rate and a larger accumulation of funds, and consequently approaches the GAP system. The scaled premium system is flexible, as it permits adaptation to changes in the conditions determining the financing of the scheme. It should be emphasized, however, that the system requires periodic increases of the contribution rate, which are not accompanied by benefit improvements. Although the contribution rate during the initial period of equilibrium will be lower than that under the GAP system, eventually a stage will be reached when it will exceed the contribution rate required under the latter financial system.

4. A fully funded system

A fully funded system is a system where liabilities are fully funded. Instead of relying on younger generations of workers to pay the benefits, each generation is required to set aside enough money to pay their own benefits. At each moment during the life of the pension plan, accumulated contributions and investment income should be enough to pay all the promises. If not, the deficit should be filled in during a stated period. This kind of financing system is more prevalent in the private pension world because it protects workers if the pension plan ends.

Appendix 4

General methodology of an actuarial valuation

This actuarial review makes use of a comprehensive methodology developed at the Public Finance, Actuarial and Statistics Services Branch (SOC/PFACTS) of the ILO for reviewing the long-term actuarial and financial status of national pension schemes. The review was undertaken by modifying the generic version of the ILO modelling tools to fit the situation of the SSO. These modelling tools include a population model, an economic model, a labour force model, a wage model, a long-term benefits model and a short-term benefits model.

1. Modelling the demographic and economic developments

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

The selection of assumptions for projections took into account the recent experience of the SSO to the extent that this information was available and credible. These assumptions were selected to reflect long-term trends rather than giving undue weight to recent experience. The detailed description of the demographic and economic assumptions is presented in Appendix 2.

2. General population

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

3. Economic growth and inflation

Labour productivity increases and inflation rates are exogenous inputs to the economic model. Real rates of economic growth are derived using the ILO economic projection model.

4. Active population and employed population

The projection of the labour force, i.e. the number of people available for work, is obtained by applying assumed labour force participation rates to the projected number of people in the general population. An unemployment rate is assumed for the future, and aggregate employment is calculated as the difference between labour force and unemployment. Growth in the insured population is linked to the growth in the employed population. In this model, the insured population is projected starting with the most current data on insured participants, and then applying coverage rates to the employed population in the future.

5. Salaries

Based on an allocation of total GDP to capital income and to labour income, a starting average wage is normally calculated by dividing the wage share of GDP by the total number of employed. In the medium term, real wage development is checked against labour productivity growth. In specific labour market situations, wages might grow faster or slower than productivity. However, due to the long-term perspective of the present study, the real wage increase is assumed to gradually converge with real labour productivity. It is expected that wages will adjust to efficiency levels over time. In this model, in order to take into account the long-term perspective of the actuarial valuation, the long-term real wage increase is based upon a long-term assumption.

Wage distribution assumptions are also needed to simulate the possible impact of the social protection system on the distribution of income, for example, through minimum and maximum pension provisions. Data on the wages by age and sex as well as on the dispersion of wages are used in the projection. Average earnings, which are used in the computation of benefits, are also projected.

6. Modelling the financial development of the social Insurance scheme

The present actuarial review addresses all income and expenditure items of the long-term (pension) benefits and the short-term benefits. Projections for pensions are done separately for each sex. Due to the importance of the long-term benefits at the SSO, more importance is given to these projections.

7. Purpose of pension projections

The purpose of the pension model is twofold. First, it is used to assess the financial viability of the branch. This refers to the measure of the long-term balance between income and expenditure of the scheme. In case of an imbalance, a revision of the contribution rate, or the benefit structure, is recommended. Second, the model may be used to examine the financial impact of different reform options, thus assisting policy-makers in the design of benefit and financing provisions. More specifically, the model is used to develop long-term projections of expenditure and insurable earnings under the scheme, for the purpose of:

1) Assessing the options for building up a contingency or technical reserve.

2) Proposing schedules of contribution rates consistent with the funding objective.

3) Testing how the system reacts to changing economic and demographic conditions.

4) Analysing financial impact of possible modifications to the scheme.

8. Pension data and assumptions

Pension projections require the demographic and macroeconomic framework already described and, in addition, a set of assumptions specific to the social insurance scheme.

The database, as at the valuation date, includes the insured population by active and inactive status, the distribution of insurable wages among contributors and the distribution of past credited service and pensions in payment. Data are disaggregated by age and sex.

Scheme-specific assumptions, such as disability incidence rates, are determined with reference to scheme provisions and the scheme's historical experience. The data and assumptions specific to the SSO are presented in detail in Appendix 2.

9. Pension projection approach

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

Pensions are long-term benefits. Hence, the financial obligations that a society accepts when adopting financing provisions and benefit provisions for them are also of a long-term nature: participation in a pension scheme extends over a whole adult life, either as contributor or beneficiary, i.e. up to 70 years for someone entering the scheme at the age of 16 years, retiring at the age of 65 years and dying some 20 or so years later. During their working years, contributors gradually build entitlement to pensions that will be paid even after their death, to their survivors.

It is not the objective of pension projections to forecast the exact progression of a scheme's income and expenditure, but to verify its financial viability. This entails evaluating the scheme with regard to the relative balance between future income and expenditure. This type of evaluation is essential, especially in the case of the SSO, which has not yet reached its mature stage.

Appendix 5

List of SSO participants who collaborated in the collection of data

	Name	Surname	Division/Bureau
1	Mrs. Petchara	Tavara	Medical Service System Management Bureau
2	Miss Roongnapa	Thongmuang	Medical Service System Management Bureau
3	Miss Theeranuch	Wattanaamorn	Medical Service System Management Bureau
4	Mrs. Jintana	Yongproksa	Contributions Bureau
5	Mrs. Rungnirund	Angkamadhakorn	Benefits Bureau
6	Miss. Rangsima	Preechachard	Benefits Bureau
7	Miss Aumpun	Thuvavit	Finance Accounting and Investment Bureau
8	Miss Wantanee	Saepoo	Finance Accounting and Investment Bureau
9	Mrs. Niyada	Seneemanomai	Investment Bureau
10	Mr. Win	Phromphaet	Investment Bureau
11	Mr. Sorakit	Atcharanuwat	Investment Bureau
12	Mr. Manas	Tanamai	Information and Communication Technology Bureau
13	Mr. Suknirun	Niramidsukpornkul	Information and Communication Technology Bureau
14	Miss Usa	Theeravittayalert	Research and Development Division
15	Miss. Anchana	Phonghirunchareon	Research and Development Division
16	Miss. Supaporn	Yongyuen	Research and Development Division
17	Miss. Siriluk	Luksanato	Research and Development Division
18	Mrs. Phunyapha	Takaew	Research and Development Division
19	Mr. Prasit	Chongussayakul	Employer's Representative
20	Mr. Chinnachot	Saengsank	Employee's Representative