
Taiwan Old-Age Security Systems: Equity and Sustainability Implications

Ai Ju Shao¹
Ming Chung University, Taiwan
(e-mail: ajshao@mcu.edu.tw)

Abstract

The article first introduces the overall old-age security systems in Taiwan with focus on the comparisons between systems for general public sector employees and private sector employees; secondly, the article unveils the inequity and sustainability issues the public pension system encounters. Due to under-funded policy burdened with over-payment and design frauds, the public pension system is not only inequitable to young participants aged under 40 within the system in term of economic capital exhaustion, but it is inequitable to the more numerous general population in private sectors in term of national budget allocation and huge gap of benefits payments. Finally this article suggests reform directions that Taiwan retirement systems should move on which includes modifying the current public old age system with lower benefit level and stringent retirement criteria, or establishing a new system intergrading the public and private plans with the goals of pursuing on-going financial soundness and optimal fairness among all stakeholders.

Introduction

Overview of the Old Age Security Systems in Taiwan

The old-age security systems in Taiwan are designed by work force

¹ Ai-Ju Shao is an associate professor with Risk Management and Insurance Department of Ming Chung University, and is pension actuary of Society of Actuary in Taiwan and an associate of Society of Actuary of the States. The important findings of this paper will be published in International Social Security Review Vol. 63, No. 1 of 2010.

segments. Each segment offers different type of social insurance plus its corresponding occupational pension system. Due to the various combination of social insurances and Occupational Pension Systems there are basically five types of old-age security systems in Taiwan, including those for employees in government agencies, in public schools, in military, in private business units and in private schools (see Table 1) (Shao, 2004).

Among these five systems, the one covering private business employees is the biggest in term of participants' volume. On top of the old-age benefits from Labor Insurance, the employees of private sector will receive the occupational pension once they satisfy retirement criteria either regulated by Labor Standard Law or New Pension Act². The smallest system is the one which applies to private school employees including kindergarten assistants to university professors. In addition to old-age benefits from Civil Servants and Teachers social insurance, private school workers are covered by Private School Pension Fund System which offers lump-sum retirement benefits. The other three types of work force which include those of government agencies, public schools and military are referred to general public sectors. They are altogether composed of 0.6 million participants. Among all these old-age security systems in Taiwan, the one which is most controversial in term of economic justice is the one for general public sector employees.

Table 1. Old-Age Security Systems in Taiwan

| | | | | | |
|--|--------------------|-------------------------------|-----------------------|-----------------------------|----------------------------------|
| | public servants | public school personnel | military personnel | private school personnel | private business employees |
|--|--------------------|-------------------------------|-----------------------|-----------------------------|----------------------------------|

² For those who were hired by private business unites prior to 2005/7/1 are allowed to choose retirement benefits regulated by Labor Standard Law; as to those who are hired after 2005/7/1 are all required to participate in Labor Pension Plan regulated by New Pension Act.

| | | | | | |
|-----------------------------------|--|----------|------------------------------------|--|-----------------|
| Covered Participants | 280,638* | 201,004* | 112,556* | 63,000** | 8,408,345*** |
| Social Insurance Old-Age Benefits | Civil Servants and Teachers social insurance | | Military Personnel Insurance | | Labor Insurance |
| Occupational Pension System | New Public Service Pension Fund System | | Private School Pension Fund System | Labor Pension Plan by New Pension Act and Labor Standard Law | |

Source:*statistics from New Public Service Pension Fund System 3rd Actuarial Report; **statistics from Private School Pension System 3rd Actuarial Report; ***statistics from Labor Insurance Financial and Actuarial Report.

Taiwan introduced retirement security program for general public sector employees in 1940's much earlier than those for general population (Hsu, 2007). Currently the 1st layer security system offered to public servants and employees in public schools is same as the one offered to private school employees and titled as Civil Servants and Teachers social insurance while the one offered to military force is titled as Military Personnel Insurance. The 2nd occupational layer offered to public servants, employees in public schools and military personnel altogether is titled as New Public Service Pension Fund System (NPSFSS). Both layers are mandatory and contributory plans with premium rate born by employers and participants. Contrasted to a lump-sum benefit offered by the 1st layer social

insurance, the NPSPFS provides many forms of payments to participants and is a very generous occupational pension system wherein benefit levels and benefit criteria are far richer and friendly than other private occupational pension systems and has attracted so-called “pension envy” (Mitchell, 2008).

Design of the NPSPFS

NPSPFS has been operating since July of 1995 superseding old non-contributory PSPFS³. The essential background for the replacement is due to ratio of pension expenses to government budget accelerates at an unexpected speed which does not only freeze out other government budgets but also limit the salary adjustment for in-force public servants. In order to suppress the increasing financial pressure, NPSPFS was established with the goal of financially self-supported. At the same year, Supervisory Board of Public Service Pension Fund (SBPSPF) and Management Board of Public Service Pension Fund (MBPSPF) under Ministry of Civil Service were established, and are in charge of fund supervision and management respectively. Pursuant to the laws, MBPSPF will pay the pension benefits for service years after new system established; as to the pension benefits based on the service years prior to the set-up of NPSPFS would be totally government financed. Due to its contributory design, NPSPFS offers much richer benefits than old PSPFS to seek supports from participants

NPSPFS, a defined benefit plan, provides death benefits, disability benefits, survivor benefits as well as retirement benefit to eligible participants. Once employee satisfies either 25 service year or age 60 and above with 5 service years he will be eligible to apply voluntary retirement pension, only with annuity payment the retiree needs to satisfy another criteria as of age 50 and above with 15 service years. Retirement benefits

³ Old PSPFS was established in 1940s and was a plan fully financed by government budget.

are provided with many forms of payments including life time annuity, lump sum and flexible combination of the previous two. As to retirement benefit level, the calculation is based on two times of final base salary which is about 110%~130% of actual wages⁴ depending on employee's seniority and ranking. For the lump sum, the system provides 1.5 credits for each service year calculated at two times of final base salary. As to life time annuity, monthly payments are calculated by 2% of annual replacement rate with base of two times of final base salary plus supplemental annuity to compensate year-end bonus. Thus, a retiree with 30 service years after NPFPS establishment will have at least 90 times of his final base salary or 71%~83%⁵ replacement ratio adjusted annually with inflation rate. Additionally, if the retiree is hired prior to new system establishment, there is system-transit compensating bonus annuity. Moreover, the lump sum old-age benefits from 1st layer social insurance, which is Civil Servants and Teachers social insurance for public servants as well as education workers and Military Personnel Insurance for military personnel, could be deposited in nation-run bank with 18% annual interest rate. Summing up all benefit items together, the total replacement rate is very likely exceeding 100% of after tax salary prior to retirement. Table 2 reports the estimated replacement ratio of public servants with various combination of old and new service years and position ranks which highlights the generosity of the system benefits. As to survivor benefit, once a retiree who chooses the monthly payment dies, either the balance of lump sum benefits and accumulated annuity amount or 50% of monthly payment will be paid to survivors. Given such benefit level, the maximum contribution rate is legislatively set at 12%, with 35% born by participants and 65% born by government agencies.

⁴ The actual wage is mainly composed of base salary and professional bonus.

⁵ 60% adjusted by 110% and 130% and plus 5% for year-end bonus annuity to derive the replacement ratio based on before tax actual wage.

Table 2: Estimated replacement ratios of public servants by position rank and service years (Unit: NT\$)

| Employee Rank | SY prior NPFPS | SY after NPFPS | actual wage (1) | personal tax rate (2) | net wage (3) = (1)*(1-(2)) | monthly annuity* (4) | replacement ratio (5)=(4)/(3) |
|---------------|----------------|----------------|-----------------|-----------------------|----------------------------|----------------------|-------------------------------|
| higher rank | 20 | 15 | 104,125 | 20% | 83,300 | 98,919 | 119% |
| | 15 | 15 | 104,125 | 20% | 83,300 | 93,713 | 113% |
| | 0 | 30 | 104,125 | 20% | 83,300 | 68,498 | 82% |
| lower rank | 20 | 15 | 81,809 | 17% | 67,901 | 77,719 | 114% |
| | 15 | 15 | 81,809 | 17% | 67,901 | 73,629 | 108% |
| | 0 | 30 | 81,809 | 17% | 67,901 | 67,716 | 100% |

Source: author's calculation

*monthly annuity includes annuity payment from old PFPS (if any) and NPFPS, system-transit compensating bonus (if any), year-end compensating bonus and 18% monthly interest income from old-age benefits of Civil Servants and Teachers social insurance.

It is worth noticing that by Public Servants Pension Fund Management Statutes of MBPSPF, the goal of the fund management is to maintain the long term solvency, which means that the financial self-sufficiency is the final goal of fund management. But Public Servant Pension Act at the same time states once system financial insolvency incurs it will be from national budget to make up the shortage. The ambiguousness of final financial responsibility leaves the system stumbling into indecision and worsens its financial status.

NPSPFS has been operating for 13 years and its controversy grows as the benefits and financial position become more transparent to general population. Though NPSPFS only covers about 600,000 participants, which is one-tenth of the size of participants covered by Labor Pension Plan in private business units, its status and development provokes national

attention. The most controversial issues of the system are, first, it would create intergenerational inequity within system if no radical modification is taken soon; second, it would create between-systems economic inequity due to wealth distribution disparities between public sector and private sector.

Equity Implications of NPSPF

Inequity within system

Pursuant to the laws, NPSPFS shall conduct actuarial valuation once every three years to measure financial strength and may adjust the contribution rate accordingly. There are three actuarial valuations performed up to now, the 1st actuarial report based on data as of June 30th of 1999, the 2nd as of December 31st of 2002 and the 3rd as of December 31st of 2005. Three actuarial valuation reports all point to one fact, that is, NPSPFS burdens itself with serious financial pressure and the pension right of young generations within the system will be endangered if the problem won't be solved soon.

According to the 1st actuarial report which was performed only 4 years after fund was established, with 7% as assumption of liability discount rate, the actuarial liability totals as of US\$11.8 billion and the unfunded liability amounts to US\$5.6 billion⁶ after netting fund asset of US\$6.2 billion. Furthermore, the normal cost by Aggregate cost method for civil servants, public school teachers and military personnel are as of 15.5%, 17.9% and 21.9% respectively while then prevailing contribution rate was only 8.8%. Valuation results pinpoints NPSPFS made its first mistake by starting with generous benefits but low contribution rate in order to seek supports from its participants which strongly contradicts to the ultimate goal of its establishment which is to replace the shaky old PSPFS and pursue long term

⁶ Unfunded liability is calculated according to entry age actuarial cost method.

financial soundness.

Due to declining trend in interest rate, the 2nd actuarial report was valuated based on discount rate as well as fund investment yield as of 3.65%. The fund values US\$6.2 billion, but actuarial liability increases to US\$23.9 billion which means unfunded liability has increased up to US\$17.7 in three years period. The normal cost which includes the amortized amount for the unfunded liability from prior service years amounts to 26.4%, 28.6% and 32% for three types of participants respectively. With such results disclosed, the authority responds with adjusting the contribution rate from 8.8% to 9.8% in year 2004, which is only one third of the equilibrium rate⁷.

The 3rd actuarial valuation adopts 4% as investment rate and discount rate, the unfunded liability was valuated to be US\$30.8 billion while fund assets accumulated to be US\$11.8 billion. While the contribution rate was adjusted again to 10.8% in year 2005, the equilibrium rate shall be 31.1%, 33.1% and 36.3%. During the 9 years period, the accrued liability increases at annual rate as of 15.3% while the fund assets only grows annually at 7.3% which together results in unfunded liability accelerating at 21%, and the funding ratio⁸ as of December of 2005 dropping to 27.6%. Table 3 shows the growth pattern of the fund liability and asset value of NPSPFS.

⁷ Equilibrium rate is calculated based on the methodology which allocates the actuarial present value of future pension benefits to the various times of valuation in a participant's active life.

⁸ Funding ratio is the ratio of fund asst over accrued liability.

Table 3: Financial Status of NPSPFS

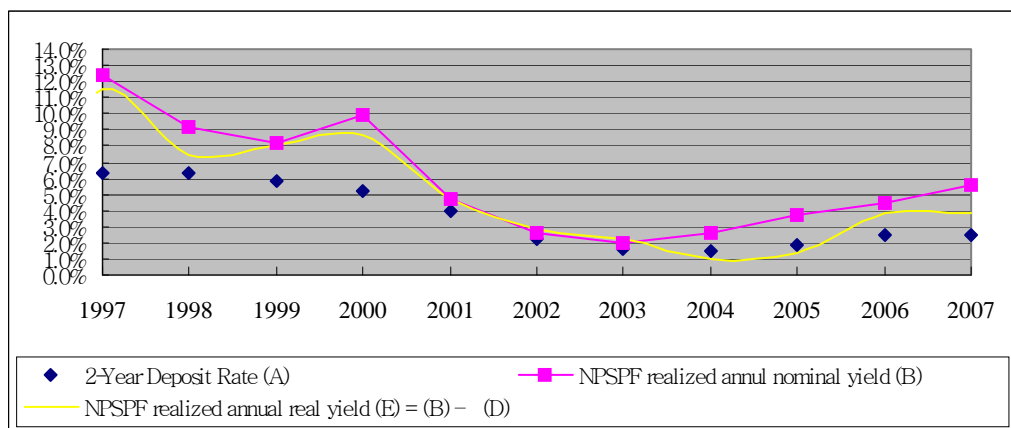
| | 1st valuation | 2nd valuation | 3rd valuation |
|--------------------------|---------------|---------------|---------------|
| Accrued liability | 11.78 | 23.88 | 42.57 |
| Fund asset | 6.23 | 6.23 | 11.76 |
| Unfunded liability | 5.55 | 17.65 | 30.81 |
| Normal Cost | 15.5%, | 26.4%, | 31.1%, |
| | 17.9%, | 28.6%, | 33.1%, |
| | 21.9% | 32% | 36.3% |
| Actual Contribution Rate | 8.8% | 9.8% | 10.8% |

Source: NPSPFS actuarial reports.

The deterioration of the NPSPFS funding status can be explained by three reasons:

First, the investment environment gets more challenges. NPSPFS allocates more than 50% of asset in interest bearing tools since 1996, but the yield, taking average two-years deposit rate of Taiwan banks as example, declined from 6.93% of 1996 to 1.812% as of 2005 and NPSPFS realized nominal yields drop from 7.8% in 1996 to 3.7% in 2005 and rebounds slightly to 5.62% in 2007. (see Figure 1). Without more sophisticated investment strategy to cope with volatile financial market, fund size grows sluggishly, not to mention the likelihood of severe capital loss in times of global financial turmoil.

Figure 1. The average 2-year deposit rates and yields of NPSPF



Second, plan fraud worsens the obligation burden. Due to absence of reduced annuity design, participants choose to retire with rich benefits once they satisfy the minimum retirement benefit criteria. Lack of actuarial equivalence between lump sum and annuity amount is another fraud. Taking those retiring at age 55 as example, the actuarial present value of female life annuity is estimated 3.3 times of lump sum payment. More retirees choose payment in annuity form more expensive the system is. Taking public servants choice as example, in year 2005 there are 93% of retirees choosing annuity payment, contrasted to 60% as plan started benefit obligation inflates rapidly.

Third, indecision by authorities to take improvement plan leads to rapid accumulation of unfunded liability and interest cost. Since 1996 to today, Taiwan has gone through two changes in the ruling party, but due to the need for votes, neither of the ruling parties will dare to reform the shaky system. The fund's financial burden gets aggravated in the price of political consideration.

The actuarial valuation indicated that if no remedy plan implemented the shortage of cash flow will incur in less than ten years from now and solvency year is only around two decades away. Based on the information disclosed, the participants under age 40 risk at great deal for their future economic security since what they contribute today will be used up by those retire in future 20 years. Thus if the system won't take action to fix the worsening financial crisis, public servants, teachers and military personnel of this generation will exhaust the economic capital of next generation and the intergenerational inequity within the system will be unavoidable since the basic equality among participants won't hold (Lund, 2006).

Inequities between public private sector employees

To solve the problem of economic inequity within the system, one of the solutions is to do fully funding. But who is responsible to finance and

who is capable to finance? After 13 years of decision detain, funding actuarial equilibrium rate means on top of 12.25%⁹ of participants' own contribution, the participants' employers, government agencies, have to budget another 22.75% of regular wages for sustaining such pension system, which is estimated about US\$3.3 billion annually¹⁰. Summing up the contribution cost with the benefit expenses for service years under old NPFPS, the total cost on the retirement benefit, leaving the expenses for old-age benefits of social insurance and 18% interest income subsidy excluded, will use up 8.3% of tax revenue while the population of general public sector only accounts for 3% of whole nation.

It is inequitable to consume national budget in such way especially when the system is distorted to deviate the spirit of pension system and too generous when compared to retirement benefits offered to general population.

According to statistics, the percentage of in-force public servants aged over 60 only takes 3%¹¹ while those aged between 18 to 50 takes up 76%. Percentage of aged education workers and military personnel is even less¹². Loss of aged experienced general public sector employees can be attributed for 2 reasons. First, retirement benefit is too generous. Participants lose motivation to continue employment if the retirement benefits is more than working salary after tax. Second, lack of early retirement and earning test create arbitrage opportunity for retirees. Contrasted to global trend to raise the normal retirement age to mitigate the old-age benefit financial burden, the retirement age of general public sector employees, taking public servants

⁹ Based on 35% equilibrium rate of which 65% born by government employers while 35% born by employees.

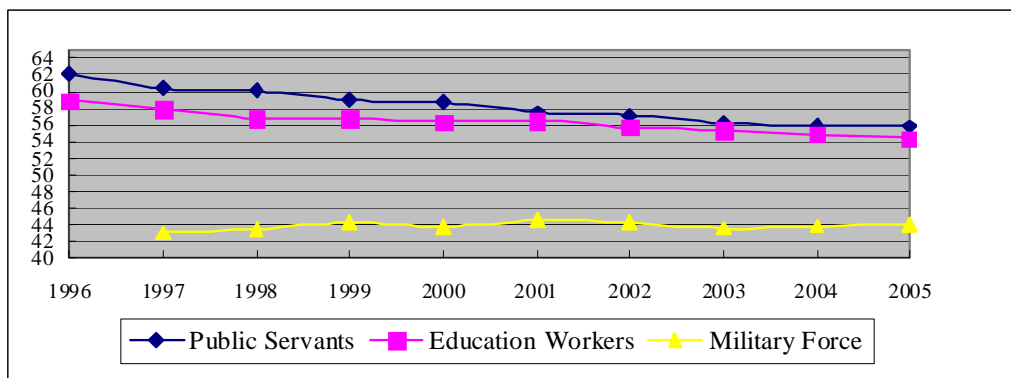
¹⁰ The annual salary expenses for public servants, military force and public education workers, according to 3rd valuation report, totals as of US\$ 14.5 billion.

¹¹ http://www.mocs.gov.tw/statistic/main_statistic_b.aspx?sl_id=090201, visited on 2008/11/3

¹² It is only 1% for education workers aged over 60 and 0% for military personnel.

as example, decreases significantly from 62.2 in year 1996 to age 55.8 in year 2005¹³ (Figure 2). If a professor starts teaching at age 30 and retires at age 55, according to Taiwan Life Insurance Annuity Mortality Table, her life expectancy at age 55 is 28 years which implies she receives longer period of annuity than years contributing in education and her survivor is entitled to receive 50% of payment if she deceases. Moreover, due to lack of earning test, many “young” retirees return to workplaces again either in private school or business units and have generous pension benefits on the one hand and receipt of private income on the other. All these facts indicate that the development of the system has deviated its fundamental principle of establishment which is to provide basic financial security for long-term hired employees after they have contributed long period of service years to the nation.

Figure 2. Decreasing retirement age for general public sector employees



Sources: NPSFPS actuarial reports.

Furthermore, it is inequitable for a public retirement system designed to be too much superior to other systems for general population. Unfortunately, the huge gap of benefits between the public system and the one applied to

¹³ Data are from NPSFPS actuarial reports.

private labor segment demonstrates this fallacy.

Taiwan promulgated New Pension Act on 2005 to have defined contribution plan replacing the old defined benefit plan¹⁴ for employees working for private business units. Though the old DB system provides possible richer benefits than the new DC system, few employees except those hired by large companies are qualified to apply retirement benefits since the criteria requires 25 years of continuous service with one same company while the average life span for small and medium size of business units in Taiwan is only 13 years. The New Pension Act is a mandatory system which requires all employers monthly contribute at least 6% of employee's salary into his personal accounts while employees are allowed to do voluntary contribution not more than 6% of salary. According to the statistics by Council of Labor Affairs, the actual average contribution rates made by employers and employees are 6.01% and 5.05%¹⁵ respectively. When the participants are qualified to receive retirement benefits, the lump sum in his personal account will be converted to life annuity if he joins the system for more than 15 years otherwise he will be paid in lump-sum. Under such system, the retirement payment fully depends on the terminal value of employee's account which relies on investment performance during the accumulation period. An employee retiring at age 60 with 30 years of service while earning 5% average investment yield and 1% of salary increase rate will only be entitled 14% of replacement ratio based on 20 years guarantee life annuity. If he matches 53.8%¹⁶ of employer's contribution which is 3.2% the aggregate replacement ratio will be 21%¹⁷ which is far less than benefits earned from the public sector for same length of service years. Basic comparisons between public and private systems are

¹⁴ The pension regulations are stipulated by Labor Standard Law.

¹⁵ <http://www.bli.gov.tw/reportY.asp?y=096&f=h1350>, visited on 2008/11/3.

¹⁶ This is the matching ratio of public sector employees which is derived from 35% divided by 65%.

¹⁷ The annuity pricing rate is assumed to be 2.5%

reported in Table 4.

Table 4: Comparisons of replacement ratio between public and private systems

| | Public (Educators, Military, Civil Service) | Private (Business Unit) |
|--|---|--|
| SY (years) | 30 | 30 |
| Replacement Ratio (2 nd Layer) | At least 60% adjusting with CPI | 14% + 7% (5% average yield, 2.5% annualized yield), not adjusting with CPI |

When protest voice from labor employees is getting louder, the authorities who make the policy and are also the beneficiaries of the policy didn't take active steps to mitigate the over-superiority and overlook the fact that the pension cost of the general public sectors is actually born by all taxpayers. The huge gap between system benefits and the inequality of budget allocation serve to illustrate the economic inequity between work segments in Taiwan.

3 Reforming the NPSFSS

Since maintaining the current benefit and raising the contribution rate up to fair rate is not workable and unacceptable, the other solution to restore the confidence of participants inside the system and population outside the system is to review the rationality of such pension system and revise the benefits and conditions accordingly. Several directions can be considered.

First, if DB is the best choice for most of the participants, then to

reduce the annual replacement rate from 2% to lower level such as 1% for future service years and base the benefit payment on actual wage instead of two times of final base salary while remove other compensating bonus including the 18% interest subsidy is the solution. In the meantime strengthening full monthly annuity criteria packaged with a reduced annuity design is a must. As to the unfunded liability accumulated up to the valuation year could be amortized separately into 20 to 30 years shared proportionately by government employers¹⁸ and participants. In order to ensure the revised system operates on an on-going basis, the fair rate¹⁹ must be established at the very beginning and adjust whenever necessary. Under such system, retirement benefit will be reasonably reduced to encourage long term employment and benefits retain a closer relationship with the contributions paid.

Second, if the participants are willing to take more responsibility for their own old-aged security (Mitchell, 2002) and the same time wish to maintain a guaranteed retirement plan, a hybrid plan such as Federal Employees Retirement System (FERS) of US could be a reform direction as well. FERS is a three-tiered retirement plan. In addition to the basic social security benefit, the other two components are Basic Benefit Plan (BBP), a defined benefit plan and Thrift Savings Plan (TSP), a defined contribution plan. BBP is calculated by 1% of high-3 average pay times years of service while TSP is composed of contributions made by participants and federal agency with cap up to 5%. Though hybrid plan involves more administration work and cost, with such arrangement participants are eventually take more charge on their old-age wellbeing while maintain a basic floor of more secure defined benefit plan, But if to keep the current

¹⁸ If the unfunded liability is amortized over 30 years, the government agencies need to expense another 7%~8% of annual salary.

¹⁹ The fair rate is about the current 12% contribution rate since the equilibrium rate excluding the unfunded liability up to the 3rd valuation report is about 2~2.3 times of current contribution rate.

12% contribution rate is a premise, the annual replacement rate of basic plan need to be further reduced to below 1% so that there is room for the contribution dollars made to DC plan.

Third, if participants are ready to have a major change, then a cash-balance system could replace the current DB system. Under such plan, if current 12% contribution rate is maintained, with average 5% investment yield and 30 service years, the replacement ratio at age 60 will be estimated to be 30% which is 30% more compared to general population under New Pension Act receives. Not only does gap between systems been mitigated but each generation will be financially supported by themselves. Equity between segments and generations will be achieved, and the wellbeing of the broader groups including general taxpayers will be enhanced (Mitchell 2002).

Finally, if Taiwan policymakers are committed to pursue the absolute justice between systems then Japanese government approach is another solution. Japanese government currently has submitted a pension reform bill which integrates the pension system for civil servants into the general pension scheme for the private sector employees. Given one old-age security system for all professions, the maximum equity between systems and generations will be achieved.

4 Conclusions

NPSPFS is a young plan with only 9 years history, the funding ratio as of the latest actuarial valuation dated at 31st December of 2005 is merely 28%. The financial deterioration and over-superiority in benefit payments have called national attention.

Plan fraud is the major reason for the deterioration of fund status. Over payment in benefits not only motives participants to leave the post earlier but also departs the spirit of pension system. Lack of reduced

annuity design burdens the system with more financial pressure as the retirement age significantly drops and life expectancy gradually increases. Lack of earning tests encourage the young retirees return to workplace in private sectors and enjoy rich benefits on the one hand and receipt of salary on the other. Though government employers budget more and more for pension expenses but still face the unavoidable deficiency. Young generations of participants inside the segment lose confidence in receiving benefits since the fund will be used up by the time they are qualified to retire. General populations think inequitable because the pension expenses for the 3% working population take up more than 8% of tax revenue and the pension benefits between two segments are far from comparison. The inequity is not only within the segment itself but also spillover to labor working segments and others.

There are two solutions for such disaster. One is to raise the contribution rate up to fair rate, the other is to cut the benefit or reform the system. To raise the contribution rate up to fair rate with 65% born by government employers does not comfort to equity principle in terms of national budget allocation, not mention the retirement benefits between public sector and private sector existing huge gap. Thus the only solution is to boldly cut the benefits or reform the system. With this approach the young generation in public sector will have better chance to receive retirement benefit and the benefits allocated to public segment won't be over superior to private segment and the minimum equality will be held.

In this paper four suggestions in term of system reform are made. One is to cut the annual replacement rate for future new service year and amortize the unfunded liability. Second is to adopt the hybrid plan. Third is to replace the current DB plan with a cash balance plan. And finally is to integrate the private and public pension systems as Japan government plans to do. Further research could be aimed at the new plan type and new

benefit level which will link the contribution rate to the benefit design well and serve the general public employees the most equitable old-age security.

From many countries experience, we observe there is no plan which pleases all stakeholders. Since the design of the plan is about allocation of resources and it is unlikely to satisfy everyone with different interest. Therefore, in the process of system review, the maximum equity and the optimal fairness is the principle that authorities in charge have to insist.

Bibliography

- Disney, R.; Johnson, P.** 2001. *Pension Systems and Retirement Incomes across OECD Countries*, Edward Elgar Publishing.
- Holzmann, R.; Richard H.** 2005. *Old-Age Income Support in the Twenty-first Century: An International Perspective on Pension Systems and Reform*. Washington, DC: World Bank.
- Hsu, S. P.** 2007 “The Current Issues and Reforms Concerning the Retirement System of Civil Servants” in *Examination & Personnel Quarterly*, Vol. 50, No. 2.
- Lund, B.** 2006. *Distributive Justice and Social Policy, Social Policy: Theories, Concepts and Issues* edited by Michael Lavalette and Alan Pratt, SAGE Publications.
- Mercer Consulting.** 2002. *NPSPF 2nd Actuarial Valuation Report*, Management Board of Public Service Pension Fund.
- Mitchell, O.** 2002. *Redesigning Public Sector Pensions in Developing Countries*, Wharton School’s Pension Research Council and Boettner Center for Pensions and Retirement Research, PRC WP 2002-09.
- Mitchell, O.** 2008. *The Future of Public Employee Retirement Systems*, Wharton School’s Pension Research Council and Boettner Center for Pensions and Retirement Research, PRC WP 2008-08.
- Pros Actuarial Consulting Group.** 2005. *NPSPF 3rd Actuarial Valuation Report*, Management Board of Public Service Pension Fund.
- Shao, A. J.** 2004. “The Old-Age Security Analysis of Three Segments in Taiwan”, in *Pension Fund Annually*, No.3.

-
- Shao, A. J.** 2007. “Taiwan Civil Service Retirement System: Reform and Directions” in *Examination & Personnel Quarterly*, Vol. 50, No. 6.
- Shao, A. J.** 2010. “Within- and Between Systems Justice Issues: Taiwan Public System” in *International Social Security Review*, Vol. 63, No. 1.
- United States General Accounting Office.** 1998. *Implementation of the Federal Employees Retirement System*, Report to the Chairman Committee on Post Office and Civil Service House of Representatives.