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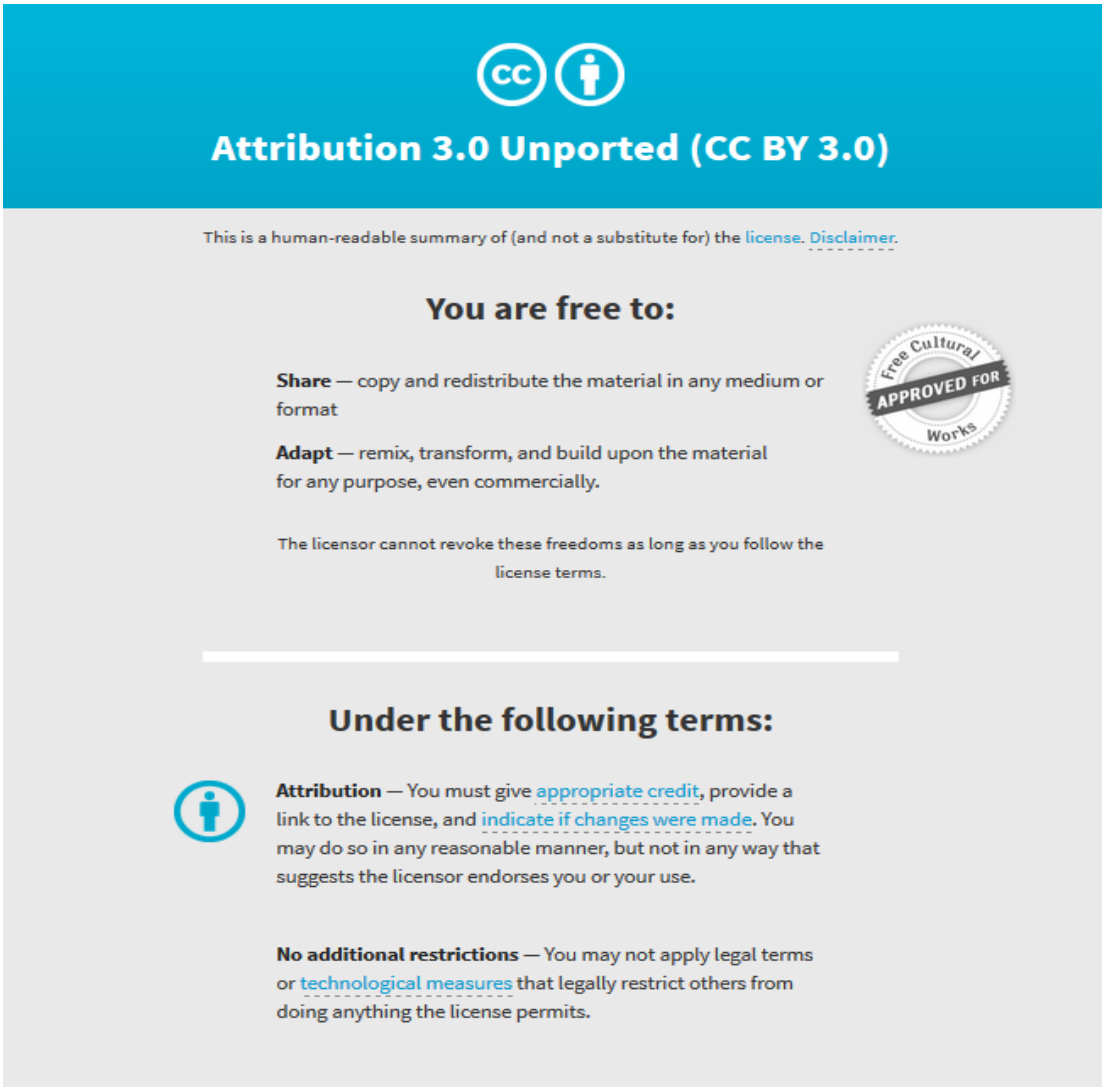

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How Fiscally Tolerable Is Thailand's Social Security Pension Fund to Early Retirement Decisions?

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Abstract

This research paper assesses the fiscal tolerability of the Thai Social Security Pension Fund to early retirement decisions, particularly among the workforce aged 50-54. Starting from 2014, the Social Security Pension Fund is due to pay regular monthly pension benefits to eligible insured persons. There has been increasing concern over the potentially high proportion of early retirees opting for one-time lump-sum old-age benefits instead of the more modest amount of monthly retirement pension. This can create severe shocks to the system. Forecasts and sensitivity analyses under alternative scenarios are conducted using an actuarial method. The estimation employs the latest 2010 National Economic and Social Development Board population forecast. In the worst case scenario, with an early retirement rate of 9 percent or higher per year, the tolerability of the system can be maintained for no longer than 25 years from now. The future generations risk facing a situation in which the old-age benefits may not be promptly received in the expected amount. This points to the important policy precaution that the currently high level of reserves in the Social Security Pension Fund does not ensure fiscal sustainability and tolerability as commonly believed. The result also implies that withdrawal from the social security pension fund by the government for other purposes is fiscally detrimental to life of the fund.

Keywords: early retirement, pension funds, social security, welfare policy

1. Introduction and Rationale

The primary objective of this paper is to assess the fiscal tolerability of the Thai Social Security Pension Fund (SSPF) when a "shock" is induced. In the study, the shock refers to the decision to take early retirement of those contributors aged between 50-54 years old. Fiscal tolerability is defined as the allowable degree of variation of indicators from the past average without causing the system to collapse. Fiscal tolerability points out how much worse the system can become and still survive. Survival, in the sense of this paper, refers to the situation where the fund has not been completely depleted. Since the Social Security System opens ways for the early retirement option, in addition to the fact that some companies provide early retirement incentives for high-salary executives, there are many opportunities for early retirement. One of the major current concerns of the Social Security Office (SSO) is the potentially large number of early retirees in the coming years starting from 2014. Up to the present, there has not been sufficient quantitative research to concretely address the impact this will have. It is, therefore, necessary to identify the degree of fiscal tolerability of the fund such that the system can be sustained.

The second objective as a by-product of the first is to further investigate whether there is really a large fiscal space in the SSPF to finance government spending as commonly believed by a number of policymakers. Constrained by budgetary gridlocks and political pressure, off-budgetary expenditure and tapping-off from large government-managed funds such as the Social Security Fund (SSF) will tend to become novel fiscal tools for future governments owing to the lack of discipline revealed in recent historical records and the country's relatively loose legal framework for monitoring and surveillance of usage. In 2011, the reserves for old-age benefit amounted to 595,304 million baht, which is approximately 7.4 percent of the country's gross domestic product (GDP). SSF has often been a tempting source of funds with the view that the funds, particularly the reserve for the old-age benefit payment within the SSPF, is a very large amount and should not be left "unused".

Based on the past evidence, the SSF has often been the primary target for political manipulation in at least three ways; namely;

1.1 Government's Contribution Overdue Owing to Excess Government Expenditure on Other Uses

De jure, the government is obligated to contribute to the fund. However, *de facto*, such discipline has not been strictly enforced. Since 2010 until 2012, the government had a cumulative contribution overdue of over 63,200 million Baht. There is no guarantee of when the government will pay the principal contribution and the interest that has been forgone.

1.2 Populist Campaigns through Contribution Rate Reduction at the Contributors' Hidden Costs (I.E., Disturbed Cash Flows of the Funds) in the Long-Run

For example, due to the flood in 2011, the government has released measures to help employers and employees through a contribution rate reduction to 2 percent in the first six months and then to 1 percent in the last six months of 2012 without government subsidies to assist in the disturbed cash flows of the fund.

1.3 Withdrawal of Funds to Finance Other Government's Projects

For example, 10,000 million baht was drawn out of the SSF, instead of using the government's own emergency expenditure, to provide loans through commercial banks for insured persons to recover from the shelter destructions caused by the flood. Aside from these, there have been several attempts to withdraw from the fund for a variety of political purposes (Social Security Office, 2012). The predicted cash flows have not been revised after these disturbances.

This paper consists of five sections. The second section provides an overview of the Thai social security system, bringing into focus the details of the pension fund within the SSF. The third section discusses relevant theoretical concepts in social security finance and modeling. The fourth section details the sources of data. The fifth section conducts a fiscal tolerability analysis. Finally, the last section provides policy implications.

2. Background and Overview of Thailand's Social Security System

According to the handbook published by the Thai SSO (2008), the government provision of social security is an important principle thatmost countries follow employing one type of social security system or another for their citizens from birth till death. The Thai social security system include the following major elements: (1) a solidaristic approach, averaging out net costs and benefits, beginning with the formal sector and intended to extend the scheme to the informal sector, (2) insurers contribute and are guaranteed benefits at the expense of the cumulative reserves in the fund, (3) the contribution is considered a special tax levied on the persons identified by the law. The long-term success of the social security system aims at extending to becoming a universal coverage scheme in the future.

The social security system of Thailand refers to the principles stated in Convention Number 102 which was adopted by the International Conference of the International Labor Organization (ILO) on 28 June 1952. The Convention sets a framework of common important basic social security principles on which any social security system should be based to encourage the widest development of social security schemes. The Convention defines the nine classical branches of social security and sets minimum standards for each. These social security branches include: medical care, sickness benefit, unemployment benefit, old-age benefit, employment injury benefit, family benefit, maternity benefit, invalidity benefit and survivors' benefit (ILO, 2012). In Thailand, social security is organized into two major funds: the Workmen's Compensation Fund and the Social Security Fund. The latter is the major focus of this paper.

The Workmen's Compensation Fund (WCF) is the first step of the social security system in Thailand to provide security for employees who are injured or sick from work-related causes. In fact, there were efforts to establish an organized social security system in Thailand starting in 1954 but, due to the unfavorable economic conditions, it was ineffective. In 1972, the Government of the Revolutionary Party issued a Notification of the Revolutionary Party Number 103 dated 16 March 1972 under which a compensation fund was established with the intention to protect employees who were ill or injured in relation to performance of work. The employer was required to contribute to the fund according to the risk category of their business at the rate of 0.2-2.0 percent. The management of the fund started on 1 January 1974 under the supervision of the Department of Labor. In 2011, the total number of 338 270 employers registered to pay contributions to the WCF. There were 8222 960 employees who were covered for work-related injury and sickness.

The Social Security Fund (SSF) was established in 1990 under the supervision of the SSO. Initially, the SSF covered 4 benefits including injury or sickness, maternity, invalidity and death. Then, the SSO extended the

benefits to include child allowance and retirement pension in 1998, and unemployment in 2004. In 2011, there were 404,195 enterprises, 71 of which were small enterprises with less than 10 employees. The number of insured persons registered with SSF was 10,499,993, covering 27.3 percent of the workforce and 16.4 percent of the population. Of those numbers, there were 9,054,535 compulsorily insured persons (Article 33). Most of them were between 25-29 years old. There were 1,445,458 voluntarily insured persons under Article 39 who had been employed in the enterprises.

Since 1994, the SSF covered the voluntarily insured persons (Article 40). In 2011, the SSO has developed the voluntary social security scheme according to Article 40 to accord with the national implementation of the 10th National Economic and Social Development Plan (2007-2011) since 1 May 2011. The insured persons under Article 40 were self-employed persons who were not employed in the enterprises under Social Security Act, and are not the insured persons under Article 33 and Article 39 (Social Security Office Annual Report, 2011).

Table 1. Contribution rates for insured person under article 30 of the social security act

Type	**Benefits**	Contribution Rate			Percentage Share of Government's Contribution
		Employee	Employer	Government	
4-Benefits Fund	Sickness, Maternity, Invalidity, Death	1.5%	1.5%	1.5%	33.33%
2-Benefits Fund	Old Age Benefit, Child Allowance	3%	3%	1%*	14.29%*
Unemployment Fund	Unemployment Benefits	0.5%	0.5%	0.25%	20.00%
Total		5%	5%	2.75%	21.57%

Source: Social Security Office (2008, p. 3); last column calculated by the authors;

*Government's contribution only goes to child allowance case.

This paper focuses on the insurance cases under Article 33 which comprises the majority of the insured persons. Future research may consider those under Articles 39 and 40 as the scale of the SSF coverage expands. The SSF consists of three sub-funds; namely: (1) the 4-benefits fund (sickness, maternity, invalidity and death), (2) the 2-benefits fund (child allowance and old-age benefits); and (3) the Unemployment Insurance Fund. Under normal circumstances, employers and insured persons contribute equally at the total rate of 5 percent of the wages; of which 1.5 percent goes to the 4-benefits fund, 3 percent goes to the 2-benefits fund, and 0.5 percent goes to the unemployment benefit fund. The government pays contributions at the total rate of 2.75 percent of wages; 1.5 percent goes to the 4-benefits, 1 percent goes to 2-benefits fund and 0.25 percent goes to the unemployment benefit fund. However, it is important to note that the government's contribution only goes to the child allowance partition of the 2-benefits fund. Hence, in reality, only the employers and employees contribute to the old-age benefits. Table 1 shows the contribution rates and the government's contribution as a share of the total contribution by all parties.

By virtue of the Ministerial Regulation, the contribution rates to the SSF has been reduced from 5 percent to 3 percent (0.5 percent for 4-benefits fund, 2 percent for 2-benefits fund and 0.5 percent for unemployment fund); and 4 percent (0.5 percent for 4-benefit funds, 3 percent for 2-benefits fund and 0.5 percent for unemployment insurance fund) during 2012 to help victims of the flood in 2011. Hence, for all employees earning in excess of 15,000 baht per month, their contributions decreased from 750 baht to 450 baht per month during January through June 2012; and 600 baht per month during July through December 2012.

It was expected that from January 2013, the contribution rate to the SSF will be resumed at 5 percent. However, this was not so as the government's pre-election 300-baht minimum wage campaign became effective. In order to relieve the burden on employers from the increased minimum daily wage policy, the Board of the SSF approved a year's extension of the reduction in the Social Security contribution rate. This was further evidence of the disturbed cash flows of the SSF caused by discretionary policies.

In terms of investment performance, as of 31 December 2011, the total investment amount of the SSF was 883,423.92 million baht. Of these, 755,544.91 million baht was in the 2-benefits fund; 67,394.36 million baht was in the 4-benefits fund and 67,394.36 million baht was in the unemployment fund. The rest of the investment amounting to 262.24 million baht is the fund for voluntarily insured persons under Article 40. In 2011, the SSF

has received investment income amounting to 36,062 million baht consisting of: (1) interest income received from bank deposits, bonds, and debentures amounting to 29,295 million baht and (2) dividends and profits from the sale of common stocks amounting to 6,767 million baht. The average investment return during the past five years was approximately 5 percent. Due to the large amount of pension reserves, politicians often consider it as a resource for financing other expenditures. However, it is important to note that, by the end of 2014, the fund will have to start paying pension benefits to insured persons who worked for at least 180 months. The analysis in the next section shows that the fund's expenditure will be sensitive to decisions on early retirement. To recall, the government often reduces contribution rates from time to time; hence, adversely affecting cash flows. Moreover, past overdue repayments by the government have neglected the forgone interest. Thus, the actual situation could have been more severe than the baseline scenario to be presented in this paper. The following sections explain the theoretical framework, while section 5 presents the optimistic baseline scenario when unexpected shocks are induced. The last section provides some precautionary notes on interfering with the uses of the fund.

3. Theoretical Framework

3.1 General Social Security Finance

The analytical framework is the application of the basics of social security actuarial mathematics in Iyer (1999, p. 15). These basics had been commonly employed by most ILO studies related to state or government-managed pension schemes with an infinite interval. Under such systems, the major theoretical assumption is that the number of contributors to the national fund will consistently increase into the indefinite future. Hence, the social security pension scheme in this hypothetical framework is open-ended, which is analogous to the assumption that the first generation of contributors will be identical to the future generation of contributors.

The framework for analyzing the sustainability of a pension scheme at time t consists of the expenditure function, $B(t)$, which comprises of payments of benefits to contributors, the insured salary function, $S(t)$, the contribution rate function, $C(t)$, implying the type of fund, the reserves function, $V(t)$, which is the difference between inflows and outflows subject to the rate of return, ϕ. The relationship between each function can be represented by the differential equation in equation (1)

$$dV(t) = V(t)\Phi dt + C(t)S(t)dt - B(t)dt \tag{1}$$

In other words, the change in reserves during time t equals revenue from cumulative contribution plus the excess of current contributions received after deduction of the benefits paid out in the same period.

Integrating equation (1) over the interval (n, m), gives the relationship between reserves at $t=n$ and $t=m$ as shown in equation (2)

$$V(m)e^{-\Phi m} = V(n)e^{-\Phi n} + \int_n^m [C(t)S(t) - B(t)]e^{-\Phi t}dt \tag{2}$$

From Equation (2), $V(m)$ can be rewritten as in equation (3)

$$V(m) = V(n)e^{\Phi(m-n)} + \int_n^m [C(t)S(t) - B(t)]e^{\Phi(m-t)}dt \tag{3}$$

If $n = 0$ and assuming $V(0) = 0$ the retrospective equation for $V(m)$ can be represented by equation (4)

$$V(m) = e^{\Phi m}\int_0^m [C(t)S(t) - B(t)]e^{-\Phi t}dt \tag{4}$$

The equilibrium for the whole period of the pension scheme can be represented by the equivalence between the present values of revenue and expenditure. The equation can be written by assuming present value of future contribution equals the present value of future benefits as in equation (5)

$$\int_0^\infty C(t)S(t)e^{-\Phi t}dt = \int_0^\infty \mathrm{B(t)}e^{-\Phi t}dt \tag{5}$$

In equation (5), it is assumed that the left-hand-side and the right-hand-side of the equation will converge under the condition that during the beginning stage the ratio $B'(t)/S'(t)$ increases from zero until a certain period of time, say $t = t^*$, at which time the ratio becomes constant. At $t = t^*$, the scheme will have reached its financial maturity. In most cases, population maturity will be reached before financial maturity. However, if the earlier generation has been paid relatively higher benefits, financial maturity will be reached earlier. At financial maturity, $B'(t)/B(t) = S'(t)/S(t) = \sigma + \gamma$ at time $t \geq t^*$, where σ is the growth rate of the numbers of contributors

and γ is the growth rate of insured salary.

Equation (5) constitutes the basic equation for considering pension schemes which will be implemented by a government, implying equation (6)

$$\int_0^m [C(t)S(t) - B(t)]e^{-\Phi t}dt = \int_m^\infty [B(t) - C(t)S(t)]e^{-\Phi t}dt \tag{6}$$

Substituting equation (4) into equation (6) leads to equation (7), which is a prospective equation

$$V(m) = e^{\Phi m}\int_m^\infty [B(t) - C(t)S(t)]e^{-\Phi t}dt \tag{7}$$

Theoretically, from the beginning of the scheme, it can be observed that the contribution function, *C(t)*, in any form that solves for the equilibrium function in equation (5) and having reserves derived from equations (4) or (7) will be a scheme that is considered sustainable in the long-run.

However, in practice, it is necessary to introduce the conditions for *C(t)* and *V(t)* since, if *C(t)* is negative, it implies that the scheme is, on the net effect, paying back to the contributors. Alternatively, if *V(t)* is negative, it means that the scheme is accumulating liabilities in paying benefits to the contributors. Hence, in practice, it is necessary to set the conditions that $C(t) \geq 0$ and/or $V(t) \geq 0$ for all time periods *t*. By imposing such conditions and other conditions will lead to the determination of various national pension schemes in different countries. The following section introduces the set of condition imposed to suit the analysis of the social security pension scheme in Thailand.

3.2 General Average Premium Systems

In Thailand, the social security pension fund has the characteristic of a General Average Premium System (GAPS) in which all members of the fund pay a single contribution rate of 5 percent of their salary. The minimum salary is 1,650 baht and the maximum limit of the salary subject to social security payment is 15,000 baht. For instance, a person with salary higher than 15,000 baht, say 100,000 baht will contribute only 5 percent of 15,000 baht. In GAPS, at time $t=m$, letting $C(t) = C$ (a constant) in equation (7) leads to equation (8) during the period (m, ∞)

$$C = \frac{\int_m^\infty B(t)e^{-\Phi t}dt - V(m)e^{-\Phi m}}{\int_m^\infty S(t)e^{-\Phi t}dt} \tag{8}$$

In other words, the contribution rate equals the present value of benefits after deduction of reserves divided by insured salary during the period. To attain equilibrium in the system from the beginning of the scheme, equation (8) can be re-written as the general average premium in equation (9)

$$GAP = \frac{\int_0^\infty B(t)e^{-\Phi t}dt}{\int_0^\infty S(t)e^{-\Phi t}dt} \tag{9}$$

For simplification, the contribution rate in equation (9) can be viewed as the average contribution between two groups of the population. The first group represents the first generation of contributors. The second group can be hypothesized as the future generation of contributors. Assume that $B(t) = B_1(t) + B_2(t)$ and $S(t) = S_1(t) + S_2(t)$, where $B_1(t)$ and $S_1(t)$ are benefits and insured salary for the first group; and $B_2(t)$ and $S_2(t)$ are the benefits and insured salary for the second group. Calculating the Average Premium (AP) for the two groups yields equations (10) and (11), respectively

$$AP1 = \frac{\int_0^\infty B_1(t)e^{-\Phi t}dt}{\int_0^\infty S_1(t)e^{-\Phi t}dt} \tag{10}$$

$$AP2 = \frac{\int_0^{\infty} B_2(t)e^{-\Phi t}dt}{\int_0^{\infty} S_2(t)^{-\Phi t}dt} \tag{11}$$

Hence, for this system of pension scheme, GAP can be rewritten as in equation (12). Conceptually, GAP may be viewed as the weighted average between *AP1* and *AP2*

$$GAP = \frac{AP1\int_0^{\infty} S_1(t)e^{-\Phi t}dt + AP2\int_0^{\infty} S_2(t)e^{-\Phi t}dt}{\int_0^{\infty} S(t)e^{-\Phi t}dt} \tag{12}$$

With a lower number of contributors relative to benefit receivers in the first stage, equations (10) and (11) imply that the contribution rate for the first group must be higher than the second group. Hence, the relationship in (13) must hold.

$$\text{AP1} > \text{GAP} > \text{AP2} \tag{13}$$

The above equations show that in a pension scheme with a single rate during period *t*, it is important that the first group of the population pay higher contribution rates in order to make the fund sustainable. Then, later on, when the second group of the population joins the scheme, the rate can be reduced and equilibrium can be attained. Hence, theoretically, such a system will be able to accumulate sufficient reserves. The practical implication is that, in GAPS, despite the ease of management, the setback is that if the contribution and ceiling salary are inappropriate, the accumulation of cash inflows will be lower than pensions benefit payment at the time of population maturity. Although in the beginning, there seems to be net inflows to the fund, it is because the full benefit payment has not yet been realized. In Thailand, the SSPF will start paying regular monthly pensions in 2014. Once the payments have started along with early retirement lump-sum payment obligations, the simulation in the next section illustrates that the reserves have the potential to be used up in due course.

4. Indications of Data and Assumptions

There are several ways to do the forecasting of the population in the Social Security System, namely; actuarial methods, econometric methods or mixed methods. The actuarial method considers the internal factors and has been employed for a long time in insurance industries and social security system analyses (Iyer, 1999, p. 65). Econometrics is an extrapolation of the past trend through regression analysis. That is, it takes into account the external factors. This paper employs the actuarial method. The forecast for the population in the Social Security System for the period 2012-2060 is based on the latest Office of National Economic and Social Development Board's (NESDB) 2010 forecast of the Thai population by age and sex under the following assumptions:

1) Fertility Assumptions

Degree of fertility: The forecast assumes that in 2010, which is the base year, the total fertility rate is 1.62 percent. After that, the rate remains constant at 1.62 percent during the first five years and gradually decline to 1.30 percent in 2050.

Fertility pattern: During the period of the forecast, the fertility pattern follows that during 2005-2010.

Sex Ratio at Birth: The female: male ratio is 105:100 during the whole period of the forecast.

2) Mortality Assumptions

Degree of mortality: The average age of mortality for men increased from 70.34 years in 2010 to 75.25 years in 2050. The average age of mortality for women increases from 77.47 years in 2010 to 81.86 years in 2050.

Survival Rate: The survival rate is calculated from the Life Table built upon by the Relational logic model using mortality patterns by age during 1999-2010, in which the relative ratio complies with the average age.

3) Migration Assumptions

Since there is no legal migration, or even if there is, the effect is minimal and will not impact the age and sex structure of the population.

In 2011, the number of the insured persons registered with the Thai SSF was 10 499 993, covering 27.3 percent of the workforce and 16.4 percent of the population. The past statistics of the unemployment rate during the past

10 years did not vary significantly around the rate of 1.6 percent. The increase in population during the same period was approximately 0.6 percent (World Development Indicator, 2010). In addition, the increase in workforce is relatively constant remaining at around 2 percent and the increase in number of SSF insured persons is around 2.6 percent per year.

In the next step, theoretical analysis relies on the probability and risks such as the risk of not surviving until the end of the period, the risk of disability, the risk of stop working during the period and the risk of early retirement each year, etc. Iyer (1999, p. 66) explains that the forecast can depend on a matrix which comprises of chain multiplication: $n_t = n_{t-1}Q_{t-1}$ where n_t is the row vector comprising of insured persons (e.g., workers, pensioners, disability beneficiaries, etc.) at time t and Q_{t-1} is the square matrix comprising of risks of changes in status of the insured person during period *(t-1, t)*.

In the forecast of SSF population, the calculation is based on the population forecast by NESDB which has already integrated the risks from the Life Table using relational logic model for ages of different cohort. However, an alternative source of Life Table can be obtained from the World Health Organization (WHO) Life Table 2010 and the results vary slightly. Other risks can be taken into consideration in the future models. However, this awaits a more detailed life table for Thailand. Aside the major statistics from the SSO and NESDB's population forecast, other macroeconomic statistics are obtained from Mahidol University Institute for Population and Social Research, World Development Indicators 2010, Fiscal Policy Office and the Bank of Thailand.

5. Fiscal Tolerability Analysis

The analysis focuses on the 2-benefits fund (the old-age benefits and child allowance) which has the highest amount of reserves among the three sub-funds within the SSF as earlier indicated in this paper. Within the 2-benefits fund itself, the amount is separated for the two purposes. The government's contribution only goes to the child allowance and does not contribute to the old-age benefit. Therefore, this analysis only focuses on the reserves for the old-age benefits which only come from the contributions of the employers and employees. The 4-benefits fund also has problems of its own; but these problems are not within the scope of this paper. In contrast to the other sub-funds which provide year-on-year benefits only during work life with the excess not accumulated for the insured person but going to the reserves for SSF's other expenditures, the pension fund has long-run impacts for the insured persons during old age after retirement. From equation (4), the function can be applied to the analysis during period t_0 to t_1 to calculate the cumulative liability of the fund reserves, $\Phi(t)$, in equation (14) which is the ratio of net present value of cumulative reserve after deduction of benefits paid over the net present value of total cumulative reserves. Ratio calculation gives a relatively unbiased estimation of the direction than unit calculation

$$\Phi(t_{t1}) = \frac{e^{\Phi t_1}\int_{t_0}^{t_1}\left[C(t)_{\sigma\alpha}.S(t)_{\sigma\alpha} - B(t)\right]e^{-\Phi t}dt}{\int_{t_0}^{t_1}2C(t)_{\sigma\alpha}S(t)_{\sigma\alpha}e^{-\Phi t}dt} \tag{14}$$

In equation (14), the subscripts σ and α denote sex and age group at time t, respectively. Since the SSF employs GAPS, the contribution rate to the old-age benefit fund is 3 percent for all employers and employees as shown in Table 1. Hence, $C(t)_{\sigma\alpha} = C_p = 0.03$. The denominator in equation (14) is multiplied by 2 because the contributions come from both the employers and employees. Equation (14) can be re-expressed in equation (15)

$$\Phi(t_1) = \frac{e^{\Phi t_1}\int_{t_0}^{t_1}\left[C_p \bullet S(t) - B(t)\right]e^{-\Phi t}dt}{\int_{t_0}^{t_1}2C_p \bullet S(t)e^{-\Phi t}dt} \tag{15}$$

In the baseline scenario analysis, the following assumptions are made.

1) The average working age starts at 22 (after bachelor's degree).

2) No insured person will encounter disability

3) No formal/informal sector migration

4) No international migration

5) Ceiling insured salary is 15,000 Baht

6) The insured salary increases at the rate of 1.2 percent per year in line with the past average inflation.

7) No inflation adjustment in benefit and contribution rates throughout the period. The rates are based on those of Table 1.

8) No benefit payment after death (this may lead to under-estimation of benefit payments)

9) The discount rate is 2.6 percent throughout the period (past five-year average)

10) Returns from investment of SSF is 5 percent (based on average returns in the past)

11) Administrative costs is 10 percent (based on SSO annual reports)

12) There are only two risks in the model. The first is death during the beginning and the end of the year each year (this has already been integrated in the demographic forecast). The second risk is early retirement, parameterized in the model, which can create a shock to the system.

13) Based on the SSF requirements, insured persons must be at the age of 55 and must have contributed to the SSF for at least 15 years to be entitled to monthly pension benefits after retirement. The monthly pension rate is 20 percent of the average salary during the last 60 months of contribution. Each additional working year is topped up by 1.5 percent per year.

14) During each year throughout the period, 60 percent of the insured persons retiring at the age of 55 are eligible for monthly pension benefits.

Table 2. Years net liability begins and years pension fund depleted under various early retirement rates

Early Retirement Rate	**1%**	2%	3%	4%	5%	6%	7%	8%	**9%**	10%
Year liability begins	**2024**	2023	2022	2020	2019	2017	2016	2015	**2014**	2014
Year pension fund depleted	**2050**	2048	2046	2045	2044	2043	2042	2041	**2039**	2038

Source: Authors' calculation

Under the baseline scenario, given that 1 percent of the potential early retirees (aged 50-54) opt to exit the labor market, Table 2 shows that the net liability will be borne in the year 2024, ten years from now; and from then the fund will begin to use its reserves. Under the given scenario, the reserves fund will be depleted in 2050 which is less than 40 years from now. The analysis then goes on to observe the degree of fiscal tolerability of the SSF to changes in retirement decisions among the potential early retirees. During the past decades, older workers tend to be motivated toward early retirement from the formal sector due to various incentives given by the private sector to employ younger generation with lower pay. Moreover, some insured persons may intentionally wish to retire early at the age of 54 or before they have been working for 15 years in order to gain the one-time lump-sum amount to carry on their own personal investment or consumption in old-age instead of a more modest amount of monthly pension.

Currently, there have been considerable concerns over the early retirement of older workers and its impact on the funds' reserves starting from 2014. The sensitivity analysis in this paper fills up the gap in research by identifying the critical point of how the system can be maintained given such shocks. From Table 2, it can be observed that as the percentage of early retirement increases by 1 percent, the year that the fund becomes depleted moves earlier by one or two years. It is, however, important to note that if the early retirement rate among elder workforce increases to 9 percent, the system will incur liability right away in 2014. This means that the system can become unsustainable since benefits exceed contributions at the start. Nevertheless, the system can go on or "tolerate" until the fund will become fully depleted in 2039, which is 11 years earlier than that of the baseline scenario. That is, once the net liability occurs, the system can maintain itself for at most 25 years. If this is the case, policy measures that impact the reserves can be considered critical and policymakers should take precautions if they wish to change any parameter.

The social security pension fund can, of course, also be adversely affected by worse case scenarios such as a reduction in investment returns or large payouts during economic recession. Without official intervention, there can already be several natural changes to the parameters such as discount rates, returns from investment, and growth of insured salary, etc. Moreover, in reality, policy changes in SSF governed by external factors have been

very customary. For example, previously, the contribution rate has been reduced to alleviate several crises. Nevertheless, despite some slight changes in macroeconomic variables, the result can vary around 3-5 years. This should not alter the general conclusion and the trend of the analysis.

The results of the analysis show that, given the current system of defined pension benefit in Thailand, later generations face the risk of not receiving old-age benefits in a full amount upon retirement. There is also asymmetric information of not knowing when the contribution rate will change and what the SSO's long-term plan is, subject to political decisions. In such an open-ended fund managed by the government, it is important that the initial rates should be higher to attain long-run equilibrium. However, imposing such a policy can be politically unpopular. International experience reveals that common solutions include increasing retirement age, reducing benefit rates, increasing contribution rates or changing of the system, for example, to become a defined contribution system (Asher & Nandy, 2008; Berkel & Borsch-Supan, 2004; Blundell, Meghir, & Smith, 2002; Borsch-Supan & Schnabel, 1998; Giang, 2008). This is a sensitive policy issue, particular in the midst of the current political situation in Thailand. The outcome requires wider public discussion of how the Thai social security pension should be managed or even reformed.

6. Policy Implications

Given the results of this paper, illustrating how vulnerable the system of the Thai social security pension is to the early retirement decision parameter, in the short-run, the research suggests that appropriate contribution and benefit rates should be reconsidered. The GAPS requires that the contribution rate should be adjusted accordingly. However, contributors must be explicitly informed of their contribution pattern throughout their working life time. In other words, changes in the rates should not come as a surprise. In Thailand, there has been some studies on measures to extend the life of the fund. For example, Thailand Development Research Institute (2008) suggests the extension of the retirement age similar to many other countries. However, this issue is still a matter of public debate in Thai society. Up to date, the retirement for the SSF remains at 55 years. Moreover, a retirement age extension can only prolong the life of the fund but the tolerability problem persists.

In the long-run, if the rates cannot be adjusted to a sustainable level due to political constraints, along with an increasing demographic dependency ratio, this paper suggests a reconsideration of the type of pension scheme for the Thai society. Possible alternatives can be the defined contribution system, or notionally defined contribution system which can calculate returns by the net present value of contributions plus returns on investment. However, the transparency in policy-making, the disciplines in the fund management, and the uses of funds are also serious issues of concern for the Thai working population paying social security taxes and income taxes. Regarding the larger picture of the country's public finance, the pension fund has often been the target source for political extractions. This paper portrays a scenario which indicates whether there is a space for political maneuvering in this corner of the public sector as commonly believed by a number of policymakers. Henceforth, with the possibility of the depletion of the funds within 25 years from now or earlier if the degree of early retirement gets higher, the future generations risk facing the situation in which the old-age benefits may not be promptly received in the promised amount. This pinpoints the important policy precautions that, although currently there are high reserves in the pension funds, withdrawal of this money by the government for other purposes can be fiscally detrimental to the sustainability and tolerability of the fund.

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