Chapter 6

Financial Sustainability and Adequacy Issues on Social Security Pensions

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Abstract

Social security pensions have two major requirements for satisfying the sincere desire of the public. One is financial sustainability, and the other is the adequacy of benefits. As the population aging went on, financial sustainability became more serious in almost all countries. A long list of policy options to ensure financial sustainability has been demonstrated globally. They are usually painstaking with tears and quite unpopular to the public. Nevertheless, many developed countries have already managed to implement these policy measures.

The other requirement, adequacy, is desired for the elderly to maintain a decent living standard after retirement. If any pension system fails to meet this requirement, it will be *politically* unsustainable.

Financial sustainability often violates the adequacy requirement. However, both requirements will not always be compatible with each other. Sophisticated balances between them are necessary for pension policymaking.

This chapter first gives an overview of making social security pension systems financially sustainable. Ample experiences in developed countries are illustrated. Before going into discussions, fundamental characteristics of social security pensions and a need for periodic actuarial evaluations are mentioned.

Second, it demonstrates the basic contents of pension adequacy from an economic perspective, explaining various relationships to poverty alleviation.

1 Introduction[1]

Social security pensions have two major requirements for satisfying the sincere desire of the public. One is financial sustainability, and the other is the adequacy of benefits.[2] As the population aging went on, financial sustainability became more serious in almost all countries.

[1] This paper is based on Chapters 1 and 2 of Takayama (2021), soon published in Chinese, and translated by Dr. Xinmei Wang.

[2] Some persons refer to these two requirements as “objectives,” but the genuine objective would be to attain a stable standard of living after retirement.

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Second, this chapter demonstrates the basic contents of pension adequacy from an economic perspective, explaining various relationships to poverty alleviation.

2 Fundamental Characteristic of Social Security Pensions

There are four major characteristics of social security pensions;

- a system of dividing the value-added of the national economy among different generations
- pay-as-you-go vs. funded: output is central
- defined benefit plans vs. defined contribution ones
- lifetime annuities vs. fixed-term annuities

A brief discussion of each is presented below.

Contributions from children and grandchildren mainly finance social security pension benefits for the elderly. It is a socialized system of income transfers between parents and their children. It is also a system of dividing the value-added of the national economy (an economic pie) between retired persons and actively working ones. In Japan, for example, 66 million working persons financially supported the life of her 127 million whole population (1.9 persons per worker) in 2015. In 2050, 46 million working generations will be estimated for 100 million persons (2.2 persons per worker). Actively working persons will be forced to bear relatively much heavier burdens during the next 35 years under a declining and aging population. Social security pensions thus have to flexibly adapt to the changing size of the national economy and the changing distribution of the population.

In a macroeconomic context, social security pensions stand indifferent to their choice of the financing method, pay-as-you-go or funded. It is known as an *equivalence proposition* (see Geanakoplos-Mitchell-Zeldes 1998). Pay-as-you-go pension benefits depend on the growth of the future economy, while funded pensions pay their benefits by returns from the funded reserve andits decumulation. Under an aging population with a slower growth rate of the

economy, the rate of return from investment or the selling price of the funded assets will consequently decline. The results will be indifferent, regardless of pay-as-you-go or funded pensions.

Someone might say that more pre-funding of social security pensions will strengthen their financial sustainability under an aging population. This assertion is a “complete lie,” quite contrary to the equivalence proposition (stated above), which is currently shared as a common understanding among pension professionals worldwide.

Output is central for pensions in the future. Higher productivity and later retirement are both crucial. Longer working years corresponding to longer life expectancy are immensely required. Pension policies have to go hand in hand with employment policies.

Within the pension system, encouraging later retirement and eliminating the work disincentives are needed. In a microeconomic context, pension entitlements vary between defined benefit and contribution plans. Defined benefit plans first prescribe pension benefits, while defined contribution plans make contributions and adjust their benefits after. However, benefits in defined benefit plans often change over time. Eventually, adjustments in benefits are inevitable in both plans.

Finally, social security pension benefits are lifetime annuities. Their payment continues until the death of each pensioner. This sharply contrasts with private pensions, whose benefits are usually fixed-term annuities or even lump-sum ones. Hence, social security pensions can only serve as the indispensable base limit of income security in old age for all persons.

3 Need for Periodic Actuarial Evaluations

Social security pensions are fundamentally financed on a pay-as-you-go basis. They involve each individual for a long time, usually 60 years or even approximately 100 years. The future is uncertain, and precise predictions are beyond human knowledge and skill. There is no single ideal form for pensions, and their system has thus to be reformed continually with no end to adapt to the changing demographic and economic circumstances flexibly.

Developed countries generally publish a periodic actuarial evaluation to make the public know whether or not the current pension systems are financially sustainable and what outcome will occur if selective reform measures are adopted. In evaluating the long-term financial performance, the public actuary’s office places basic assumptions on future changes in fertility, mortality, labor force participation, CPI, wage index, and investment return from the funded reserve. It then projects long-term changes in each number of contributors and beneficiaries, annual revenues, expenditures, surplus/deficit, and balance of the funded reserve. The concern is whether or not the funded reserve will be used up in the future and when it will run out, provided that the current provisions remain unchanged. The actuary’s office usually assumes three cases (optimistic, medium, and pessimistic).

It is 75 years in the US, Canada, and Sweden regarding the projection term. It is 65 years in the UK, 50 years in France, and 100 years in Japan. Actuarial evaluations are done yearly in the US and Sweden, while in the UK, France, and Japan at least every five years. In the

meantime, actual and assumed conditions would more or less diverge, even when every effort is made, using the best available data. Over time, fresh data becomes available, and periodic updates of the financial projections are done using revised assumptions. Hence, actuarial evaluations are more like “projections” into the future of pension finances based on currently available demographic and economic data rather than future “forecasts.”

The authoritative actuary office has ideally to be independent of pension administrations. This is for ensuring neutrality, making its evaluation trustworthy. This is the case in the UK and Canada.

4 Policy Options for Ensuring Financial Sustainability

4.1 Major Options

There are four major options, as Barr-Diamond (2010) points out.

- Reducing the Level of Benefits
- Raising the Normal Pension Age
- Hiking the Contribution Rate
- Increasing National Output

Each option is explained below.

Reducing the Level of Benefits

There are several ways to reduce the level of pension benefits, such as changes in the reference indicator for benefit indexation and the update of past wages, a delay in the onset of benefit indexation, a reduction of the accrual rate (and the unit price of the flat-rate benefit) and a cut of the nominal amount of too generous benefits.

In the past, the automatic indexation of benefits to wages and the update of past wages for new beneficiaries were applied in many developed countries. Today, they have changed the reference indicator for this indexation and the update to contain the increasing cost of paying the aggregate amount of benefits.

The Iron Lady, Margaret Thatcher, executed the representative example, changing the automatic indexation of benefits to wages into the indexation only to CPI in the UK. Wages got higher than CPI there, and pension benefits began to decrease in real terms as time went on.

Japan recently faced wage increases lower than CPI increases (or decreases more than CPI decreases). The government decided to use the lower indicator for benefit indexation for the time being from 2021 onward.

In 2004, Germany and Japan introduced the so-called “demographic factors” to adjust the level of pension benefits for the time being. Japan then started considering the annual decline in the number of insured persons and the annual increase in life expectancy to reduce the benefit level for all existing pensioners in real terms yearly. Germany virtually adopted a similar tool as Japan. Spain followed suit in 2014, establishing a new revaluation formula.

Spain also began to apply “the sustainability factor” (life expectancy) to calculate the starting benefits of social security defined benefit pensions from 2019 (see Ramos (2014)). Since life expectancy tends to rise over time, this application will indicate that future retirees will automatically have a lower monthly amount of starting benefits than current retirees with the same employment record. In contrast, the total amount received as pensions over their lifetime would remain unchanged on average cohort by cohort, thereby enhancing intergenerationally more equitable redistributions of retirement income. This adjustment is similar to that structurally built in the defined contribution or notional (or non-financial) defined contribution pensions (see Settergren (2001) for Sweden and the cases in Italy, Latvia, Norway, and Poland).

As for a delay in the date of benefit indexation, France, for example, moved the date from April to October, i.e., from 2014, six months later. The Slovak Republic limited the benefits increase by fixed amounts from 2013 to 2017, while Austria, Greece, Portugal, and Slovenia temporarily froze automatic benefit indexation for all but the lowest group.

Regarding the update of past wages in line with wage increments in fixing the benefit amount for new pensioners, Germany and Japan changed the indicator from wages *before* deducting tax and social insurance contributions to the take-home pay (wages *after* tax and social insurance contributions deductions). The former got higher than the latter in the aging process. Japan further introduced the demographic factors mentioned above in updating past wages as an additional adjustment.

A reduction of the accrual rate for the earnings-related component is the most orthodox means for reducing pension benefits. Suppose the average service (contribution) years get longer in the future, say, from the current 30 years to 40 years, then, the accrual rate can be reduced gradually from, say, 1.0% per year to 0.75% per year cohort by cohort, keeping the average replacement rate unchanged. This was done in Japan in the 1985 reform. Suppose the average service years no longer get extended in the future. In that case, a new and lower accrual rate can be introduced for all insurers, including the existing beneficiaries, provided that the current nominal amount of benefits is fully guaranteed for existing pensioners to receive for the time being until the newly determined amount exceeds the predetermined amount. In the meantime, the benefit indexation is to be suspended. This kind of special treatment enables a smoother transition. This took place in Japan when a drastic reform was done in 1986 for civil servants, and in Greece when the unification of all social security pension systems was legislated in 2016.

As for a cut of the nominal amount of too generous benefits, it is politically difficult. Even if the public accepts it, its improving effect on pension financing might remain limited. Rather it can help the system to become more equitable.

The following are a few examples in Japan. A maximum 10% cut of the nominal amount of pension benefits was forced on retired employees in the National Railway Company when they began to receive the supportive grant from civil servants in Central Government in 1985. At that time, the funded reserve of the pension system for employees in the National Railway Company ran out. Another maximum 10% cut of the nominal pension benefits for retired civil

servants was executed in 2013, receiving old-age benefits of more than JPY 2.3 million yearly. The pension systems for civil servants were keeping their financing healthy, yet this cut was taken to cool down the intensified jealousy against civil servants. A 10% cut was just an easy option for the Japanese to make the first compromise. In contrast, it ensures the pensioners concerned keep their living standards unchanged, thus being regarded as not contrary to public order and morals.

Taxing more on too generous pension benefits is an alternative option.

Raising the Normal Pensionable Age

Raising the normal pensionable age[3] is fairly difficult since it is easy for the people concerned to know that things are of their own promptly. They hurriedly think of themselves as the "losers" and are likely to violently protest against this increase (see the latest case under the Putin Administration, for example). This policy option is politically unpopular.

It takes much time for a majority of the public to understand why this option is necessary for the pension system to keep its financing healthy and to remain intergenerationally equitable under the lengthening life expectancy.

Polite, patient and repeated explanations are required before the proposal is made as to why this policy measure is appropriate and what will happen in the future without adopting this option.

Due lead time has to be built up in implementing this policy, say, 10 or 15 years. During this preparatory period, the government needs to complementarily create or improve working conditions for seniors by subsidizing elderly workers who receive better training for higher productivity (upgraded skills and better job quality) and by giving subsidies to employers who hire seniors more.

These orthodox approaches might end in vain, however. Rather, persistent deficits in the current account of the pension system and depletion of the funded reserve often trigger enforcement of this option in a much hastier and ruder way (the 2010/2012 reform in Greece and the 2011 reform in Italy, for example. See OECD (2013) and Segreti-Dinmore (2011)).

The less difficult option will be to attain gender equality by converging the lower normal pensionable age for women to the same level for men. This is often the case in many countries. Incidentally, women live longer than men on average.

To cope with rising longevity, some countries (the UK, France, and Sweden) adopt a "trisection" rule of one's grown-up life stages, regarding the third stage as the period of pensioners while placing the first and second stages as the contribution period. Their recent idea of increasing the normal pensionable age (or extending contribution years for receiving a full or non-reducing amount of benefits) is based on this rule. The normal pensionable age will be increased to 68 by 2046 in the UK following this rule.

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[3] The normal pensionable age is not always the same as the mandatory retirement age or the retirement age in practice. The normal pensionable age is defined as the starting age for receiving old-age pension benefits with no reduction or increment. The mandatory retirement age means the age when workers with indefinite-term employment are forced to retire.

Other countries like Denmark, the Netherlands, and Italy have adopted an automatic indexation of the normal pensionable age to longevity. Belgium, Finland, Greece, Hungary, Korea, Portugal, the Slovak Republic, and Turkey follow suit. Once a one-shot reform for the government to enforce this rule is done, the rule automatically applies without further legislation. Thus, this is regarded as a wise method to avoid *political risk* (see European Commission (2009)).

Overall, many developed countries have already increased the normal pensionable age to 67 or even higher, although they underwent great hardships before enacting their legislation. Denmark's estimated normal pensionable age will reach 74 in the future, presenting an extreme case.

An advance payment of actuarially reduced benefits is usually admitted from age 60 or 62. The UK is an exception, having no such provisions. Some countries such as Japan and Spain set up a temporary bridge to the increased normal pensionable age by devising a "partial pension" for those working part-time close to the normal pensionable age.

An alternative option is to extend the contribution years for receiving the full amount of benefits. France, for instance, once *decreased* the normal pensionable age from 65 to 60 in 1982. This decision was made to enable employment conditions for young persons to get much better by encouraging elderly workers to retire earlier. Since then, increasing the normal pensionable age has been particularly difficult in France. The French government has been forced to muddle through pension-sustainability issues, struggling to work out by devising an extension of contribution years for receiving the full amount of benefits. It was extended step by step from 37.5 years in 1994 to 43 years in 2035.

Hiking the Contribution Rate

As the population aging proceeded, many countries gradually hiked the contribution rate for pensions. Some countries with a relatively lower rate of contributions can still further increase their rate. This increase might cause damage to companies' economic activity. A majority of developed countries have little room for adopting this policy today. These countries are seeking for alternative policy options to raise revenues. See Subsection 4.2 below.

Increasing National Output

Increasing national output is very crucial, as already discussed above. This is the policy option other than the pension system. Policymakers are there in the cabinet office other than the pension ministry.

4.2 Other Options

In addition to four major options, the following are five other options.

- Increasing Transfers from General Revenue
- Expanding the Contribution Base
- Coverage Expansion

・Broadening the Social Pool
・System Integration/Unification

Each option is illustrated below in order.

Increasing Transfers from General Revenue

Transfers from general revenue can be increased when the economy is growing steadily with accompanying increased tax revenues. This was done to realize a lift of the benefit level for Japan's Kosei-Nenkin-Hoken (KNH) in 1965.

Governments can concentrate the transfer from general revenue to make it more equitable by subsidizing a flat-rate portion of benefits only, stopping help to finance the earnings-related portion. This was done in Japan when the "common" basic benefit was introduced in 1986.

Transfers from general revenue are sometimes used to make up for a financial loss in some pension systems. There is a natural limit to this selective use.

Increases in transfers from general revenue will probably be feasible when a new tax is introduced. In France, Contribution Sociale Généralisée (CSG) has been used to finance part of social security pension benefits since 1991. In Japan, an earmarked consumption tax was introduced in 2014 to lift transfers from general revenue from one-third to one-half for financing the basic benefit. Both taxes can be regarded as variants of the value-added tax, imposing them on actively working persons and retired ones. They are more equitable between generations than contributions for pensions.

Expanding the Contribution Base

Contributions were imposed initially on regular wages and salaries. Their base can be expanded to include bonuses and all kinds of allowances for the pension system to have a possible increase in revenues. This expansion also contributes to attaining more equitable burdens among different kinds of employees.

Sweden removed the wage cap (ceiling) for *employers'* contributions while keeping the wage cap unchanged in calculating the number of pension benefits.

Strengthening measures to collect contributions is another option for increased revenues. Some countries changed their collection authorities from the social insurance agency to the tax office. The latter usually have superiority in collection capacity.

Coverage Expansion

An increase in the number of contributors is another policy option. There may be persons who meet the eligibility requirements for the program participation yet are not covered. These persons have to be encouraged to participate in the pension program. Relaxing the eligibility requirements is the other policy tool. For instance, atypical employees such as part-time employees, temporary staff, contract workers, and dispatched employees can be included in the pension program for employees.

Eligibility requirements can be eased further by applying the program to employees working at smaller business establishments with less than five members or even only one member.

Eligibility requirements may also be relaxed to mandate older employees to pay contributions after they reach the normal pensionable age and above when they continue working. This is the case in Germany and Japan.

Broadening the Social Pool

Some population groups with a declining number of contributors and a lower level of monthly salaries face financial difficulties earlier than others in the pay-as-you-go system. Broadening the social pool of pension contributions beyond the boundary of respective programs can make their programs financially more sustainable.

It also enables equal treatment for all pensioners to receive the same amount of monthly benefits when they have paid the same amount of contributions during their active life, as far as the same cohort is concerned. The same benefit formula enables a smaller gap in contribution rates among different programs. Germany, France, and Japan have such broadened social pool in pension financing. These countries have segmented pension programs separated by different sectors of the population.

System Integration/Unification

The ultimate goal of the pay-as-you-go pension system will be to integrate or unify all the systems. Germany enacted a law integrating two major programs for blue- and white-collar workers in 2004. Japan took a step-by-step approach to integrating pension programs for employees and has unified all of them since 2015 (see Takayama (2018)).

Broadening the social pool or integration can save time before fully-fledged policy measures are implemented.

4.3 Some Remarks

Policy measures for ensuring the financial sustainability of pensions mostly take pains and tears. The later pension reforms come, the more painful they are.

If any country has lacked the political will to tackle the problem, letting things run their course, the outcome would be to excite outrage and despair among the elderly, together with roaring distrust against the country leaders among the young, who would be most deprived of their extremely high unemployment rate.

Greece serves as a typical example of what not to be. Pensions in Greece were once known to be among the most generous in the EU, while Greece suffered from high public debt and deficit. The financial crisis took place in 2008. The European Central Bank and other lenders imposed radical austerity packages on the Greek people. Drastic pension reforms and cuts in its benefits were a precondition for the loans granted to Greece. More than 10 pension cuts were implemented in 2010 (see Nakou (2018)). In 2010, Greece was forced to raise the

normal pensionable age, extend the contribution period, and impose an emergency benefit freeze. In 2012, they abolished holiday bonuses (the 13th and 14th pensions) and executed additional cuts to the highest benefits. The cumulative cuts ranged from 14% for the lowest-paid pensioners to over 40% for the top 2% of pensioners whose monthly benefits were above EURO 2,000. In 2016, they unified all the pension systems, abolishing all special arrangements. Existing benefits had to be recalculated by the new method and frozen at current levels until their value became equal to the value of the new pensions.

The author would like to emphasize that any success or failure in pension reforms will depend on whether or not smoother transitions from the existing system to a new one can be implemented.

Any reform involves both winners and losers. Winners usually have no voice or keep silent, while losers are most likely to be against the reform, sometimes with loud voices and radical actions.

Losers have to be limited to those who are financially better off, enjoying privileged benefits. It takes some time for them to correctly understand what reform is urgent, why the reform will save the cost imposed on their children and grandchildren, or why the reform will make the system more equitable. It is political leaders that have to persuade them to accept some concessions. Their vested interests must be preserved to the utmost limit, while their expected rights can be shaken down slowly over time. Pensions should not make a steep turn.

5 Pension Adequacy

This section demonstrates the basic contents of pension adequacy from an economic perspective.

Subsection 5.1 defines the concept of pension adequacy in the simplest way. It is the widely-used traditional one, different from the 3-dimensional complex concept proposed by a holistic document; *the 2018 Pension Adequacy Report* of EU. Subsection 5.2 discusses major factors governing pension adequacy other than income level. Subsection 5.3 explains various relationships to poverty alleviation. Subsection 5.4 refers to the challenges ahead for inventing new pension adequacy indicators on a macro basis.

5.1 Defining Pension Adequacy

In this chapter, the author adopts the traditional definition of pension adequacy, which has long been used in pension academia.

Pension adequacy is identified with an adequate level of pension *benefits* for each

individual (and couple) on a *micro* basis,[4,5] which ensures a decent living standard in dignity for old-age pensioners. In other words, pension adequacy can be consumption smoothing before and after retirement.

The conventional index to measure pension adequacy is the replacement ratio, i.e., the level of pension benefits (in cash) compared to the income from work before retirement (excluding income in-kind). Benefits are confined only to social security pensions, but in a much broader sense, benefits from non-mandatory occupational and personal pensions can also be included. Lifetime *average* wages and salaries usually specify the denominator (converted to their present value), while those amounts immediately before retirement are optionally used.[6]

An appropriate value of pension adequacy is given uniformly throughout the nation, ignoring regional differences.[7] This makes a sharp contrast with measures of poverty relief (public assistance). Incidentally, poverty relief requires immediate policy responses, whereas pension adequacy is a prolonged administration problem.

Lower incomes yield higher reference standards of pension adequacy. This is because the propensity to consume in old age decreases as the income level of wages and salaries in the past went higher.

Furthermore, for the existing old-age pensioners, the higher the level of their past income is, they can have much greater availabilities of other income sources than social security pension benefits, such as wages and salaries, non-mandatory occupational and personal pensions, asset income (rent, interest, dividend, parking charges, etc.) and asset withdrawals. Then, the standard value of pension adequacy declines more for the middle and higher income classes who have other income sources than wages and salaries.

Figure 6.1 depicts varying values of pension adequacy. If the consumption expenses are above the 45-degree line, then the standard value of pension adequacy indicates 100% or more. If it is below the 45-degree line, the reference value lies down under 100%.

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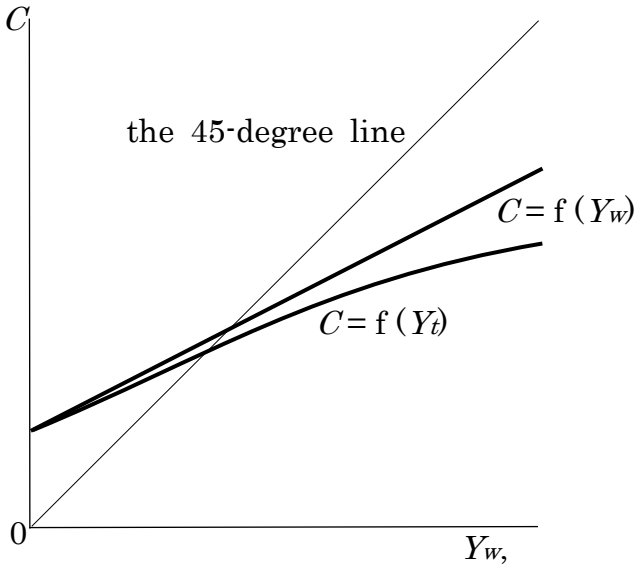
[4] Some others include *cost* elements in discussing pension adequacy by considering financial sustainability. This approach may complicate its discussions; it requires considerations on the micro-and macro-basis, arguments of different objectives with different policy instruments, and handling of trade-off problems. Thus, it may induce a hard-to-understand explanation for most non-experts in pensions. The present author separates pension adequacy from financial sustainability, setting the respective chapters.

[5] Following *EC's 2018 Pension Adequacy Report*, Zhao et al. (2019) wrote an excellent paper and examined three pension adequacy indicators, reflecting poverty prevention, consumption smoothing, and financial sustainability. My understanding is that poverty prevention or financial sustainability can be measured appropriately to a greater extent by direct indicators such as the poverty line, the headcount ratio of poor people, their poverty gap ratio, and the present value of pension benefits divided by the present value of future contributions and tax revenues plus accumulated reserves. This is shown in the balance sheet of social security pensions of the society as a whole, taking the future 75 or even100 years into account. Thus, only consumption smoothing seems to be the right objective for measuring pension adequacy in a narrow sense.

[6] As for non-salaried persons (farmers, merchants, craftworkers, professional free-lancers, etc.), remunerations or earnings after deduction of expenses are used as the denominator.

[7] China might be an exceptional huge nation in the world. Each Province in mainland China might be equivalent to each nation in other major countries.

Figure 6.1 Consumption Function and Degrees of Pension Adequacy



Note: *C*, *Yw*, and *Yt* denote the monthly reference standard (amount) of consumption expenses in old age, the monthly amount of lifetime-average wages and salaries, and the monthly amount of lifetime-average wages and salaries combined with income from other sources, respectively. It is assumed that the number of consumption expenses gives the numerator of the reference standard of pension adequacy.

In principle, the targeted replacement ratio as pension adequacy lies within 100% for the middle- and higher-income groups. If someone with a peculiar privilege enjoys the replacement ratio of more than 100%, then it implies that they receive too generous pension benefits.

The most popular standard of pension adequacy is demonstrated by focusing on individuals with the median or average amount of wages and salaries.[8,9] Their modal amount has rarely been used, though it may present one of the typical examples.

International Labor Organization once recommended three degrees of 40%, 45%, and 55% as the reference standard of pension adequacy for typical workers at the point of their retirement (see ILO (1952) (1967a) (1967b)). The ILO standards were often referred to measure how the consumption is smoothed.

Several major factors other than income levels govern the standard degree of pension adequacy. Their examples are balance of length between working and retired years, net or gross income, early or later stages after retirement, individual or married couple unit, different components of consumption expenses between pension contributors and beneficiaries, and balance between solidarity and self-reliance. The next section describes these factors, respectively.

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[8] For example, the *Pension Adequacy Report 2018* of the European Union uses the median amount before tax and social security contributions deducted (in gross terms), while Japan currently adopts the average amount in gross terms, both as the numerator.

[9] Regarding economic variables, the median is higher than the mode, while it is lower than the average. Consequently, the standard value of pension adequacy using the median will be slightly higher than that obtained by the average.

5.2 Other Factors Governing Pension Adequacy

Balance of Length between Working Years and Retired Years

The reference standard value for pension adequacy is higher if a person works as an employee for longer years and receives pension benefits for shorter years. For example, assuming that they work for 40 years and retire to receive pension benefits for 20 years. Then the required monthly amount of pension benefits will be two-thirds (66.7%) of monthly wages and salaries to attain consumption smoothing throughout their lifetime. In a polar case where they work for a much shorter period of 30 years and receive pension benefits for 30 years, the standard pension adequacy value will be 50%, much lower than 66.7% in the former.

Thus, the year of entrance to and exit from the labor market matters. The normal pensionable age is also decisive.

The examples shown above are simplified ones. They assume no wage increases, no tax, social security contributions, no benefits indexation, or family formation. If these factors are considered, the reference standard for pension adequacy has to be adjusted accordingly.

Net vs. Gross

Usually, income tax and social security contributions are imposed on wages and salaries. At the same time, the amounts of their payment from pension benefits are much smaller, or even just about nil in many cases. Consequently, the net pension adequacy is, more or less, higher than that in gross terms.

Early or Later Stages after Retirement

Consumption activities require physical energy, which diminishes gradually over time in old age.

This fact will justify an implementation of CPI indexation of pension benefits, seen in many countries. The wage escalation rate is often higher than the increase of CPI. In these circumstances, the value of the standard for pension adequacy will decline gradually after retirement.

In later stages after retirement, some special consumption expenditures such as healthcare, long-term care, transportation, housing, and heating may become huge. But these expenses are better paid in kind through respective programs. Section 5.1 of this chapter states that pension adequacy is traditionally measured by income in cash (and not by income, including in-kind benefits).

Individual or Married Couple Unit

There is a household scale of economy in consumption expenditures. The value of reference standards for pension adequacy varies depending on whether the individual unit or the married couple unit is applied. The equivalized income is used for individualization,

influenced by living habits and policy arrangements of life-related programs in each country. Take old-age Japanese pensioners, for example. On average, their monthly amount of basic consumption expenditures for a married couple is equal to 1.4 or 1.5 times larger than that for an individual.

Different Components of Consumption Expenses

For actively working generations, consumption expenses generally contain raising and educational costs of their children, repayments of land and housing loans, and necessary costs for daily works and commuting, all of which old-age pensioners can dispense.

The Balance between Solidarity and Self-reliance

In designing social security pensions, some redistributive elements are incorporated to mitigate the gap in past work income within generations. A universal flat-rate portion of benefits is the typical example. Other examples are guaranteed minimum pensions, supplementary pensions, progressive pension formulas, credits for family care periods, non-contributory social pensions, contributions based on upper earnings limits, and reduced or exempted contributions.[10] In some cases, testing is introduced by mean-testing, income-testing or even pension benefits (of earned entitlements).

Each country has its perceptions of income inequality in old age. The solidarity strength among the members of society varies across different countries. Levels and categories of income redistribution in social security pensions are consequently different, mainly due to the country's history, culture, and geographical conditions.

5.3 Relationship to Poverty Alleviation

Consumption smoothing throughout a long lifetime requires young- and middle-aged persons to do forced savings. Social security pensions are invented to work as the major system to achieve this goal.

Funded reserves are unnecessary for the social security pension program to perform this mission well. Almost all developed countries manage the program in pay-as-you-go financing and not by a funded scheme.

The longer a person contributes, the more their monthly benefits get promised to be paid. These secrets operate as strong incentives for forced savings and tax advantages.

Achievements in consumption smoothing eventually meet with poverty prevention. However, many persons fail to enjoy consumption smoothing. Examples are low-wage earners, females with longer family-care periods, immigrants, and the unemployed or persons in poor health. After retirement, they are forced to receive other benefits such as non-contributory minimum or social pensions, special pension credits, or even public

[10] Levying personal income tax on pension benefits can be another example, though this belongs in tax policy tools beyond the framework of pensions.

assistance. These pension benefits/credits and public assistance are policy tools for poverty relief.

Regarding old-age pensioners, poverty prevention requires additional policy instruments from youth. More generous educational policies with grants and scholarships, effective employment machines, and health promotion measures are also essential. Forced savings are not the exclusive means.

Poverty relief has to be provided to poor individuals and households, regardless of age. Many causes trigger the poverty problems, such as the harshness of nature, a large family with many children, marriage at a young age, unexpected death of a father at his young age, incompetent parents, famine, malnutrition, ill health, injury, disease, low educational standards, economic slump, unemployment, and old-age are the typical causes. Each case should be treated with its relevant policy tool of a wide variety. It includes uniform benefits in cash nationwide and benefits in kind and area-specific or age-specific services. These benefits and services are financed by transfers from general revenue, with a means-test[11] in almost all cases.

The main policy tool for poverty relief is public assistance, which is often associated with a sense of stigma. More or less, young- or middle-aged persons have opportunities after a period to get away from receiving public assistance, whereas old-age pensioners have few opportunities for doing it. Due and valid reasons are there for many countries to have additional and complementary schemes for poverty relief *within* their pension program for old-age persons. They often set up top-ups of a minimum guaranteed pension, non-contributory supplementary pensions, and social pensions (allowances). In some cases, they become eligible to receive these pension benefits from a higher age of 75 or 80.

The poverty line and the poverty gap are commonly used in the poverty index. The poverty line is an income level, and a person with an income below the line is considered poor. The poverty gap of any individual is the difference between the poverty line and their income. In addition, there are three more indices of poverty on the *macro* basis; the head-count ratio, the poverty-gap ratio, and the Gini coefficient of income distribution among the poor. The head-count ratio is the percentage of people below the poverty line. The poverty-gap ratio is the *per-person* aggregate short-fall of income of all the poor taken together from the poverty line.

These three indices are all insensitive mutually to the others. However, to avoid these shortcomings, Takayama (1979) derived his measure of poverty from an ordinal axiomatic approach. The Gini coefficient of the censored income distribution is truncated from above by the poverty line, which includes the three indices mentioned above as its indispensable components.

5.4 Challenges Ahead

[11] Means testing may have disincentive effects on savings for retirement before the normal pensionable age and/or on working longer.

The indicator of pension adequacy is currently given only on a *micro* basis by the reference standard of the replacement ratio. No indices of consumption smoothing on the *macro* basis have yet been invented.

A similar way of thinking in deriving the new measure of poverty on the *macro* basis mentioned above could help propose a new inadequacy index (for consumption smoothing) on the *macro* basis.

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References

Barr, N. & Diamond, P. (2010) *Pension Reform: A Short Guide*, Oxford: Oxford University Press, available in Chinese.

European Commission (2006), *Adequate and Sustainable Pensions: Synthesis Report 2006*, European Communities.

European Commission (2009) “Denmark: National Report on Strategies for Social Protection and Social Inclusion 2008-2010,” p.53 and Table 1.8, available on the website; http://ec.europa.eu/social/keyDocuments.jsp?ype=3&policyArea=0&subCategory=0&country=0&year=0&advSearchKey=nsr+spsi&mode=advancedSubmit&langId=en

European Commission (2018a) *The 2018 Ageing Report*, Publication Office of the European Union, available on the website; https://ec.europa.eu/info/sites/info/files/economy-finance/ip079_en.pdf

European Commission (2018b), *Pension Adequacy Report 2018: Current and Future Income Adequacy in Old Age in the EU*, Vol.1, European Union.

Geanakoplos, J., Mitchell, O. S. & Zeldes, S. P. (1998) “Would a Privatized Social Security System Really Pay a Higher Rate of Return?” NBER Working Paper 6713, available on the website; https://www0.gsb.columbia.edu/mygsb/faculty/research/pubfiles/474/gmzwd98.pdf

ILO (1952), *C102—Social Security (Minimum Standards) Convention.*

ILO (1967a), *C128—Invalidity, Old-age and Survivors’ Benefits Convention.*

ILO (1967b), *R131—Invalidity, Old-age and Survivors’ Benefits Recommendation.*

Nakou, G. (2018) “The First Cut is the Deepest? Greek Pension Reforms in Context,” *Macropolis*, 7 June, available on the website; http://www.macropolis.gr/?i=portal.en.features.7113

OECD (2013) *Pensions at a Glance 2013*, OECD Publishing, available on the website; http://www.oecd.org/pensions/public-pensions/OECDPensionsAtAGlance2013.pdf

OECD (2015) *Pensions at a Glance 2015*, OECD Publishing, available on the website; https://www.oecd-https://www.oecd-ilibrary.org/social-issues-migration-health/pensions-at-a-glance-2015_pension_glance-2015-en

OECD (2017) *Pensions at a Glance 2017*, OECD Publishing, available on the website; https://www.oecd-ilibrary.org/social-issues-migration-health/pensions-at-a-glance-2017_pension_glance-2017-en

Ramos, R. (2014) "The New Revaluation and Sustainability Factor of the Spanish Pension System," *Economic Bulletin*, July-August, Banco de España, available on the website; https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/InformesBoletinesRevistas/BoletinEconomico/14/Jul/Files/art2e.pdf

Segreti, G. and Dinmore, G. (2011) "Italy 'takes axe' to pension system," *Financial Times*, 7 December, available on the website; https://www.ft.com/content/d3ec9142-2027-11e1-9878-00144feabdc0

Settergren, O. (2001) "The Automatic Balance Mechanism of the Swedish Pension System," Working Paper, The National Social Insurance Board, Sweden, available on the website; https://www.pensionsmyndigheten.se/content/dam/pensionsmyndigheten/blanketter---broschyrer---faktablad/other-languages/archive-reports,-working-papers-and-studies/The%20Automatic%20Balance%20Mechanism%20of%20the%20Swedish%20Pension%20Reform.pdf

Takayama, N. (1979), "Poverty, Inequality and Their Measures: Prof. Sen's Axiomatic Approach Reconsidered," *Econometrica*, 47 (3), pp. 747-759, available on the website below: http://takayama-online.net/English/pdf/Poverty1979.pdf

Takayama, N. (1997), "Summary Comments by Rapporteur," presented at ILO-OECD workshop on Development and Reform of Pension Schemes, Paris, December, available on the website below: http://takayama-online.net/English/pdf/eng-1.pdf

Takayama, N. (2003)「全球性养老保障制度的最新争论与改革动向」『经济研究：资料』第4期, pp.10-21, in Chinese, available on the website; http://takayama-online.net/Japanese/pdf/thesis/thesis/chinese_ver2.pdf

Takayama, N. (2017) "Several Questions on Basic Ideas of the 1994 World Bank Report *Averting the Old Age Crisis,*"『社会保障評論』1(4), pp.36-43, in Chinese.

Takayama, N. (2018) "Major Changes in Japanese Public Pension System: Their Backgrounds and Underlying Philosophies,"『比較』96, pp.175-203, in Chinese.

Takayama, N. (2019), "How to Make Pension System Financially Sustainable?" available on the website below: http://takayama-online.net/pie/stage3/Japanese/d_p/dp2019/dp679.pdf

Its Chinese version is published in *China Labor*, DOI:10.19390/j.cnki.chinalabor.2019.05.006

Takayama, N. (2021), *Pension Reform: Global Solutions and Japanese Experiences*, Research Institute for Policies on Pension & Aging (RIPPA), Japan.

Zhao, Q., Li, Z. & Wang, Y. (2019), “Adequacy Analysis of the Basic Old-age Pension System Based on Local Administrative Data in China,” a paper presented at the 7th workshop on China-Japan Joint Research Project on Pensions, 25-26 November, RIPPA, Tokyo.