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PROBLEMS OF PUBLIC PENSIONS IN JAPAN

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I. *Introduction*

Problem of public pensions has come to be recognized as one of the most important policy issues in Japan.[1] It seems, however, that common arguments on this subject are not necessarily directed to correct problems.

For example, it is frequently argued that the public pension system will face a financial crisis in the future. It is pointed out that if the current benefit-contribution structure is maintained, the financial performance of the system will rapidly deteriorate, that reserve funds will evaporate in the near future, and that a sharp increase in the contribution becomes inevitable thereafter. According to a prediction by the Ministry of Welfare, the rate of contribution of the Employees' Pension will be forced to rise from the current rate of 10.6 percent to 30.6 percent in the year 2010 and to 34.9 percent in 2025. It is argued that since these levels are beyond the tolerable limit, the prediction in effect implies a bankruptcy of the system. It is further argued that in order to save the system from the financial disaster, radical reexamination of the current benefit structure must be undertaken.

Evidently, some kind of reform will be inevitable, and this will indeed be a painful and difficult process. However, if we regard the existence of the public pension programs *per se* as the cause of the increase in burden in the future, we would commit a serious fault. The burden of future generations cannot be alleviated even if the benefits are successfully reduced or even if the programs are entirely eliminated, because in those cases elders must be taken care of by individual households or by public assistance programs. Future generations cannot escape from increases in burden of some form, given the changes in the age structure of the population.

This argument does not deny the possibuility that public pensions may affect future burdens through their effects on the nation's intertemporal allocation of resources. Economists are fully aware that whether this happens or not depends not only on the method of financing the program—pay-as-you-go or funded method—but also on the extent to which individual households regard future benefits of public pensions as substitutes for other assets, namely on the impact of public pension programs on household savings. More specifically, if public pensions have no impacts on household savings, the burden of future

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[1] The term "social security" (*shakai hosho*) is used in Japan in a much broader sense than in the U.S.; it includes not only public pension but also medical insurance, public assistance, unemployment compensation and other welfare programs. For this reason I use the term "public pension" in this paper rather than "social security."

generations is not affected by their existence even if the pay-as-you-go method is adopted.

Other type of common argument criticizes the difference among benefits of various public pension programs. It is true that several programs with considerably different benefit-contribution structures coexist in Japan and that his creates various troublesome outcomes. It must be noted, however, that the difference in the benefits *per se* does not necessarily imply a violation of the equity principle. In fact, if the programs are managed according to an actuarially fair basis, the difference in benefits is justifiable because it reflects the difference in contributions. Therefore, equity between different programs cannot be judged without knowing the extent to which the benefit is financed by accumulated contributions.

It can therefore be said that although the importance of the problems emphasized by common arguments is not totally deniable, most of the arguments miss the crucial points or discuss inappropriately defined problems. It can also be argued that these arguments have the effect of concealing the truely important issues by emphasizing irrelevant problems. This paper tries to correct such biases in the argument.

This paper is organized as follows. In section II, the Japanese public pension system is briefly reviewed. The purpose of this section is to provide an introductory knowledge to those who are not familiar with the system.

Sections III and IV discuss institutional aspects of the present system. In section III, it is pointed out that in spite of the existence of the indexing provision, which in fact involves the double-indexing problem, determination of the real value of future benefits is primarily left to future discretionary actions. For this reason, there exist considerable uncertainties in future benefits. The role of reducing uncertainties in retirement life plan is therefore not necessarily fulfilled by the present system. It is also pointed out that the present benefit structure creates discrepancies between the benefits of different cohorts because benefits are related to the number of years in which contributions were paid. The contributory philosophy behind this provision is no longer supportable.

Section IV considers the financing structure. The officially calculated "level contribution" on which the official explanations are based contains several technical flaws. In particular, the strange assumption of no growth creates serious biases in the result. It is therefore not too much to say that the contributions have been determined without any reasonable principle. It is shown that most of the current benefits consist of transfers from the current contributors and tax payers. This involves not only any intergenerational transfer but also an intragenerational transfer. The latter arises because of the difference in benefits between different programs. The difference in benefits is not justifiable because most of the benefits are transfers. The problem is all the more serious in the present Japan because there are many cases in which a son belongs to a different program from his father's and hence is forced to support other persons' parents via the public pension program.

In section V, I present some empirical evidences on the impact of public pensions on household savings. In spite of its potential importance, this problem has not been studied enough in Japan, due on the one hand to economists' concern on "excess saving" and on the other hand to several technical difficulties—the difficulty of defining future benefits and the difficulty of distinguishing the effects of public pensions from those of Oil Shocks.

The present analysis is based on the life cycle model of saving including public pension variables which was originally proposed by Feldstein. In the analysis of the Japanese case, it is important to include retirement payments as well. The wealth and income data were

derived from the Family Saving Survey, on which the following interesting observations can be made: First, wealth-income ratio for government employees' households is significantly lower than that for other employees' households. Second, wealth-income ratio for employees' households is significantly lower than that for other households in ages just before retirement.

Several specifications have been tried. Among them equations which incorporate the differences between the variables for employees' households and those for other households' seem to yield the most plausible results. A tentative conclusion is; retirement payments reduce the preretirement savings of employees' households; almost a yen-to-yen substitution exists between the preretirement wealth accumulation and the accumulated contributions of public pension; and pure wealth effcet of public pension is absent.

Finally, there is a brief conclusion.

II. *An Overview of the Japanese Public Pension System*

The Japanese public pension system consists of eight programs, each covering people of different employment status. The most important programs are the Employees' Pension (*Kosei Nenkin*) which covers employees of the private firms and the People's Pension (*Kokumin Nenkin*) which covers self-employed (including farmers). Since the establishment of the People's Pension in 1961, all households have been covered by some public pension programs. The number of contributors and beneficiaries by programs are shown in Table 1. Note that the above two programs cover approximately 90 percent of the total households.

The benefit-contribution structures are different among the programs. For example, while the benefit and the contribution of the Employees' Pension are related to earnings, those of the People's Pension are not, due to the difficulty of assessing the earnings of self-

TABLE 1. THE NUMBER OF CONTRIBUTORS AND RECIPIENTS BY PROGRAMS (March 1980)

(1,000 persons)

Programs	Number of contributors	Number of Recipients of old-age pensions
Employees' Pension	24,714	1,834
Seamen's Pension	211	36
National Government Employees' Pension	1,175	269
Local Governments Employees' Pension	3,192	526
Public Corporations Employees' Pension	798	263
Private Schools Employees' Pension	311	10
Agriculture Corporations Employees' Pension	474	56
People's Pension	27,851	8,191*
Total	58,726	11,184

* Including the noncontributory recipients, which was 3,340 thousand.
Source: Social Insurance Agency (1980).

employed. The treatment of spouse (usually wife) is also different; namely, the People's Pension treats her as an independant contributor-beneficiary, but other programs usually treats her as a dependant. Historical backgrounds are varied too. Whereas the oldest one—the Pension for the National Government Employees—can be traced back to as early as the 1870s, the youngest one—the People's Pension—has the history of only 20 years. Reflecting these factors, there are considerable differences in the benefit-contribution levels and in the rates of government subsidies.

The overall benefits were improved significantly in the mid-1970s, and it is by no means an exaggeration to say nowadays that the Japanese public pension system is one of the bests in the world. If one compares the old-age pension in various countries, one finds that the level of the Japanese pension exceeds that of the most European countries; for example, the average benefit of the Employees' Pension in FY 1980 was abot ¥97 thousand (about $400)[2] per month, which was nearly 40 percent of the previous year's average earnings (including bonus). In terms of the "model benefit", i.e., the benefit provided to a recipient satisfying certain standard conditions, the level is still higher at ¥136 thousand (about $550) per month. The Japanese system is competent also in the eligible age which is 60 for the Employees' Pension.

The current rate of contribution for the Employees' Pension is 10.6 percent of the earning excluding bonus, which is shared equally between the employer and the employee. In case of the People's Pension, the basic contribution is currently ¥5,220 per month per contributor. If one wishes to receive additional benefit, one has to pay the additional contribution of ¥400 per month. Subsidies from the General Account are provided to the programs. The rate of subsidy is 20 percent of the benefit in case of the Employees' Pension and 33.3 percent in case of the People's Pension. In either case, the subsidy is granted at the time of the pension payment.[3] Because the pension payment in Japan has not reached the "matured stage", the amount of subsidies is relatively small. In FY 1979, the amount of subsidies to all public pension programs was ¥2,020 billion, which was 5.3 percent of the budget

TABLE 2. REVENUES AND EXPENDITURES OF MAJOR PENSION PROGRAMS

(Yen billion)

	Employees' Pension			People's Pension		
	FY 1965	1975	1979	FY 1965	1975	1979
Revenue	384	3,137	5,981	50	694	1,691
Contribution	297	2,202	3,988	25	369	1,006
Subsidy	8	174	464	15	213	521
Others*	79	761	1,529	10	112	164
Outlays	42	988	2,733	2	462	1,359
Balance	342	2,148	3,247	48	231	333
Reserve Fund	1,441	12,286	24,351	195	1,815	2,360

* Mainly interest revenue.
Source: Ministry of Finance (1980).

[2] In this paper, exchange rate of $1=¥250 is used.
[3] Prior to 1975, subsidy to the People's Pension was 50 percent of the contribution and was granted to the People's Pension Special Account at the time of the receipt of contribution. The reserve fund of the People's Pension grew rapidly owing to this provision.

TABLE 3. SUPPLY OF FUNDS: TRUST FUND AND PRIVATE FINANCIAL INSTITUTIONS

(Yen billion)

	FY 1960	1965	1970	1975	1980
Trust Fund	347	1,187	2,791	9,858	14,889**
Postal Saving	151	465	1,420	5,050	7,900
Employees' Pension	92	324	856	2,135	3,300
People's Pension	—	45	169	0	
Others	105	353	347	2,672	3,689
Private Financial Institutions*	1,228	2,860	7,341	12,434	15,235

* New supply of industrial equipment funds by private banks.
** Revised plan basis.
Source: Bank of Japan (1980).
Ministry of Finance (1980).

total of the General Account.

The revenues and outlays of the two major programs are shown in Table 2. The balances have always been positive, reflecting the fact that the Japanese public pensions are not managed according to the pay-as-you-go method. Note, however, that the ratio of the surplus to the revenue is decreasing in either program.

The accumulated contributions are pooled in the Trust Fund (*Unyobu Shikin*), which is the main component of the Fiscal Investment and Loan Program (FILP). The FILP is a system of government-operated financing, whose basic function is providing financing to various government-affiliated agencies such as the Japan National Railways, the Japan Highway Corporation, the Japan Development Bank, the Export-Import Bank of Japan, and the Housing Loan Corporation. Today, the number of agencies which receive the FILP fund exceeds 40. The sources of the Trust Fund are shown in Table 3. Although the largest source is the Postal Saving, the reserve fund of public pensions has an important share. In FY 1980, the increment in the Fund, the amount newly allocated to the agencies, was about ¥15 trillion. This is comparable in magnitude to the supply of funds by all private financial institutions which is shown in the bottom line of the table.

Finally, tax treatment is briefly reviewed. The old-age benefit is treated in the income tax system in the same way as wage income. Thus, although a certain deduction is allowed, it is regarded as a taxable income. On the other hand, contribution paid by an individual is fully deductable from his income, and contribution paid by the employer is treated as a business expense of the firm. Therefore, the present system allows the deffered tax payments for that part of income which is "saved" according to the public pension programs. This is of course a favourable treatment because income tax is progressive.

III. *The Benefit Structure and Its Problems*

In sections III and IV, the benefit-contribution structure of the two major programs—the Employees' Pension and the People's Pension—is reviewed in some detail and problems contained in the present structure are discussed. This section takes up the benefit side.

The pension system provides various benefits such as the old-age benefit, survivors

benefit, orphan benefit and disability benefit. The most important one is of course the old-age benefit. One is eligible to receive benefits if one has paid contributions for more than a specified years which is 20 years for the Employees' Pension and 25 years for the People's Pension[4]; one has reached the eligible age which is 60 for the Employees' Pension and 65 for the People's Pension; and for the full benefit of the Employees' Pension, one is retired.

The old-age benefit of the Employees' Pension consists of three parts; the fixed amount benefit, the contribution-related benefit, and the supplementary benefit. In case of the People's Pension, the benefit is fixed amount. In both cases, the benefits are related to the number of years in which contributions were paid (hereafter referred to as "contribution years"). More specifically, old-age benefits are determined according to the following formulae:

Employees' Pension

$$B_E=(A_E+eE)NR+D, \qquad (1)$$

People's Pension

$$B_P=A_PNR+C_PN, \qquad (2)$$

where B_E and B_P are monthly benefits, E is the average monthly regular earnings[5], N is the number of contribution years, and R is the coefficient for indexing inflation. If the rate of inflation represented by the rate of increase of the Consumers' Price Index is a constant p (>0.05) for m years after the values of the parameters A_E and A_P are set, then $R=(1+p)^m$. The values of the parameters A_E, A_P and e are specified in the laws. Current values are $A_E=$ ¥2,050, $A_P=$ ¥1,680, and $e=0.01$. The term D represents the supplementary benefit for spouse and other dependants. Currently, $D=$ ¥15,000 if the recipient has spouse. The last term of the B_P equation represents the additional benefit which is provided to those who have paid the additional contributions. Currently, $C_P=$ ¥200.

In order to present the benefit level in a plain way, "model benefit" is calculated by setting the values of E and N at those of a "representative beneficiary." In FY 1980, the following values were assumed: $E=$ ¥198,500, $N=30$ for the Employees' Pension, and $N=25$ for the People's Pension. Thus, model benefits were $B_E^*=$ ¥136,050 (including the suplementary benefit for spouse), and $B_P^*=$ ¥94,000 per couple (including the additional benefit). The replacement ratio of the current model benefit of the Employees' Pension is about 50 percent in terms of total earnings and about 70 percent in terms of regular earnings (In the Japanese salary system, bonus payment has an important share; earnings including bonus is 30 to 40 percent higher than earnings excluding bonus. In this paper, the former is referred to as "total earnings" and the latter as "regular earnings"). It must be born in mind that the nature of the "model benefits" are different between the two programs; namely, while the model benefit of the Employees' Pension can be regarded as the benefit of an actual "representative beneficiary" at present, that of the People's Pension is only hypothetical because the contribution years of the current beneficiaries are at most 15 years.

[4] In case of the People's Pension, there is a special provision to provide benefits to those contributors who have paid contributions for more than 5 years. Noncontributory benefits are provided by the People's Pension program to those people who were over 50 in 1961 and were not covered by other public pension programs. The latter is financed exclusively by the subsidy from the General Account.

[5] Actual formulae are somewhat more complicated. For example, there are upper limits to E and N in computing the benefits. Also, the value of E has been periodically reassessed.

TABLE 4. MODEL BENEFITS AND THEIR REPLACEMENT RATIOS

(Benefits in yen, ratio in percent)

	Model Benefits				Earnings		Replacement Ratios	
FY	A_E	B_E*	A_P	B_P*	Y_1	Y_2	B_E*/Y_1	B_E*/Y_2
1966	250	10,000	80	4,000	44,642	35,017	22.4	28.6
67		10,000	200	10,000	49,747	38,865	20.1	25.7
68		10,000		10,000	56,511	43,731	17.7	22.9
69		10,000		10,000	65,824	50,088	15.2	20.0
70	400	20,000	320	25,000	76,505	57,896	26.1	34.5
71	460	21,500		25,000	87,172	66,085	24.7	32.5
72		21,500		25,000	101,330	76,696	21.2	28.0
73	1,000	52,242	800	50,000	123,913	91,509	42.2	57.1
74		52,242		50,000	158,290	115,560	33.0	45.2
75		72,997		66,657	176,532	131,905	41.4	55.3
76	1,650	90,392	1,300	75,000	199,174	148,137	45.4	61.0
77		98,325		81,116	217,303	162,573	45.2	60.5
78		104,485		85,850	231,749	174,174	45.1	60.0
79		107,858		88,884	242,989	181,610	44.4	59.4
80	2,050	136,050	1,680	94,000	259,832	193,208	52.4	70.4

Notes: 1. A_E and A_P are parameters defined in the text.
2. B_E* and B_P* are monthly "model benefits" of the Employees' Pension and People's Pension. B_P* is for a couple. The value of N for B_E* changes over time, that for B_P* is fixed at 25. Additional benefits are included in B_P* since 1970.
3. Y_1 is total cash payments in all industries excluding service industries. Y_2 is regular salaries in all industries excluding service industries.

TABLE 5. AVERAGE BENEFITS OF NEWLY ENTITLED RECIPIENTS AND THEIR REPLACEMENT RATIOS

(Benefits in yen, ratio in percent)

	Employees' Pension			People's Pension		
FY	$\overline{B_E}$	$\overline{B_E}/Y_1$	$\overline{B_E}/Y_2$	$\overline{B_P}$	$\overline{B_P}/Y_1$	$\overline{B_P}/Y_2$
1966	8,318	18.6	23.8			
67	8,776	17.6	22.6			
68	9,263	16.4	21.2			
69	11,440	17.4	22.8			
70	15,784	20.6	27.3			
71	17,446	20.0	26.4	4,345	4.98	6.57
72	19,101	18.9	24.9	4,333	4.28	5.65
73	28,052	22.6	30.7	5,994	4.84	6.55
74	45,648	28.8	39.5	10,572	6.68	9.15
75	56,525	32.0	42.9	11,730	6.64	8.89
76	69,250	34.8	46.7	15,711	7.89	10.61
77	79,055	36.4	48.6	18,291	8.42	11.25
78	85,419	36.9	49.0	19,812	8.55	11.37
79	89,341	36.8	49.2	21,073	8.67	11.60
80	97,007	37.3	50.2			

Notes: 1. $\overline{B_E}$ and $\overline{B_P}$ are monthly average benefits of newly entitled recipients of the Employees' Pension and the People's Pension, respectively.
2. Y_1 and Y_2 are difined in Table 4.

The indexing provision was introduced in FY 1973. The present formula for the Employees' Pension apparently involves the "double-indexing" problem.[6] Curiously, this "serious technical flaw" has never become a subject of policy debates in Japan. It would therefore be worthwhile to present a numerical example to illustrate the way that this works.

Consider first a static situation in which monthly regular earnings have been ¥200 thousand for all workers for a long time. Then old-age benefit of a beneficiary who has worked for 30 years is ¥121.5 thousand per month (excluding supplementary benefits). Suppose now that both nominal earnings and price begin to grow at an annual rate of 5 percent. Then, thanks to the indexing provision, the real value of the benefit of the above mentioned beneficiary is kept unchanged. The replacement ratio is maintained at 0.61. However, a different situation arises for a younger beneficiary. To see this, consider a worker of age 30 who is expected to work for 30 years. His average monthly regular earning will be ¥443 thousand. Hence the old-age benefit that he can expect to receive at age 60 will be as much as ¥840 thousand. The replacement ratio will be raised to 0.97. Thus, the younger beneficiary has derived two advantages from inflation—one from the increase in average monthly regular earning itself and one from an increase in the benefit relative to the nominal value of average monthly regular earning. The advantages are greater for a higher rate of inflation. For example, if the rate of inflation is 10 percent the replacement ratio becomes 1.95 for the above mentioned beneficiary, and if the rate of inflation is 15 percent the replacement ratio becomes 4.66!

In this way, the present indexing procedure treats younger beneficiaries too generously. This of course creates several undesirable outcomes. First, the total pension payments will grow at a faster rate than the rate of inflation. Second, discrepancy will arise between the benefits of different cohorts. Third, the benefits of the Employees' Pension relative to those of the People's Pension will become higher, because no double-indexing exists in the latter program. The second problem can in principle be settled by periodically reassessing the value of past regular earnings. But this will spread the effect of double-indexing to all cohorts, thus raising the overall benefit level of the Employees' Pension. This implies that the third problem is aggravated.

The above description contains some exaggerations, however, because the double-indexing does not work fully in our system due mainly to the existence of the fixed term A_E. In fact, the replacement ratio could fall if earnings grow in real terms (This is probably the reason why the problem of double-indexing has not become a serious policy issue in Japan). To see this, assume that the rate of growth of real earnings is 3 percent instead of zero and that the inflation rate is 5 percent. Then, the average monthly regular earning of the above mentioned worker will be ¥755 thousand, and hence the old-age benefit that he can expect to receive at age 60 will be ¥1,244 thousand if no amendment is made to the benefit formula. The replacement ratio will then be 0.62.

The fall in the replacement ratio is greater for higher rate of real growth. For example, if the real rate of growth of earnings is 5 percent, the replacement ratio will fall to 0.48. Table 6 exhibits the replacement ratios for various combinations of the rate of inflation and the rate of growth of nominal earnings. It is clear from the table that if the rate of in-

[6] For expositions of the "double indexing," see Feldstein (1975) or Penner (1979, pp. 82–92).

TABLE 6. REPLACEMENT RATIOS FOR VARIOUS COMBINATIONS OF INFLATION AND NOMINAL EARNING GROWTH

	p					
g	0.00	0.02	0.05	0.08	0.10	0.15
0.25	0.394	0.713	1.702	3.962	6.870	26.069
0.05	0.225	0.407	0.972	2.263	3.924	14.889
0.08	0.143	0.259	0.619	1.440	2.498	9.477
0.10	0.112	0.203	0.484	1.126	1.952	7.409
0.15	0.07	0.127	0.304	0.707	1.227	4.655
0.20	0.05	0.093	0.221	0.514	0.891	3.382
0.25	0.04	0.073	0.174	0.406	0.704	2.670
0.30	0.03	0.061	0.145	0.336	0.583	2.214

Notes: 1. p is the rate of inflation and g is the rate of growth of nominal earning.
2. The replacement ratio is given by $\frac{3}{2}\left(\frac{1+p}{1+g}\right)^{30}\left[0.205+0.0067\frac{(1+g)^{30}-1}{g}\right]$

flation is low, the replacement ratio falls considerably even for a modest rate of real growth. In these cases, descretional legislative actions are still required in order to prevent the replacement ratio from falling, in spite of the existence of the indexing provision.

In fact, even after the introduction of the indexing provision, discretional adjustments were made periodically in Japan in two respects; One was the increase in the value of the parameters A_E, and the other was the reassessment of the past regular earnings.

It can therefore be said that in our benefit structure the future level of real benefits is determined primarily by discretional actions in the future. The impression that real values of future benefits are automatically protected by the indexing provision is mostly an illusion. The provision is nothing but a short-term device to adjust for inflations during the periods between discretional changes. It follows that there is a considerable uncertainty in the level of future benefits.

From the point of view of a prospective beneficiary, this kind of uncertainty is a serious problem. Public pension is not necessarily a reliable source of income in retirement life. It is true that the government has declared its objective of maintaining the replacement ratio (in terms of the regular earning) at about 60 percent. Yet the problem is that this is no more than an objective with no compulsory powers. It is frequently argued that one of the important functions of the public pension is to reduce uncertainties in retirement life plans. This role is not necessarily fulfilled by the present system.

It might be argued that the uncertainty is not without merit because it mitigates the possible adverse effects on savings. This argument is of course unacceptable. First, if insufficient savings are to be avoided, full funded method of financing should be pursued. Second, optimistic people would reduce savings even in the face of uncertainty. Third, if actual benefit turns out to be sufficient, the savings of those households which had pessimistic outlooks will turn out to be excessive. From the point of view of an individual household, this implies an intertemporal misallocation of resources.

The present benefit structure has another problem. As mentioned before, the benefits are related to the number of contribution years. The rationale for this provision is probably the necessity of keeping the contributory philosophy of public pensions. The problem

arises because the beneficiaries of considerably different contribution years coexist due to the fact that the Japanese public pensions are on the process of "matuarization." This makes the benefit levels of different cohorts to differ considerably even if values of the past earnings are equalized.

To make the point clearer, assume that people work from age 20 to 60 and die at age 75. Then, in case of the Employees' Pension which was established in 1944, the number of contribution years is distributed from 20 to 35 in 1979, and 30 to 40 in 1989. It is in the year 1999 that the number becomes 40 for all the beneficiaries. In case of the People's Pension which was established more recently, the distribution remains for longer periods; the number of contribution years will be distributed from 25 to 35 in 2001, and from 35 to 40 in 2011. It is in the year 2016 that the number becomes 40 for all the beneficiaries. In case of the Employees' Pension, the benefits of recipients of the longest contribution years will be more than 30 percent higher than those of the recipients of the shortest years, in the coming decades. It follows that if the benefit structure is so designed as to make the replacement ratio (in terms of regular earnings) of the highest benefit equal to the standard value of 60 percent, then that of the lowest benefit will be only 45 percent. On the other hand, if the replacement ratio is set at 60 percent for the lowest benefit, that of the highest benefit will become as high as 80 percent. This kind of discrepancy in benefits is probably undersirable in view of the nature of the public pension programs.

From the point of view of intergenerational equity, there seems to be little grounds to relate benefits to the number of contribution years because the principle of funded method of financing has already been violated to a considerable extent.[7] If there is a reason to relate the benefit to the number of contribution years, it is perhaps the necessity of maintaining intragenerational equity between those who have worked for longer years and those who have not. However, this would hardly justify the present structure in which even the fixed amount term is proportional to the number of contribution years.

It is true that the present system has a desirable property of mitigating induced retirement effects because benefits will increase as one works for longer years. However, the property will be weakened in the future. To see this, assume for simplicity that "disutility of work" can be represented by fraction $d(0<d<1)$ of total earning Y. Then old-age benefit of fixed amount will induce earlier retirement if replacement ratio is greater than $[1-(c+d)]$, where c is the rate of contribution in terms of total earnings. Under our system, earlier retirement will be induced if replacement ratio is greater than $[1-(c+d)]\,N/(N+1-L)$, where N is the number of contribution years and L is the expected years of receiving benefits.[8] In deriving this result, it is assumed for simplicity that benefit increases at the same rate as the discount rate. Clearly, the induced retirement effect is weaker under our system. For example, if $N=30$ and $L=15$, then $N/(N+1-L)=2$. It may be because of this that in Japan the

[7] See Section IV and Table 9.

[8] If an individual works one more year, his net gain in earning (earning less disutility and contribution) is

$$G=[1-(c+d)]Y$$

On the other hand, his old age benefit is $eNY=hY$ where e is a constant and h is the replacement ratio. By working one more year, present value of lifetime benefits is reduced by

$$D=eNLY-e(N+1)(L-1)Y$$
$$=(N+1-L)hY/N$$

By setting $D>G$, we get the condition in the text.

public pension programs seem to have very little impacts on retirement. Note, however, that the critical value of replacement ratio will fall in the future because the number of contribution years N will increase. It will be decreased further due to possible changes in the benefit structure. In the first place, the eligible age of the Employees' Pension which is currently 60 will be raised to somewhere around 65. This will reduce the value of L by five years and together with the lengthening of N, reduces the value of the coefficient $N/(N+1-L)$ to 1.3. In the second place, the contribution rate c which is currently about 7 percent (in terms of total earning) for the Employees' Pension will be raised to somewhere around 25 percent in the future. Then, assuming $N=40$ and $d=0.5$, we have the critical value of 0.32 in terms of total earnings. Note that this is lower than the present value of 0.50.

IV. *Problems in the Financing Structure—The Nature of Intergenerational and Intragenerational Transfer*

According to official explanations, the Japanese public pensions are managed according to the "modified funded method of financing," by which is meant a structure in which the actual rate of contribution is set at a somewhat lower level than the theoretical "level

TABLE 7. LEVEL RATES, ACTUAL RATES AND BALANCE RATES

	Employees' Pension			People's Pension		
FY	level rate	actual rate	balance rate	level rate	actual rate	balance rate
1960	4.4%	3.5%				
61				¥128	¥100	
62						
63						
64						
65	6.9	5.5				
66			20.6%			¥533
67				403	200	1,333
68						
69	8.5	6.2	18.0		250	
70			20.3	852	450	2,133
71		6.4	20.4			
72					550	
73	10.5	7.6	25.1			5,333
74				2,661	900	
75					1,100	
76	13.9	9.1	25.4	5,040	1,400	8,666
77					2,200	
78					2,730	
79					3,300	
80	19.1	10.6	24.7	7,980	3,770	11,200
81					4,500	

Note: Rates for the Employee's Pension are those for males. Rates for the People's Pension until 1969 are those for younger contributors. The "balance rates" are calculated by equations (4) and (5) in the text.

TABLE 8. PROCEDURE FOR COMPUTING THE LEVEL RATE

A.	Present value of benefits	¥198.9 trillion
B.	Present value of subsidies	36.6
C.	Reserve fund	20.0
D.	Present value of contributions	142.4
E.	Present value of regular earnings	745.7
F.	The level rate	19.1%

Source: The Actuarial Section, The Ministry of Welfare (1981).

contribution" (*heijun hokenryo*). The values of actual rate and the level rate are shown in Table 7. The reason for setting the actual rate lower than the level rate is explained to be the necessity of alleviating the burden of the contributors.

This explanation gives us the following impressions: First, it seems as though the system is in principle managed according to an actuarially fair basis, and although the system has begun to deviate from it in recent years, the degree of deviation as represented by the ratio of the actual to the level rate was not so great in the past. In fact, many people believe that the current benefits are financed almost entirely by the accumulated contributions. Second, we have an impression that because the deviation was smaller in the past and getting greater recently, it is the current contributors rather than the current beneficiaries that are treated relatively favourably. Actually, many people believe that the relative magnitude of the reserve fund as measured by its ratio to the amount of pension payments is decreasing in recent years because the deviation is getting greater.

I agrue below that these impressions are false, that the official presentation is seriously misleading and that it has the effect of concealing the grave problems of the present system. For this purpose, it is necessary to understand the computation procedure of the "level contribution." Table 8 demonstrates this for the case of the Employees' Pension. The table is almost self-explanatory; the present value of required contributions is derived as $D=A-(B+C)$, then the "level rate" is computed by deviding this by the present value of regular earnings.

Note, first, that the government subsidy is counted as an important element of the revenue. As mentioned before, subsidies are granted at the time of the pension payment, which implies that they are borne by future generations. Therefore, the "level contribution" already contains a deviation from the full funded method of financing. This may merely be a semantic problem. Yet the semantics are sometimes important. A similar problem will be pointed out later.

The second problem is a substantial one. The above calculation is based on a very strange assumption that neither earnings nor benefits will grow in the future even in nominal terms. All that are allowed to change in the future are the demographic conditions and the number of contribution years of beneficiaries and contributors. In spite of this essentially "static" setting, the discount rate is assumed to be as high as 5.5 percent per annum.

Obviously, this assumption brings serious biases in the result. In the first place, the relative magnitude of the reserve fund is overvalued, which implies that the level contribution is biased downward. In the second place, effects of "matualization" is underestimated because benefits in distant futures are overdiscounted. As mentioned in the previous section, average contribution years of beneficiaries will become longer in the future, which

ceteris paribus makes the benefits higher. In the above procedure, however, this effect is not properly reflected in the "level rate."[9] It can be argued furthermore that there is a factor which works in the opposite direction. In the above procedure, the replacement ratio is bound to rise in the future because contribution years of beneficiaries become longer while the earnings are fixed. In a world where earnings grow, this is equivalent to assuming that parameters be fully adjusted to earnings. As noted earlier, this is probably more than what can be reasonably expected in the future.

As a result of these factors, the meaning of the calculated level contribution is very obscure. There is no assurance that the system continues to balance in the future even if the actual rate is strictly equated to the level contribution, and no relative improvement of the benefit is undertaken. Neither does it represent some benchmark rates such as the minimum or the maximum rate for the desirable performance of the system. It is not too much to say that the calcualted rate provides us with no practical information. It follows that all that can be said *a priori* about the past financial performance of the system is that the rates were set at some *ad hoc* levels which people were able to accept. Reserve funds were accumulated owing to the simple fact that the number of beneficiaries were considerably smaller than that of contributors.

In order to say something more about the past performance of the financing system, some other measures must be calculated. Two such measures are presented below. In the first method, we consider the balance of contributions and benefits of a representative individual who has just entered into the labor force. He is expected to work for N years and receive old-age pension for L years. His initial monthly regular earning is E, which is assumed to grow at an annual rate of g. We further assume that the pension system is fully indexed to the earnings, and that the discount rate is equal to g. Then, in case of the Employees' Pension, the condition for his lifetime benefits to be financed by his lifetime contributions is given by

$$0.8LB_E = Nr_E E \qquad (3)$$

where r_E is the rate of contribution. In the above equation, subsidies from the General Account are taken into account (with rate 0.2), but the existence of past reserve fund is not. Substituting (1) into (3), and assuming away the term D, we get

$$r_E = 0.8L(A_E/E + 0.01)\,. \qquad (4)$$

The third column of Table 7 shows the computed values, where it is assumed that $L=15$ and that E is equal to Y_2 of Table 4 (regular salaries). In case of the People's Pension, the corresponding result is

$$r_P = 2LA_P/3 \qquad (5)$$

The sixth column of Table 7 shows the results with $L=10$.

Several points can be observed from the table. First, the officially computed "level

[9] In the future, the number of beneficiaries will increase relative to that of the contributors. According to a prediction by the Ministry of Welfare, the ratio of the beneficiaries to contributors which is currently 8.2 percent for the Employees' Pension will be increased to 36.6 percent in the year 2015. This aspect of "matualization" is undervalued too.

TABLE 9. ACCUMULATED CONTRIBUTIONS AND NET FUTURE BENEFITS

(¥ thousand)

	ACCW	ENFBW	ACCO	ENFBO
1968	506	2,097		
69	578	2,466		
70	672	4,291		
71	774	4,595	74	1,542
72	902	4,845	90	1,535
73	1,033	5,942	110	2,131
74	1,226	12,109	138	3,762
75	1,468	14,656	172	4,170
76	1,778	18,438	214	5,592
77	2,142	21,889	276	6,927
78	2,559	24,123	354	7,483
79	3,007	25,817	452	7,940
80	3,557	30,327	566	

Note: ACC is accumulated contributions and ENFB is expected net future benefits. Both are as of age 57. Letters *W* and *O* at the end of the variables represent the Employees' Pension and the People's Pension, respectively. Contributions and benefits of the People's Pension are those of couples. Benefits of the Employees' Pension are "model benefits" including supplementary benefits and survivors' benefits. Benefits of the People's Pension are average benefits.

contribution" has been considerably lower than the rate computed here, which we call "the balance rate." Second, the discrepancy between the balance rate and the actual rate is getting smaller in recent years rather than getting larger. This suggests that the second impression mentioned at the beginning of this section is in fact false.

The other method of evaluating the past contribution is to calculate accumulated contributions of an individual and to compare this with his expected benefits in the future.[10] The figures in Table 9 shows the result for a newly entitled representative recipient in each fiscal year. In this calculation it is assumed that past contributions are accumulated at an annual interest rate of 6 percent and that future benefits will grow at the same rate as the discount rate.

If the system had been managed according to an actuarially fair basis, and if there had been no improvements in the relative value of benefits as represented by the replacement ratio, then there would be no difference between the accumulated contributions (ACC) and the present value of expected net future benefits (ENFB). The figures in Table 9 clearly show that the actual financing has been far from this. For example, in case of the Employees' Pension, the difference was as much as ¥27 million (about $108 thousand) per beneficiary in 1980, that is to say, a newly entitled beneficiary could expect to receive as much as ¥27 million (in terms of the present value) throughout his life in excess of his accumulated

[10] Same variables will appear in the next section.

contributions.[11] This result is a manifestation of the fact that most of the benefits that current beneficiaries receive are borne by the current contributors and tax payers.[12] This of course implies an intergenerational transfer. To draw attention to the magnitude of the transfer, it would be necessary to point out that this was greater than the value of household net financial assets which was only ¥4 million per household in 1980. In terms of total annual flow, the transfer amounted to nearly ¥2.4 trillion in FY 1980 if we regard the fraction (ENFB−ACC)/ENFB of the pension payments as transfer. This was greater than the annual budget for the public assistance program which was about ¥1 trillion in FY 1980.

The present system is not to be blamed if the nature of the transfer were only intergenerational. As a matter of fact, public pensions in most countries create this kind of transfer. The problem in the Japanese system is that there is an element of intragenerational transfer which is quite hard to justify. This arises from the fact that the benefits of the People's Pension are significantly lower than those of the Employees' Pension. The figures in Table 9 indicates that the transfer created by the People's Pension program is less than one sixth of that created by the Employees' Pension program.

If public pensions are managed according to the full funded method, the difference between the two programs are justifiable because it reflects the difference in the contributions. However, *since most of the benefits are transfers, there is little grounds to justify such a difference.* In fact, this difference creates an intragenerational transfer, which is socially inadmissible because of the following reasons: First, it is a transfer to those people who are relatively wealthy. Note that under the present benefit structure, those people with higher past earnings receive more transfers. Second, the transfer is not easily perceivable. As mentioned before, many people believe that the current benefits are paid entirely out of the accumulated contributions, so that there is no element of transfer in the present system. The present benefit structure in which benefits are related to the number of contribution years and (in case of the Employees' Pension) to the past regular earnings tends to make people believe that the present system is an actuarially fair one. The use of the term "contribution" (*hokenryo*) instead of the term "payroll tax" or "social security tax" has the effect of strengthening the belief. Here, the semantics is quite important.

The problem is all the more serious in the present Japan because there are cases in which sons of self-employed are contributors of the Employees' Pension. These cases are quite common due to the enormous change in the employment structure in the past decades. Table 10 shows an estimated decomposition of the current male contributors of the Employees' Pension. (Assumptions and procedures of the estimation are given in Appendix.) Group B_2 contributors are those whose fathers are the beneficiaries of the People's Pension. For them the burden is twofold: They have to support their own parents because the current benefits of the People's Pension are inadequate. At the same time, they have to support other person's parents by paying the contribution of the Employees' Pension. On the other hand, group B_1 contributors are those whose fathers are beneficiaries of the Employees' Pension. For them the only burden is the contribution of the Employees' Pension, because their parents receive enough benefits. Clearly, the equity between these two groups is

[11] Absolute magnitude is a more appropriate measure to evaluate the extent of transfer than such measures as the rate of return, because the amount that can be "invested" in public pension cannot be chosen by individual contributors.

[12] Similar problem was discussed by Takayama (1981).

TABLE 10. AN ESTIMATED DECOMPOSITION OF THE MALE CONTRIBUTORS OF THE EMPLOYEES' PENSION

group A: fathers are still contibutors	3,961 thousand
group B_1: fathers are recipients of the Employees' Pension	3,376 thousand
group B_2: fathers are recipients of the People's Pension	2,470 thousand
group B_3: fathers are deceased before 80	3,583 thousand
group C: fathers are deceased	3,505 thousand
(total	16,894 thousand)

seriously violated (It is true that contributors in group B_3 and C are also supporting other person's parents because their parents are dead. However, this kind of situation inevitably happens in any public pension program and therefore is not to be blamed). The contributors seem to be accepting the current burden because they believe that their contribution will be used for their own benefits in the future. A significant change will occur in the group B_2 contributors' attitude if they become aware that most of their contributions are in effect used to support the parents of others.

Regressive effects of public pensions are sometimes pointed out. But the usual argument concentrates on the ratio of contributions to earnings, which certainly declines for higher earnings due to the fixed contribution of the People's Pensions and the upper limit in the calculation of the contribution of the Employees' Pension. Although this is undersirable, it seems to be a minor problem compared to the one mentioned here.

I mentioned in the introduction that the common argument on public pension is misleading in its emphasis of the future deficit of the program. One implication has become clear now. This argument gives us an impression that the problem of the public pension is not an immediate one so that, although the problem may become serious in the far future, there are plenty of times to prepare for it. Our argument has shown that this is false, and that the problem of the public pension is a very urgent one. The common argument has the effect of concealing this aspect of the public pension system.

V. *Effects on Savings—Some Empirical Findings*

In this section, I present some empirical evidences on the impact of public pensions on household savings. The result presented here should be regarded as a preliminary report of a research in progress.

Backgrounds

The impact of public pensions on household savings is at least potentially an enormously important problem in Japan. This is apparent if one recalls the remark in Section IV that the net wealth promised by the Employees' Pension is more than six times as large as the average household's net financial asset.

In spite of this, very few empirical studies have yet been done in Japan [A work by Yoshikawa (1982) is one of the few studies in this field]. Using a similar specification as that of Feldstein (1974), he analyzed the time series data of the period 1970 to 1979. However

he found no significant effects of the public pension variables).

There are several reason why this study does not attract much attention. One is the fact that "excess saving" rather than insufficient saving is the major concern of economists in Japan. This intelectual "bias" is of course a reflection of the fact that the propensity to save is still remarkably high in Japan. Also, the Keynesian way of thinking to attribute economic difficulties to excess saving intensifies the bias.

In addition, there are several technical difficulties in conducting empirical studies. First, as noted in Section III, there is a considerable uncertainty in the benefits that people can expect to receive in the future. The uncertainty was greater in the years before 1973 when the system was on the process of "rapid improvements." It is therefore extremely difficult to find the appropriate measure of expected benefits. This is especially true for the Peoples' Pension in the period between 1961 and 1971, when there were no payments of contributory pensions. Even so, people must have expected positive benefits in the future. It follows that in empirical analysis we are forced to test two hypotheses at the same time: One is the appropriateness of a specific futute benefit variable that is used in the analysis. The other is of course the household saving behaviors.

The second difficulty in empirical analysis is that of distinguishing the effect of public pensions from that of general econcomic changes, especially the one caused by the Oil Crisis. As frequently mentioned, it was in FY 1973 that a significant improvement of the public pension system was realized. However, this was also the year in which the first Oil Schock occurred. It is therefore very difficult to distinguish the two effects in the time series data. This difficulty could be avoided if cross section micro data were available. Unfortunately, such data are not available at present.

The Model

The model underlying our analysis is the life cycle model of saving. In the present analysis, we use accumulation equation rather than saving equation. The life cycle model predicts that the net wealth of an individual just before retirement (NW) is a function of his lifetime disposable income (DLI) and the amount of wealth that he expects to receive after retirement (RW). Assuming linearity, the model is described as

$$NW=a_0+a_1DLI+a_2RW+u \qquad (6)$$

where u is a random variable. In the extended life cycle model (Feldstein 1974), the sign of a_2 is not determined *a priori*. However, if induced retirement effect is small, a_2 should be a negative number between zero and minus one.

Public pension wealth (PPW) is of course an important component of RW. There could be two alternative defintions of PPW: One is the expected present value of future benefits ($EGFB$), the other is the difference between $EGFB$ and the expected present value of future contributions (EFC), and is called "expected net future benefit" ($ENFB$). The former corresponds to Feldstein's "gross social security wealth," and the latter to "net social security wealth" (Feldstein 1974). Which of the two concepts should be employed depends upon the model of saving behavior. In the present analysis I use the gross concept ($EGFB$) because the treatment of contributions is consistent in this concept (In $ENFB$ concept, while future contributions are explicitly treated as deductions from wealth, past contributions are not treated as accumulation of wealth. They are taken into account only in the process of computing disposable income).

Instead of using the net concept (*ENFB*), I will follow the procedure proposed by Kotlikoff (1979) and decompose the *ENFB* variable into two parts: The absolute yield of the public pension (*AYP*) and the value of past contributions accumulated to the present (*ACC*). Namely,

$$ENFB = AYP + ACC \qquad (7)$$

If public pension is managed according to an actuarially fair basis, *AYP* should be zero, because in that case *EGFB* should be equal to the sum of *EFC* and *ACC*. Actual values of *AYP* are positive, however, as mentioned in Section IV.

In the following analysis we will employ two alternative specifications: The first specification uses the *EGFB* variable, and the second specification uses the *AYP* and *ACC* variables separately. In the latter specification, income variable will be gross of contribution income (*GLI*) rather than disposable income (*DLI*) because contribution is separately treated by the *ACC* variable.

In the analysis of saving behaviors of the Japanese employees, it is important to include retirement payments (*RP*) in *RW* for the following reasons: First, its magnitude is quite large. According to a survey by the Ministry of Labor, retirement payments in large firms are more than 40 times the monthly salary.[13] Second, retirement payments have been indispensable components of the Japanese employment system for a long time. For example, firms usually accumulate large reserve funds for retirement payments, an increment to which is treated as a business expense in the corparation tax. On the workers' side, "relying upon retirement payments" is a quite common pattern of saving behavior.

Finally, age variable (*AGE*) is introduced to allow for a gradual accumulation process of wealth before retirement.[14] It is assumed that the income-wealth ratio increases linearly as one approaches the retirement age.

Therefore, our specification will be:

$$NW = b_0 + b_1 DLI + b_2 DLI*AGE + b_3 RP + b_4 EGFB + u \qquad (9)$$

and

$$NW = b_0' + b_1' GLI + b_2' GLI*AGE + b_3' RP + b_4' ACC + b_5' AYP + u' \qquad (10)$$

Expected value of b_4' is -1 (Kotlikoff 1979). Expected signs of b_3, b_4, b_3' and b_5' are negative.

Strictly speaking, the coefficient b_5' varies as age changes (Kotlikoff 1979). However, this effect is not considered in the present analysis. Neither is the (expected) retirement age explicitly taken into account.

[13] Ampleness of retirement payments reflects the characteristic of the Japanese employment system where an individual usually works in the same firm for more than 30 years.

[14] Age variable is defined as follows:

AGE = 1	for age agroup	45–49
= 2		50–54
= 3		55–59
= 4		60–65

In regression analysis, retirement payments variable (*RP*) is excluded for ages over 55, because individuals are supposed to have received retirement payments (cf. *f.n.* 16). This is taken care of by the dummy variable *K* defined in Table 13.

TABLE 11. WEALTH-INCOME RATIOS

(¥ thousand)

	Government Employees		Other Employees	
	annual income	net wealth / income	annual income	net wealth / income
1965	847	0.72	924	0.99
1970	1,540	0.74	1,587	0.90
1975	3,647	0.60	3,321	0.71
1980	5,332	0.60	4,942	0.84

Source: Family Saving Survey.

TABLE 12. WEALTH-INCOME RATIOS

	Age Groups					
	35–39	40–44	45–49	50–54	55–59	60–64
1970						
WIW	0.665	0.757	0.777	0.865	1.198	1.101
WIO	1.068	1.295	1.129	1.242	1.580	1.572
1975						
WIW	0.533	0.572	0.686	0.723	0.921	1.395
WIO	0.580	0.741	0.927	0.942	1.437	1.337
1980						
WIW	0.499	0.561	0.679	0.858	1.251	1.663
WIO	0.425	0.604	0.913	1.465	1.376	1.525

Note: *WIW* and *WIO* are the ratios of net wealth to income of employees' households and other households, respectively.
Source: Family Saving Survey.

Before engaging in an analysis of time series data, we will make some observations on the data. Table 11 presents the ratios of net wealth to annual income for two kinds of employees' households. The most striking feature of the table is the low ratio for the government employees. In 1980, the ratio for the government employees was nearly two-thirds of that for the employees of private firms. It is a well known fact that the government employees have enjoyed old-age pensions which are superior to other public pensions.[15] For example, old-age benefits for the government employees is more than 30 percent higher than those of the Employees' Pension in terms of the ratio to income. Therefore, the data in Table 11 may be a regarded as evidences of the wealth substitution effect. It must, however, be noted that according to the model presented above, the difference in retirement payments is also relevant to the difference in net wealth. Unfortunately, this cannot be tested explicitly due to the unavailability of retirement payments of the government employees (Smaller uncertainties in future earnings, retirement payments and old-age pensions may also be working to reduce savings of the government employees, although these were not explicitly taken into account in our model).

Another observation can be made from Table 12 which shows the wealth-income ratio of employees' households (*WIW*) and that of other households (*WIO*). Although the dis-

[15] Public pensions for government employees have long histories. Thus they are firmly incorporated in the life cycle plans of government employees.

crepancy is reducing in recent years, *WIW* is considerably lower than *WIO*, especially for age groups 40–59. It seems that the difference in *RW* (wealth that an individual expects to receive after retirement) has significant impacts on the saving behaviors of these two kinds of households. There is a significant increase in *WIW* at age group of 55–59. This probably reflects the receipt of retirement payments (Note that after receiving retirement benefit, people usually find jobs in other firms and continue to work).[16] However, even after this, *WIW* is lower than *WIO*. One possible explanation of this difference (and the difference in earlier ages) is the difference in the benefit-contribution structures of the Employees' Pension and the People's Pension. This possibility will be tested explicitly below.

The Data

The wealth and income data used in this analysis were derived from the Family Saving Survey (*Chochiku Doko Chosa*) conducted annually by the Statistics Bureau. The survey covers both employees' and self-employed households.[17]

Wealth data in this survey include bank deposits, postal savings, life insurance and securities, but exclude land and physical assets. Net wealth is the difference between wealth and liabilities.

Income data in the Family Saving Survey include bonus payments and earnings of household members other than the head. They also include taxes and social security contributions. For employees' household, disposable regular income of household head was computed using the ratios that were derived from the Family Income and Expenditure Survey (Statistics Bureau).[18] These data were used for computing the *ACC* variable.

Income data are necessary also for self-employed households (They are used for the *LI* variable only. The *ACC* variable for self-employed households is calculated without earning data because the contribution for the People's Pension is fixed amount). The data involve conceptual as well as statistical difficulties. On the conceptual level, the data include not only labor income but also returns to other factors of production such as land and fixed capital. In theory, different types of income should be treated differently in the accumulation equation. However, since it is impossible to distinguish them in statistics, no distinction was made between them assuming that propensity to consume out of different types of incomes are the same. On the statistical level, it is impossible to know tax and social security burdens of the self-employed households. For this reason, the income data in the Family Saving Survey were regarded as disposable income for the self-employed households. This of course introduces a serious measurement error. The results for the self-employed should therefore be regarded with great cautions.

Time series data of actually paid retirement payments are not available. In the prsent analysis, data were derived from the survey of retirement payments of representative retirees (Ministry of Labor).

The public-pension-related variables were constructed in basically the same way as Feldstein (1974) or Kotlikoff (1979). In computing *ACC*, past contributions were accumu-

[16] Thus a worker usually "retires twice": The first retirement, which usually occurs at age 55, is that from the firm for which he has worked since his youth (At this retirement, he receives considerable amount of retirement payments). The second retirement is the "true retirement," after which he is entitled to receive old-age benefits.

[17] The number of households covered by the survey is about 6 thousand in recent years.

[18] Current disposable income was used as a proxy for the lifetime disposable income.

TABLE 13. ESTIMATED PARAMETERS OF EQUATIONS (9) AND (10)

(9-*W*)	$NWW=1.037DLIW+0.098DLIW*AGE$	
	(0.203) (0.057)	
	$-0.104K*RP-0.010EGFBW$	$(\bar{R}^2=0.799)$
	(0.033) (0.014)	
(10-*W*)	$NWW=0.814GLIW+0.058GLIW*AGE$	
	(0.181) (0.049)	
	$-0.113K*RP+0.975ACCW-0.067AYPW$	$(\bar{R}^2=0.541)$
	(0.030) (0.326) (0.022)	
(9-*O*)	$NWO=1.232DLIO+0.147DLIO*AGE$	
	(0.126) (0.035)	
	$-0.148EGFBO$	$(\bar{R}^2=0.706)$
	(0.042)	
(10-*O*)	$NWO=1.184GLIO+0.157GLIO*AGE$	
	(0.124) (0.035)	
	$+2.439ACCO-0.212AYPO$	$(\bar{R}^2=0.715)$
	(1.777) (0.059)	

Notes: 1. Figures in parentheses are standard errors.
2. Dummy variable K is defined as follows:
$K=1$ for age group 45–54
$=0$ for age group 55–65
3. *DLI*: disposable income, *GLI*: Gross income, *AGE*: age, *RP*: retirement payments, *EGFB*: gross future benefit, *ACC*: accumulated contribution, *AYP*: absolute yield of public pension. Letters *W* and *O* at the end of variables represent employees' and other households, respectively.

lated with the interest rate of 6 percent per annum. In computing *EGFB* and *AYP*, it was assumed that both henefits and contributions will grow in the future at the same rate as the interest rate.[19] All variables used in regressions were deflated to the constant price of 1975.

Empirical Results

Equations (9) and (10) were estimated using time series data of the period from 1968 to 1980. Each equation was estimated both for employees' households (indicated by the letter *W* at the end of variables) and for other households (indicated by the letter *O*). Since our model tries to explain retirement savings behavior, ages just before retirement should be the object of the study. In the present analysis, several combination of age groups between 45 and 65 were tried.

Each equation was estimated by *OLS*. Here, equations without constant terms are reported (Equations with constant terms were also tried. However, none of the constant terms were significant. Furthermore, the inclusion of constant terms had in general no effects on the coefficients of other variables).

In Table 13, the results for age group 45–59 are shown. The coefficients for the *RP* variables are significantly negative, although absolute values seem somewhat small (As noted before, the *RP* variable used in regression is that of a "representative retiree," which

[19] Model benefits are used for computing future benefits. For the People's Pension the benefits per household is that of couples.

is probably higher than average payment. Thus the absolute value of the estimated coefficient being less than one does not necessarily imply imperfect substitution. However, even if this is taken into account, the estimated coefficients probably imply imperfect substitution). The coefficients of income variables should be read with cautions because wealth-income ratio is b_1+b_2AGE (or $b_1'+b_2'AGE$). For example, in equation (9–W), the estimated wealth-income ratio of age group 55–59 is 1.33. The coefficients for public-pension-related variables are somewhat embarrassing. The coefficients of AYP variables in equations (10–W) and (10–O) and $EGFBO$ variable in equation (9–O) are significant with right signs. However, other coefficients are either insignificant or with wrong signs.

Other combinations of age groups were also tried. Although the coefficients do not change significantly for "other households," those for the employees' households seem to be sensitive to the choice of age groups.

As has been suggested earlier, it is very likely that the above estimates are strongly influenced by changes in the general economic structure caused by the Oil Schocks. Wrong signs of public-pension-related variables may be attributed to them. Equations with dummy variables for the Oil Schocks were tried, but the coeficients were insignificant.

In order to eliminate possible effects of general structural changes, the difference between the data for employees' households (W–data) and those for other households (O–data) were examined. Namely, the following equations were regressed:

$$\triangle NW=b_1\triangle DLI+b_3RP+b_4\triangle EGFB+v \tag{11}$$

$$\triangle NW=b_1'\triangle GLI+b_3'RP+b_4'\triangle ACC+b_5'\triangle AYP+v' \tag{12}$$

where $\triangle$ represents the difference between the W–data and O–data.

The above specifications are justified only on the assumption that saving behaviors of the two types of households are the same. It may be argued that this assumption is too heroic. However, it should be regarded as a necessary cost to overcome the effects of the economic turbulences in the mid-1970s.

Table 14 and 15 present the estimated results for each specification and for various combinations of age groups. In this estimation, income are gross of tax and social security contributions.

Estimated coefficients are not sensitive to the choice of age groups. The coefficients of income and retirement payments are significant in both specifications. In the first specification, the coefficient of $\triangle EGFB$ is significantly negative, although its absolute value is somewhat small. In the second specification, the estimated coefficient of $\triangle ACC$ variable is close to the theoretical value of minus one. In this respect, our model seems to be more appropriate than a simple Keynesian saving function according to which the coefficient should be around -0.3. On the other hand, the coefficient of $\triangle AYP$ variable is insignificant.

A tentative conclusion derived from the last estimation would be the following: First, retirement payments reduce the preretirement savings of employees' households as compared to other households. Although the data do not allow us to make a precise judgement on its magnitude, it seems that the substitution is less than perfect. Second, almost a yen-to-yen substitution exists between the preretirement wealth accumulation and the accumulated contributions of public pensions. Namely, the payments of contributions for public pensions are regarded as accumulation of wealth, rather than a simple deduction from dis-

TABLE 14. ESTIMATED PARAMETERS OF EQUATION (11)
$\triangle NW = b_1 \triangle DLE + b_3 K^* RP + b_4 \triangle EGFB$

Choice of age groups	b_1	b_3	b_4	$\bar{R}^2$
1	1.240	−0.125	−0.020	0.313
	(0.345)	(0.024)	(0.015)	
2	1.026	−0.120	−0.022	0.305
	(0.381)	(0.025)	(0.017)	
3	1.151	−0.153	−0.029	0.411
	(0.368)	(0.030)	(0.016)	

Notes: 1. The figures in parentheses are standard errors.
2. The choice of age group is as follows:

Case	Age groups included: 45–49	50–54	55–59	60–65
1	×	×	×	×
2	×	×	×	
3		×	×	×

3. Dummy variable K is defined in Table 13.

TABLE 15. ESTIMATED PARAMETERS OF EQUATION (12)
$\triangle NW = b_1' \triangle GLE + b_3' K^* RP + b_4' \triangle ACC + b_5' \triangle AYP$

Choice of age groups	b_1'	b_3'	b_4'	b_5'	$\bar{R}^2$
1	1.765	−0.094	−1.179	0.157	0.485
	(0.326)	(0.021)	(0.280)	(0.045)	
2	1.462	−0.096	−0.938	0.117	0.416
	(0.384)	(0.023)	(0.333)	(0.054)	
3	1.717	−0.127	−1.075	0.141	0.516
	(0.384)	(0.028)	(0.351)	(0.059)	

Notes: 1. Figures in parentheses are standard errors.
2. Dummy variable K and the choice of age groups are the same as in Table 14.

posable income. Finally, wealth effect of public pensions caused by positive AYP seems to be absent.

Needless to say, some reservations must be made to the last conclusion. First, the observed result may be due to the failure of the specific future benefit variable used in this study to correctly represent people's expectation. Second, it may be due to the short history of the public pension system in Japan. If this is the case, we cannot deny the possibility that households savings are reduced in the future as people become more knowledgeable about pension benefits. This possibility is quite likely in view of the fact that retirement payments which are firmly embedded in workers' expectations have significant effects on preretirement accumulation.

VI. *Concluding Remarks*

In concluding this paper, I consider implications of the analysis presented above and search for future research topics, rather than just summarize the contents.

In the first half of this paper, I have examined institutional aspects of the public pension system in Japan and have pointed out several problems. A natural extension of the argument would be a reform proposal, which, however, was not discussed in this paper. It seems that too many proposals have been made without being accompanied by solid analytical works. I have refrained from making a haste proposal because prerequisite analyses seem still lacking.

Empirical analysis reported in Section V should obviously be supplemented by further investigations. Analysis of government employees' households seems worth trying if data become available.

Although evidences are not enough to draw decisive conclusions, the analysis presented here seems to suggest that substitution between preretirement accumulation and wealth that people can expect to receive after retirement is less than perfect. If one emphasizes the less than perfect substitution rather than the existence of substitution itself, and if one recognizes the fact that both retirement payments and public pensions were funded, implication might be different from what was emphasized by Feldstein. It might be argued that in case of Japan, these provisions have increased, rather than decreased, national savings and have formed a basic condition for the rapid economic growth in the post-War period.

Finally, the importance of retirement payments on preretirement savings has been confirmed, though this was not the original object of our study. By analyzing the substitution between expected retirement payments and preretirement accumulations, we are in effect investigating whether individuals are able to "see through the corporate veil." Note that the problem is posed here with respect to employees, rather than to shareholders.

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APPENDIX. Decomposition of the Contributors of the Employees' Pension

In this appendix, I will show how the contributors of the Employees' Pension can be decomposed according to their fathers' status. For simplicity, we assume the followings:

1. Males are the households heads and females are dependants.
2. The age difference between a father and his sons is 30 years (Brothers are assumed to the same age).
3. Recipients of old-age benefits are males of age 60 to 80. The age distribution of the male contributors of the Employees' Pensionn as of March 1980 was as follows:

group A: age 15–29, 3,961 thousand
group B: age 30–49, 9,429 thousand
group C: age 50– , 3,505 thousand
(total: 16,894 thousand)

Under the assumptions 2 and 3, sons of the current recipients belong to group B. The total number of fathers (including those who are already dead) of the people in group B is estimated as follows:

$$9{,}429 \times \frac{\text{number of people of age 20 to 40 in 1940}}{\text{number of people of age 30 to 50 in 1980}} = 9{,}429 \times \frac{21{,}124}{35{,}804}$$

$$= 5{,}563 \text{ (thousand)}$$

(This implies that the average number of children per couple was $9{,}429 \div 5{,}563 \times 2 = 3.4$)

The number of survivors is:

$$5{,}563 \times \frac{\text{number of people of age 60 to 80 in 1980}}{\text{number of people of age 20 to 40 in 1940}} = 5{,}563 \times \frac{13{,}097}{21{,}124}$$

$$= 3{,}449 \text{ (thousand)}$$

The total number of recipient of old-age benefit of the Employees' Pension in 1980 was 1,992 thousand. We assume that all of their sons are covered by the Employees' Pension. We further assume that all fathers of contributors of the Employees' Pension are covered either by the Employees' Pension or by the Peope's Pension.

We then obtain the following breakdown of the above 5,563 thousand people:

recipients of the Employees' Pension	1,992 thousand
recipients of the People's Pension	1,457 thousand
deceased	2,114 thousand

Consequently, the contributors of the Employees' Pension can be decomposed as shown in Table 10.

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