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TWO COMPETING HYPOTHESES FOR THE NENKO WAGE SYSTEM*
—SKILL OR LIVING COST COMPENSATION?—

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I. *Introduction*

It has long been a prevailing understanding among Japanese economists that the labor market in Japan is segmented into large and small firms, and that large firms are characterized by the Nenko (seniority-based) wage system, life-time employment, and the enterprise union. It is almost impossible to experience such a dramatic change that has taken place in the evaluation of the characteristics of Japanese industrial relations. The formerly prevalent view stressed that the Nenko wage system tends to lower the morale of younger workers, that employment stability guaranteed by life-time employment tends to reduce work incentives, and that enterprise unions are an obstacle to worker unity on an industry- (or nation-) wide basis in terms of improving working conditions. For these reasons it was felt that the Japanese economy should adopt Western-style industrial relations.

As is usually the case in academic circles, however, there existed opponents to the prevailing view. They detected merits as well as defects in enterprise unions, emphasizing that this type of workers' organization is better suited to reduce grievances which occur in the workshop and to achieve wage increases irrespective of the ability of marginal firms to afford them.[1] It was also recognized that the Nenko wage system stimulates the identification of the employee with the firm, which helps raise morale and maintains discipline in the workplace.[2] The well-known work of E.F. Vogel[3] is a symbolic study showing a shift from the conventional way of thinking.

Some economists have sought to determine similarities between Japan and the West, emphasizing that Japanese industrial relations are not as unique as have been generally claimed. In regard to the internal wage structure which is the focus of this paper, Kazuo Koike pointed out as early as 1966 that the Nenko wage system is not unique to Japan.[4] In surveying numerous articles and books, Mikio Sumiya also concluded that Japanese industrial relations are intrinsically similar to those prevailing in Western societies.[5] Haruo Shimada applied a more accurate statistical method to a comparative study of wage structures between

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[1] See Shirai (1968), pp. 41–50.
[2] See Nakayama (1973), pp. 389–392.
[3] Vogel (1979).
[4] Koike (1966), p. 130.
[5] Sumiya (1974).

Japan and U.S., and found similarities as well as disimilarities between the two countries.[6]

The main purpose of this paper is not to make an international comparison, but to analyse the internal wage structure in Japan, from which to obtain quantitative bases for a comparative study which will be made in the near future. Kazuo Koike defines the Nenko wage system as one in which wages increase according to age or length of service.[7] This definition seems less than satisfactory, because it completely ignores the difference in economic meanings between age and length of service. In order to develop an international comparison it is necessary to quantitatively examine the factors that are relevant to the internal wage structure and to determine which are the most important. The importance of these factors may vary from country to country. A similarity of internal wage structures should be judged on the basis of a similarity of the determining factors.

In the following sections, several hypotheses are examined (section II), and regression models and their estimated results are presented and analysed (sections III and IV). The data employed in this paper are micro data collected by the Ministry of Labor for compiling the *Basic Survey on Wage Structure*. The micro data on occupational wages enable us to make a cross-tabulation by age, length of service, and years of occupational experience, which is not available from the published data source. This will allow a further advance in the analysis of the internal wage structure.

II. *Various Hypotheses Regarding The Internal Wage Structure*

Several representative hypotheses are reviewed in this section.[8] They are classified into skill hypothesis, living cost compensation hypothesis, and others. The Nenko wage system is usually explained by using a combination of these hypotheses rather than a single one. In this sense, they are complementary rather than mutually exclusive. However, there remains the problem of determining which factor is most important. For this purpose, a quantitative analysis is required.

1. *Skill Hypothesis*

(1) Japanese type of skill hypothesis[9] It has been argued that even after the Japanese economy reached a highly developed stage of capitalism, the production processes in modern enterprises still remain heavily dependent on intuitive behavior, due to technological backwardness, as is required in the primitive handicraft industries. This type of skill is more or less characterized by its informality and firm specificity. The informality causes the firms to attach more importance to 0-J-T than to classroom teaching, and the specificity leads them to employ length of service rather than years of occupational experience as a measure of skill. It is because of this firm specificity of skill that wages rise according to length of service.

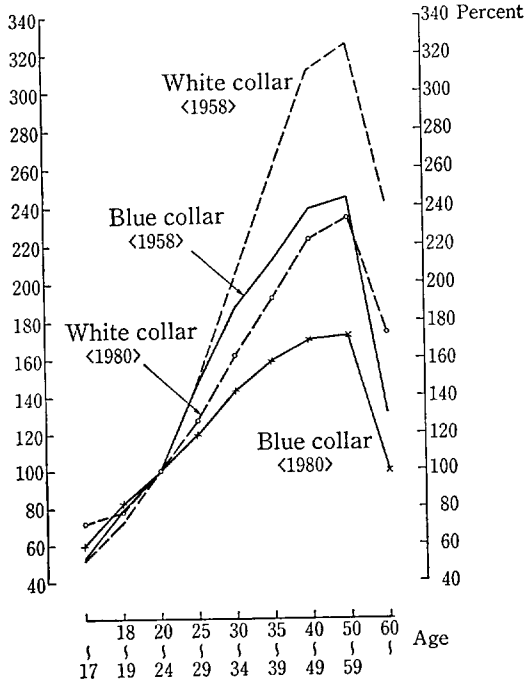
[6] Shimada (1981).

[7] Koike (1981), p. 55, states "Measure age or length of service along the horizontal line, and wage rates along the vertical line. If the slope of the line is upward, wages are increasing on the Nenko basis."

[8] For recent surveys on the Nenko wage system, see Sano (1981), Ch. 1, and Odaka (1984), Ch. 1.

[9] Ujihara (1966), pp. 345–456, and Tsuda (1968), Ch. 1.

FIG. 1. AGE PROFILES OF MONTHLY CONTRACTUAL EARNINGS, MALE WORKERS IN MANUFACTURING INDUSTRIES WITH MORE THAN 1000 EMPLOYEES



Source: Ministry of Labor, *Basic Survey on Wage Structure.*

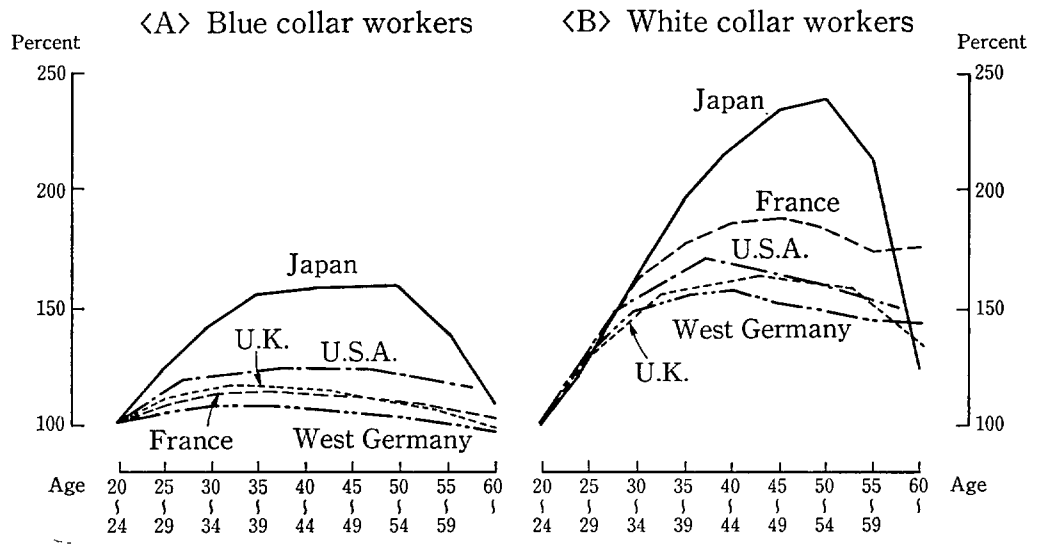
The proponents of this hypothesis anticipated that the Nenko wage system would gradually lose ground as technology developed. In fact, internal wages by age showed the widest differentials in 1958, and then began to narrow (see Figure 1). Contrary to the anticipated reaction, however, the wage differentials by age still existed in recent years when the importance of intuitive behavior almost disappeared in modern factories, and these wage differentials remain much steeper than those of other advanced countries (Figure 2). This fact suggests the need to develop other hypotheses to explain the Nenko wage system.

(2) Job rotation hypothesis Kazuo Koike has made the assumption that technological knowledge of the entire production process, the structure of machines, and the characteristics of the products produced are indispensable to workers who are required to deal with unexpected problems or to maintain capital equipment.[10] To acquire this knowledge, workers start their careers at easy jobs, and are gradually promoted to more difficult and mutually related higher level jobs. An increase in wages according to age or length of service reflects the acquisition of skills through job rotation.

There are several ways of acquiring skills, such as formal education, public vocational training, apprenticeship, within-firm training, and so on, and of these, O-J-T is the most important according to Koike. He states that skill is more or less firm-specific, because the number and the arrangement of jobs involved in promotion (or a career) differ from firm to

[10] Koike (1966) and (1981).

FIG. 2. AGE-WAGE PROFILES FOR SELECTED COUNTRIES, MALE WORKERS IN MANUFACTURING INDUSTRIES



Source: Ministry of Labor, *Kokusai Hikaku Rodo Joho Soran* (*General Summary of Information on Labor in An International Perspective*), 1980, pp. 265–266.

Note: Profiles shown are 1977 for Japan, 1969 for the U.S.A., 1977 for the U.K., and 1972 for West Germany and France.

firm, and that workers in a large firm are shifted widely among closely related jobs (not randomly selected jobs) for the acquisition of skills. For Koike, O-J-T through job rotation is the most effective method for skill formation.

The survey conducted by the Research Institute of Employment and Occupation reveals that most large corporations rotate workers occasionally from job to job, but the range and the route of job rotation are not always prespecified. According to the survey, as shown in Table 1, achieving the goal of the "right man in the right place" is no less important in terms of job rotation than acquiring of a wide range of skills, though Koike places strong emphasis exclusively on the latter.

P.B. Doeringer and M.J. Piore pointed out skill specificity, O-J-T, and custom as the major factors which generate an internal labor market.[11] Skill specificity increases the share of training costs borne by the employer to supply the incentive to reduce labor turnover. It also increases the importance of O-J-T for skill formation. Within the internal labor market, jobs are arranged in such a fashion that work on one job develops the skills required for more difficult tasks encountered in a higher level job. Unskilled workers are hired at the port of entry, and acquire skills as they climb the ladder of promotion. Thus, wages increase as workers are promoted. Consequently, there appears to be a relationship between wages and age or length of service.

A remarkable similarity is observed between Koike's and Doeringer-Piore's hypotheses. Therefore, the same comments could be made for Doeringer-Piore's hypothesis. The latter

[11] Doeringer and Piore (1971), Ch. 2.

TABLE 1. REASONS FOR JOB ROTATION OF REGULAR MALE WORKERS IN LARGE FIRMS WITH MORE THAN 3000 EMPLOYEES

(Multiple answers)

	Clerical section	Production section	Trade and sales section	R & D section
To achieve the goal of the right man in the right place	79.0%	55.9%	72.1%	77.9%
To acquire skills through job rotation	91.0	71.2	83.7	77.9
To improve human relations	0.0	0.0	0.0	0.0
To meet changes in business activities	5.0	40.7	11.6	11.8
To meet changes in job requirements	7.0	23.7	9.3	23.5
To fill vacancies due to separation	9.0	1.7	10.5	2.9
To satisfy workers' demands	1.0	3.4	3.5	1.5
Number of firms	100	59	86	68

Source: Research Institute of Employment and Occupation, *Kigyonai Rodoryoku no Yuko Katsuyo ni kansuru Jittai Chosa* (*Research for Effective Use of Work Force within Firms*), 1982, p. 451.

stress skill specificity much more than Koike, for whom general skills are more important than specific skills. The empirical evidence given in the later section is not favorable to the hypothesis which is heavily dependent on skill specificity.

2. *Living Cost Compensation Hypothesis*

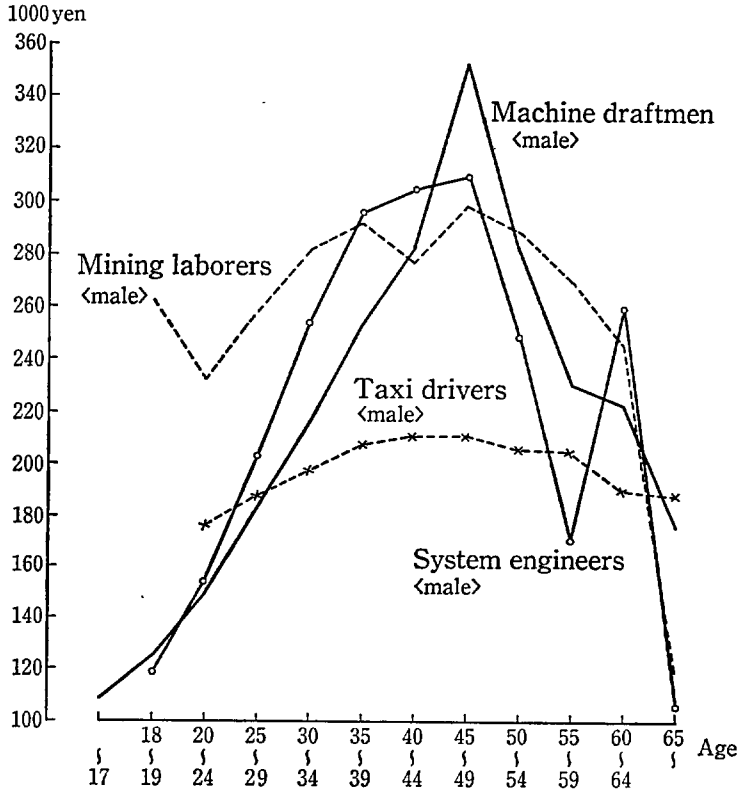
S. Ujihara and H. Funabashi insist that wage increases according to age signify compensation of living costs by age.[12] Because of low wages for young workers in an economy with redundant labor, an employer must compensate middle-aged workers with higher wages. This hypothesis infers that the narrowing wage differentials by age for the period of the 1960's (see Figure 1) are attributed to a labor shortage due to the high rate of economic growth. The living cost compensation hypothesis can easily explain why age profiles of wages are much flatter for female workers than for male workers who are the primary income earners.

Advocates of the hypothesis do not deny that skill is a factor in wage increases. Their main contention, as is shown in Figure 2, is that age-wage profiles in Japan tend to increase up to around the age of fifty, which indicates to the advocates a discrepancy between wages and skills for older workers.

A few factors could be presented to explain this discrepancy. (1) The Nenko wage system is supported especially by middle-aged workers who must bear the burden of higher living expenses. If higher wages for older workers are financed by transferring value added from the younger to the older generation, employers would also be in a position to support this wage system. Kazuhiro Arai applied two period consumption-loan model to the Nenko wages.[13] His basic idea is that wages at different ages are not equal to productivities because inter-generational transfers take place within firms when wages are determined. (2) In the case where young workers make up a large percentage of the employees, the total wage bill could be reduced by making the age-wage profiles steeper. (3) The Nenko wage system provides the employees with the expectation of a higher standard of living in the future,

[12] Funabashi (1961) and (1967). A similar idea was pointed out by Ujihara. See Ujihara (1966), p. 450.
[13] Arai (1983) is a theoretical analysis based on the living cost compensation hypothesis.

FIG. 3. AGE PROFILES OF MONTHLY CONTRACTUAL EARNINGS, SELECTED COUNTRIES, 1980



Source: Ministry of Labor, *Basic Survey on Wage Structure.*

thereby increasing their loyalty to the present firm. If wage increases according to age are coupled with the possibility of promotion, identification with and loyalty to the firm is further strengthened. Y. Sano and T. Tachibanaki traced the concept of living cost compensation back to the paternalism intrinsic to Japanese society.[14] Although it may seem irrational, the Nenko wage system has the effect of increasing incentive, which explains why this system has survived for so long.

3. *Other Hypotheses*

(1) Self-selection hypothesis[15] Workers are not equal in terms of their potential productivity, trainability, and expected tenure at a firm. The firm prefers to hire those applicants who will be the most productive, the most easily trainable, and the least likely to quit. Two methods are available to the firm in selecting applicants; one is a screening procedure which ranks them on the basis of some set of observable characteristics, and the other is a self-

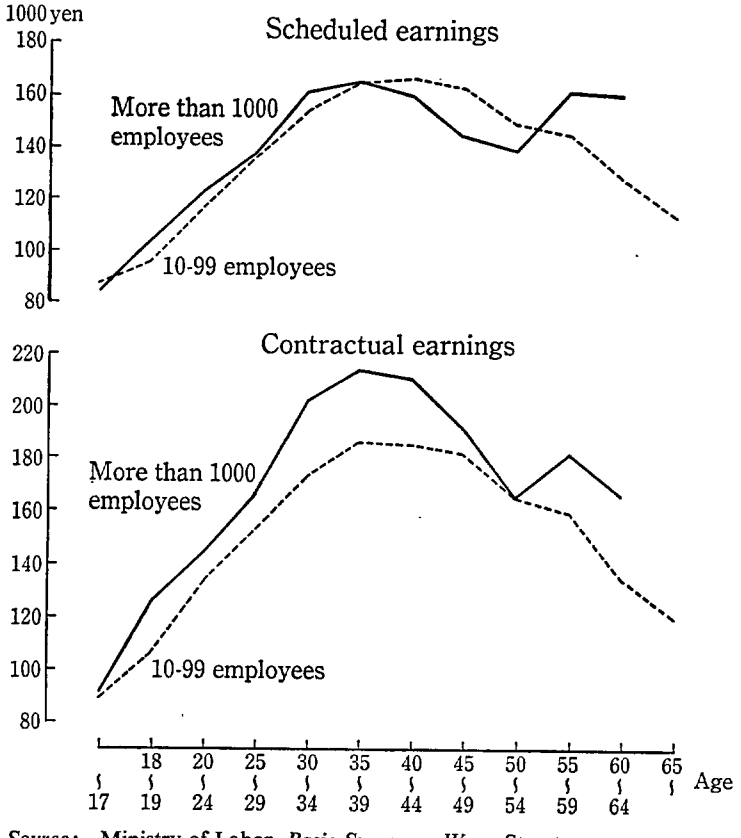
[14] Sano (1981), Ch. 1 and Tachibanaki (1975).
[15] Salop and Salop (1976).

selection procedure which is a pricing scheme that causes the applicants to reveal truthful information about themselves in terms of their market behavior.

The first procedure necessitates a higher cost, depending on how carefully the firm wants to screen the applicants. In the second procedure, in contrast, the firm has only to set a tilted wage structure rather than a flat one. Potential short-term employees are apt to prefer the flat wage structure, whereas potential long-term employees are more willing to accept the tilted wage structure. Therefore, if the firm sets an appropriately tilted wage structure, only employees who seek a long career will apply at the firm, and turnover costs will be reduced.

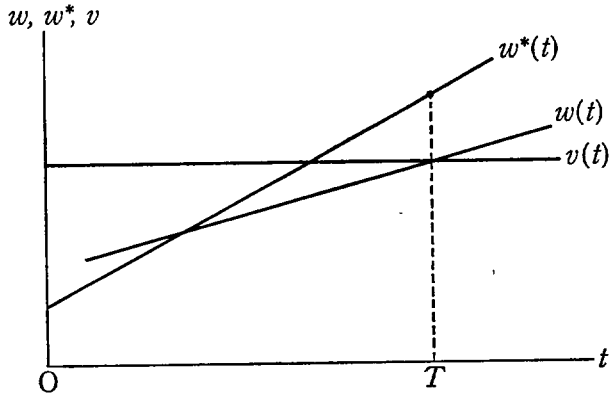
Figure 3 compares the wage differentials by age between selected occupations such as mining laborers, taxi drivers, machine draftmen, and system engineers. Age-wage profiles for the first two occupations are much flatter than those for the latter two. This fact is consistent with the self-selection hypothesis because mining laborers and taxi drivers have a high degree of mobility. However, this hypothesis can not explain why age-wage profiles

FIG. 4. DIFFERENTIALS OF STARTING WAGES BY AGE AND FIRM SIZE, MALE WORKERS, 1980



Source: Ministry of Labor, *Basic Survey on Wage Structure.*
Note: Starting wages are those paid for employees with less than one year internal experience.

FIG. 5. DETERMINATION OF RETIREMENT AGE AND AGE-WAGE PROFILES



are much steeper for large firms than for small ones. The self-selection hypothesis suggests that starting wages should be lower for large firms with steeper profiles. Figure 4 shows the opposite to be the case, however. In almost all age classes, the starting wages are higher for large firms. As far as comparisons between large and small firms are concerned, the tilted wage structure is not effective as a pricing scheme which sorts out potential long-term employees, since all would like to work at high wage firms.

(2) Cheating hypothesis[16] Let $w(t)$ be the individual's reservation wage at t, and $v(t)$ his marginal value productivity of labor. E.P. Lazear claimed that the age of retirement T is determined at the point where $w(t)=v(t)$, as is illustrated in Figure 5. His argument is that for the period O-T, a worker should be paid less than his marginal productivity when young and more when older (see $w^*(t)$ in Figure 5). His reasoning is that a steeper wage path reduces the worker's incentive to cheat, since he is dismissed when cheating is detected and loses the chance for future higher wages.

The marginal productivity of labor $v(t)$ is assumed constant over the worker's lifetime, but the wage path $w^*(t)$ slopes upward. This is a remarkable difference between the human capital hypothesis and the cheating hypothesis. However, it is not a realistic way of describing the behavior of Japanese workers and the employment practices in Japan to assume that employees are constantly comparing the cost and benefit of cheating, and are immediately fired when cheating is discovered.

(3) Incentive hypothesis The skill hypothesis assumes that an increase in productivity results in an increase in wages, whereas the incentive hypothesis assumes that an increase in wages, or its expectation, raises workers' morale, resulting in an increase in labor productivity. This is a kind of high wage economy in which the tilted structure, rather than an increase in the general wage level, is assumed to induce workers to do their best. Isao Ohashi hypothesized a system in which a worker who is diligent in his work when young is promoted to a managerial position faster than other workers.[17] In this system, the incentive to work tends to rise as wages increase largely through promotions. For him, the main factor of age-wage profiles is promotion to higher wage level jobs. This hypothesis does not ex-

[16] Lazear (1979).
[17] Ohashi (1981).

plain the increase in wages without promotion. It should be combined with other hypotheses in order for it to be more effective.

III. *The Models and Their Estimation*

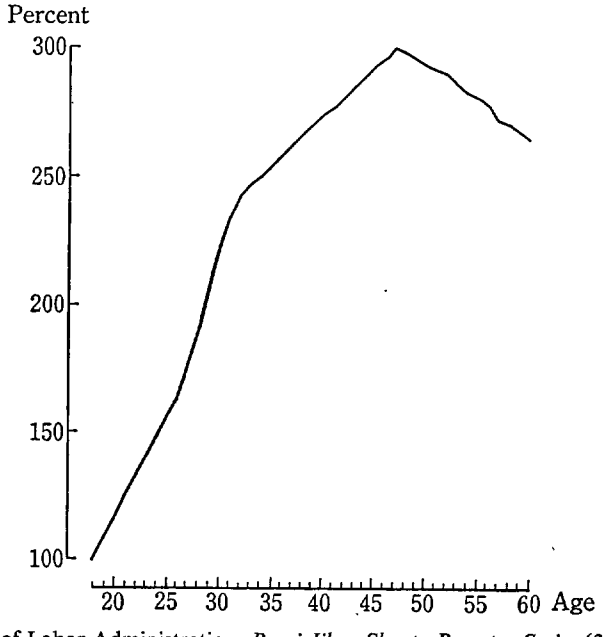
1. *Model Variables*

(1) Size of firm (SZ_i) In Japan there are remarkable differences between small and large firms in terms of technological levels and output market structures, which give rise to a large gap in value added per worker. Together with trade unions organized mainly in large firms, the gap in labor productivity brings about wage differentials by size. Another reason for taking the size variable into consideration is the difference in sampling ratios from different sized firms. Since the micro data are used in the following analysis, some data processing is necessary to eliminate biases in the parameter estimates. It is for these reasons that a size dummy variable is included as an explanatory variable in the regression model, where

SZ_1 ..... 1 for the firm with 10–99 employees, 0 otherwise,
SZ_2 ..... 1 for the firm with 100–999 employees, 0 otherwise,
SZ_3 ..... 1 for the firm with more than 1,000 employees, 0 otherwise.

(2) Education level (ED_j) Human capital theory assumes that expenditures for educa-

FIG. 6. INDEX OF LIVING COSTS FOR A MODEL HOUSEHOLD WITH TWO CHILDREN, IN APRIL 1975

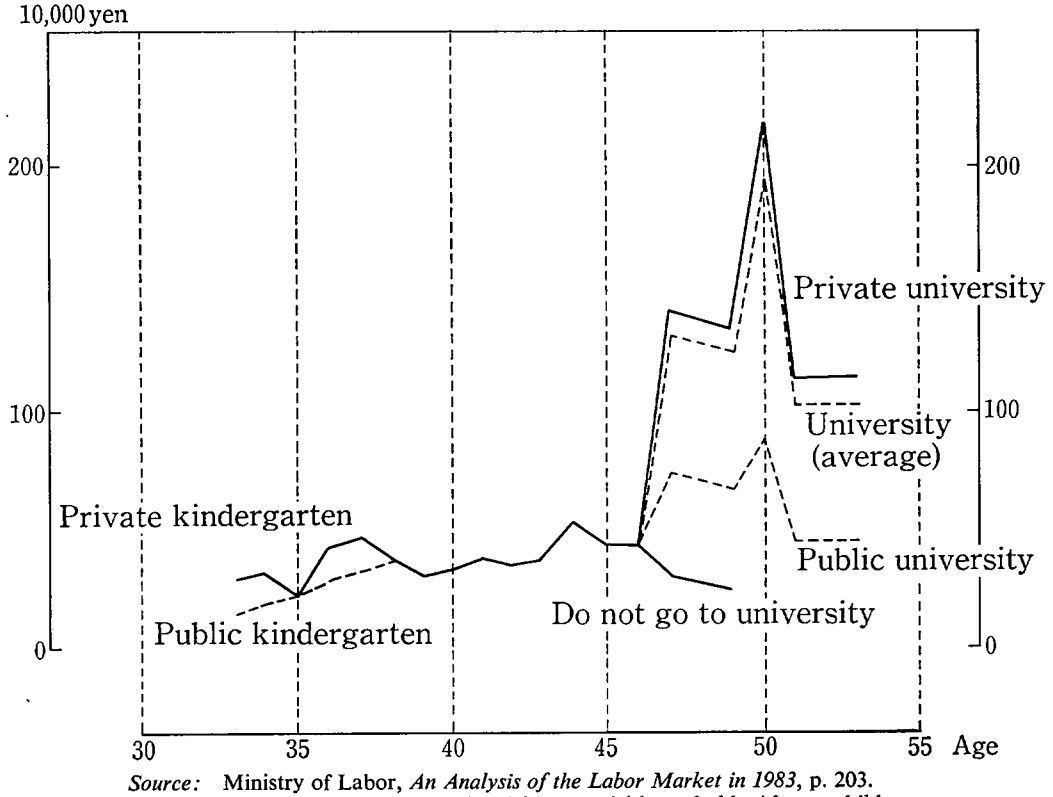


Source: Institute of Labor Administration, *Rosei Jiho: Shunto Bessatsu Series* (2) (*Bulletin of Labor Administration: Special Issue for Spring Labor Offensive* (2)), 1976, p. 40.
Note: The two children are assumed to enter the work force after leaving senior high school.

tion are an investment in human capital, which raises labor productivity and wages.[18] In contrast, the job market signaling theory insists that education does not increase productivity, but is useful only for distinguishing applicants with potential productive capability.[19] It is presumed here that the costs of education are negatively correlated with potential capability. Therefore, given the wage differentials by education level, only able workers can justify the costs involved. They also receive higher wages, so it is difficult to distinguish between the human capital theory and the job market signaling theory. Regardless of this fact, the education variable should be taken into consideration.

The original data classify the education level into four categories, such as junior high school, senior high school, junior college, and university.[20] The micro data used here exclude those employees who are in managerial positions, so that percentage of graduates of junior colleges and universities is very small. Thus, the following dummy variable is adopted;

FIG. 7. CHANGES IN EDUCATION COSTS OVER THE LIFE CYCLE OF A HEAD OF THE HOUSEHOLD (IN 1982 YEAR PRICES)



Source: Ministry of Labor, *An Analysis of the Labor Market in 1983*, p. 203.
Note: Education costs are calculated for a model household with two children.

[18] Becker (1975) and Mincer (1974).
[19] Spence (1973).
[20] Junior high school and senior high school include respectively elementary school and middle school under the old Japanese education system.

ED_1 .... 1 for graduates of junior high school, 0 otherwise,
ED_2 .... 1 for graduates of senior high school and more, 0 otherwise.

(3) Age (AGE) This is a proxy of living costs at different ages. The index of standard costs of living is shown in Figure 6 for a representative household with two children. As the head of the household ages, living costs increase, reaching a peak at the age of forty seven, and then decline. This pattern of change in living costs is very similar to the age-wage profiles shown in Figures 1 and 2. In Figure 6, the two children are assumed to enter the work force after leaving senior high school. If they go on to university, the costs of living will increase more steeply up to the age of fifty as is illustrated in Figure 7.

One method for examining the effect of living costs on wages is to use the index of standard living costs as an explanatory variable. However, the data on standard living costs are not available for household categories of different characteristics. For the sake of simplicity, the age variable is used.

(4) Internal experience (IE) Internal experience (or length of service), which is defined as duration of service of workers with their present employer, is a proxy variable of firm specific human capital. Doeringer and Piore state that almost every job involves some type of specific skill. The examples they cite are familiarity with a particular piece of operating equipment, knowledge of the personalities of team members, and so on.[21]

(5) Occupational experience (OE_k) This is length of experience in the present occupation for workers, such as a system engineer, latheman, handy man, and so on. It includes the number of years during which a worker was engaged in the same occupation at other firms. In contrast to internal experience, the years of occupational experience indicate an accumulation of general skill. Following the original classification given in the micro data, the degree of occupational experience is expressed by using a dummy variable;

OE_1 .... 1 for less than one year experience, 0 othersie,
OE_2 .... 1 for 1–2 years experience, 0 otherwise,
OE_3 .... 1 for 3–4 years experience, 0 otherwise,
OE_4 .... 1 for 5–9 years experience, 0 otherwise,
OE_5 .... 1 for more than 10 years experience, 0 otherwise.

(6) External experience (EE) External experience refers to human capital which has been acquired outside the present firm; that is, in other firms, in the family, or in other types of social relations. In the case of female workers whose employment is often ended by marriage or at the birth of a child, "external experience" in this paper involves not only work experience but also human capital in a vague sense, such as wisdom or knowledge acquired in the course of life.

External experience can be obtained from the identity equation,

$$AGE = ALS + EE + IE \quad \text{.......}(1)$$

where ALS is the age of leaving school. Thus,

$$EE = AGE - ALS - IE \quad \text{.......}(2)$$

The education dummy variable (ED_j) strictly corresponds to ALS above. To avoid multicolinearity, any one of the four variables (AGE, ED_j, EE, IE) should be omitted in estimating

[21] Doeringer and Piore (1971), pp. 15–16.

regression models. Therefore, two types of models will be tried; the first is the $IE \cdot EE$ Model in which AGE is omitted, and the second is the $IE \cdot AGE$ Model in which EE is omitted. The years of occupational experience (OE) is not subject to the identity equation (1), so it is a matter of choice whether this variable is included.

(7) Working hours (H) This also has an effect on wages. In the following, we will attempt to explain hourly wages, rather than adding working hours to a set of independent variables.

Thus, the basic regression model is expressed as follows, where W is the scheduled wages.

$$\begin{aligned} ln\ W/H = {} & a_1 + a_2 SZ_2 + a_3 SZ_3 \\ & + \{a_4 + a_5 SZ_2 + a_6 SZ_3\} \cdot ED_2 \\ & + \{a_7 + a_8 SZ_2 + a_9 SZ_3\} \cdot EE \\ & + \{a_{10} + a_{11} SZ_2 + a_{12} SZ_3\} \cdot EE^2 \\ & + \{a_{13} + a_{14} SZ_2 + a_{15} SZ_3\} \cdot IE \\ & + \{a_{16} + a_{17} SZ_2 + a_{18} SZ_3\} \cdot IE^2 \\ & + \{a_{19} + a_{20} SZ_2 + a_{21} SZ_3\} \cdot OE_2 \\ & + \{a_{22} + a_{23} SZ_2 + a_{24} SZ_3\} \cdot OE_3 \\ & + \{a_{25} + a_{26} SZ_2 + a_{27} SZ_3\} \cdot OE_4 \\ & + \{a_{28} + a_{29} SZ_2 + a_{30} SZ_3\} \cdot OE_5 \\ & + \{a_{31} + a_{32} SZ_2 + a_{33} SZ_3\} \cdot AGE \\ & + \{a_{34} + a_{35} SZ_2 + a_{36} SZ_3\} \cdot AGE^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3) \end{aligned}$$

TABLE 2. SAMPLE SIZE OF REGRESSION ANALYSIS

	Male	Female
1970	343,156	174,932
1975	173,898	100,009
1980	213,013	107,225

TABLE 3. CHARACTERISTICS OF THE DATA USED, 1980

	Male workers		Female workers	
	Sample means	Official figures	Sample means	Official figures
Scheduled earnings (100 yen/month)	1668	1986	1146	1169
Scheduled working hours (hour/month)	183	182	180	181
Hourly scheduled earnings (yen/month)	911	1091	637	645
Percentage share of workers by firm size				
10–99	0.475	0.356	0.463	0.407
100–999	0.293	0.331	0.285	0.344
More than 1000	0.232	0.313	0.252	0.259
Percentage share of workers by education				
Junior high school	0.508	0.327	0.406	0.333
Above senior high school	0.492	0.673	0.594	0.667
Average of ALS	15.8		16.2	
Average of EE	12.5		14.4	
Average of IE	8.8	10.8	5.2	6.1
Average of AGE	37.1	37.8	35.7	34.8
Average of OE	9.3		6.2	

Notes: i) Official figures are for all workers in all industries, and are calculated from the Ministry of *Labor's Basic Survey on Wage Structure.*

ii) Blanks indicate "not available" from the *Basic Survey.*

TABLE 4-1. ESTIMATED RESULTS OF *IE·EE* MODEL, MALE WORKERS

Year			1970		1975		1980	
No. of Equation			(4-A)	(4-B)	(4-A)	(4-B)	(4-A)	(4-B)
Sample Size			343156	343156	173898	173898	213013	213013
	SZ_2	a_2	0.02430	0.04684	0.03862	0.06747	0.00825*	0.05127
	SZ_3	a_3	0.13713	0.14881	0.15585	0.16758	0.11876	0.11999
ED_2		a_4	0.15387	0.15340	0.10626	0.10687	0.10378	0.10533
	SZ_2	a_5	0.00578*	0.00323*	0.02479	0.02312	0.01192	0.00928
	SZ_3	a_6	0.02123	0.01949	0.01502	0.01325	0.02990	0.02758
EE		a_7	0.03244	0.02722	0.02224	0.01814	0.02179	0.01721
	SZ_2	a_8	0.00822	0.00978	0.00519	0.00673	0.00341	0.00560
	SZ_3	a_9	0.00112	0.00392	0.00472	0.00726	0.00184	0.00565
EE^2		a_{10}	−0.00067	−0.00059	−0.00048	−0.00041	−0.00045	−0.00038
	SZ_2	a_{11}	−0.00020	−0.00022	−0.00015	−0.00017	−0.00010	−0.00013
	SZ_3	a_{12}	−0.00006	−0.00009	−0.00015	−0.00020	−0.00006	−0.00012
IE		a_{13}	0.03606	0.01316	0.03205	0.01358	0.03210	0.01100
	SZ_2	a_{14}	0.00715	0.00840	0.01066	0.01353	0.00985	0.01440
	SZ_3	a_{15}	0.00501	0.01185	0.01209	0.01421	0.01455	0.02154
IE^2		a_{16}	−0.00082	−0.00027	−0.00066	−0.00022	−0.00057	−0.00009
	SZ_2	a_{17}	−0.00001*	0.00000*	−0.00008	−0.00013	−0.00009	−0.00018
	SZ_3	a_{18}	0.00018	0.00039*	−0.00011	−0.00016	−0.00018	−0.00035
OE_2		a_{19}	—	0.06366	—	0.06558	—	0.07314
	SZ_2	a_{20}	—	−0.00680*	—	−0.01783	—	−0.03638
	SZ_3	a_{21}	—	0.00266*	—	−0.00027*		0.01143*
OE_3		a_{22}		0.14112	—	0.11512	—	0.14229
	SZ_2	a_{23}	—	−0.01973	—	−0.02406	—	−0.05736
	SZ_3	a_{24}	—	−0.02551	—	0.00120*	—	−0.01103*
OE_4		a_{25}	—	0.22213	—	0.18891	—	0.21516
	SZ_2	a_{26}	—	−0.03453	—	−0.04957	—	−0.06646
	SZ_3	a_{27}	—	−0.05348	—	−0.02395	—	−0.04022
OE_5		a_{28}	—	0.31645	—	0.27077	—	0.31655
	SZ_2	a_{29}	—	−0.05694	—	−0.07085	—	−0.10658
	SZ_3	a_{30}	—	−0.09842	—	−0.04442	—	−0.09405
AGE		a_{31}	—	—	—	—	—	—
	SZ_2	a_{32}	—	—	—	—	—	—
	SZ_3	a_{33}	—	—	—	—	—	—
AGE^2		a_{34}	—	—	—	—	—	—
	SZ_2	a_{35}	—	—	—	—	—	—
	SZ_3	a_{36}	—	—	—	—	—	—
		Const.	0.46748	0.40689	1.38004	1.31526	1.68762	1.61232
		$\bar{R}^2$	0.33311	0.35753	0.35285	0.37117	0.36277	0.38575

TABLE 4-2. ESTIMATED RESULTS OF *IE·AGE* MODEL, MALE WORKERS

Year			1970		1975		1980	
No. of Equation			(5-A)	(5-B)	(5-A)	(5-B)	(5-A)	(5-B)
Sample Size			343156	343156	173898	173898	213013	213013
	SZ_2	a_2	−0.19554	−0.22183	−0.11035	−0.13954	−0.08015	−0.11752
	SZ_3	a_3	0.12876	0.07791	0.10820	0.06510	0.13649	0.02995*
ED_2		a_4	0.09979	0.10895	0.08209	0.08809	0.08444	0.09151
	SZ_2	a_5	−0.01467	−0.01966	0.01571	0.01248	0.00345*	−0.00096*
	SZ_3	a_6	0.00829	0.00103*	0.00260*	−0.00222*	0.01703	0.01043
EE		a_7	—	—	—	—	—	—
	SZ_2	a_8	—	—	—	—	—	—
	SZ_3	a_9	—	—	—	—	—	—
EE^2		a_{10}	—	—	—	—	—	—
	SZ_2	a_{11}	—	—	—	—	—	—
	SZ_3	a_{12}	—	—	—	—	—	—
IE		a_{13}	0.01567	0.00117	0.01728	0.00534	0.01624	0.00434
	SZ_2	a_{14}	0.00096*	0.00285	0.00652	0.00942	0.00420	0.00828
	SZ_3	a_{15}	−0.00004*	0.00543	0.00463	0.00597	0.00725	0.00995
IE^2		a_{16}	−0.00028	0.00007	−0.00028	0.00001*	−0.00022	0.00006
	SZ_2	a_{17}	0.00012	0.00008	0.00000*	−0.00006*	0.00003*	−0.00006
	SZ_3	a_{18}	0.00011	−0.00001*	−0.00003*	−0.00008	−0.00011	−0.00019
OE_2		a_{19}	—	0.05410	—	0.05196	—	0.05078
	SZ_2	a_{20}	—	−0.01190	—	−0.01436*	—	−0.04202
	SZ_3	a_{21}	—	−0.00220*	—	0.00141*	—	0.02125
OE_3		a_{22}	—	0.11447	—	0.09015	—	0.09221
	SZ_2	a_{23}	—	−0.03175	—	−0.02642	—	−0.06202
	SZ_3	a_{24}	—	−0.04017	—	−0.00103*	—	0.01159*
OE_4		a_{25}	—	0.17086	—	0.14799	—	0.14186
	SZ_2	a_{26}	—	−0.04978	—	−0.05485	—	−0.07373
	SZ_3	a_{27}	—	−0.06669	—	−0.02866	—	−0.00910*
OE_5		a_{28}	—	0.24704	—	0.20898	—	0.21868
	SZ_2	a_{29}	—	−0.06165	—	−0.07084	—	−0.10667
	SZ_3	a_{30}	—	−0.09441	—	−0.03726	—	−0.05106
AGE		a_{31}	0.07695	0.06795	0.06586	0.05834	0.07129	0.06255
	SZ_2	a_{32}	0.01614	0.01949	0.01124	0.01465	0.00773	0.01252
	SZ_3	a_{33}	−0.00119*	0.00351	0.00418	0.00769	−0.00018*	0.00568
AGE^2		a_{34}	−0.00090	−0.00080	−0.00078	−0.00070	−0.00082	−0.00073
	SZ_2	a_{35}	−0.00019	−0.00023	−0.00015	−0.00018	−0.00010	−0.00015
	SZ_3	a_{36}	0.00007	0.00002	−0.00002*	−0.00005	0.00003	−0.00002*
		Const.	−0.66686	−0.58222	0.34412	0.41009	0.51835	0.61151
		$\bar{R}^2$	0.38139	0.39449	0.39506	0.40498	0.42042	0.43055

TABLE 4-3. ESTIMATED RESULTS OF *IE·EE* MODEL, FEMALE WORKERS

Year			1970		1975		1980	
No. of Equation			(4-A)	(4-B)	(4-A)	(4-B)	(4-A)	(4-B)
Sample Size			174932	174932	100009	100009	107225	107225
	SZ_2	a_2	0.03122	0.05783	0.09119	0.11825	0.00956*	0.02313
	SZ_3	a_3	0.10286	0.01675	0.21803	0.15619	0.07016	0.02124
ED_2		a_4	0.15195	0.12882	0.20904	0.18594	0.18845	0.17489
	SZ_2	a_5	0.07340	0.06834	0.04907	0.04488	0.06120	0.05438
	SZ_3	a_6	0.02448	0.04636	−0.01737	0.00076*	0.00480*	0.01521
EE		a_7	0.01143	0.00597	−0.00444	−0.00823	−0.00180	−0.00543
	SZ_2	a_8	−0.00405	−0.00378	0.00851	0.00807	0.00558	0.00518
	SZ_3	a_9	0.00534	0.01105	0.01833	0.02147	0.02441	0.02874
EE^2		a_{10}	−0.00025	−0.00017	0.00006	0.00012	0.00001*	0.00007
	SZ_2	a_{11}	0.00008	0.00009	−0.00022	−0.00020	−0.00011	−0.00010
	SZ_3	a_{12}	−0.00007	−0.00017	−0.00043	−0.00047	−0.00051	−0.00058
IE		a_{13}	0.04118	0.00566	0.03344	−0.00467	0.02260	−0.00660
	SZ_2	a_{14}	0.02118	0.01561	0.00483	0.00957	0.00655	0.00041*
	SZ_3	a_{15}	0.06071	0.05606	0.03499	0.04173	0.05320	0.06237
IE^2		a_{16}	−0.00091	−0.00005*	−0.00060	0.00024	−0.00021	0.00044
	SZ_2	a_{17}	−0.00026	−0.00012*	0.00027	0.00011*	0.00006*	0.00025
	SZ_3	a_{18}	−0.00182	−0.00133	−0.00089	−0.00092	−0.00145	−0.00154
OE_2		a_{19}	—	0.06536	—	0.06154	—	0.08226
	SZ_2	a_{20}	—	−0.01422	—	−0.01897	—	0.00843*
	SZ_3	a_{21}	—	0.12193	—	0.07224	—	0.07189
OE_3		a_{22}	—	0.15648	—	0.13712	—	0.14684
	SZ_2	a_{23}	—	−0.01937	—	−0.04030	—	0.00492*
	SZ_3	a_{24}	—	0.09647	—	0.04753	—	0.02644
OE_4		a_{25}	—	0.24996	—	0.24066	—	0.22337
	SZ_2	a_{26}	—	−0.01226*	—	−0.06273	—	0.02382
	SZ_3	a_{27}	—	0.07349	—	−0.00157*	—	−0.03345
OE_5		a_{28}	—	0.40325	—	0.44156	—	0.36596
	SZ_2	a_{29}	—	0.03186	—	−0.04295	—	0.03967
	SZ_3	a_{30}	—	−0.06226	—	−0.09817	—	−0.13186
AGE		a_{31}	—	—	—	—	—	—
	SZ_2	a_{32}	—	—	—	—	—	—
	SZ_3	a_{33}	—	—	—	—	—	—
AGE^2		a_{34}	—	—	—	—	—	—
	SZ_2	a_{35}	—	—	—	—	—	—
	SZ_3	a_{36}	—	—	—	—	—	—
		Const.	0.12730	0.11209	1.05427	1.04709	1.44677	1.41004
		$\bar{R}^2$	0.35871	0.38464	0.41177	0.43973	0.37338	0.39534

TABLE 4-4. ESTIMATED RESULTS OF *IE·AGE* MODEL, FEMALE WORKERS

Year			1970		1975		1980	
No. of Equation			(5-A)	(5-B)	(5-A)	(5-B)	(5-A)	(5-B)
Sample Size			174932	174932	100009	100009	107225	107225
	SZ_2	a_2	0.19109	0.19330	−0.13038	−0.10189	−0.08970	−0.06997
	SZ_3	a_3	0.22701	0.04066	−0.10327	−0.19852	−0.26306	−0.40311
ED_2		a_4	0.13642	0.12437	0.21960	0.20443	0.19930	0.19224
	SZ_2	a_5	0.07658	0.07153	0.04262	0.03882	0.05444	0.04848
	SZ_3	a_6	0.02515	0.03587	−0.02635	−0.01656	−0.00823*	−0.00441*
EE		a_7	—	—	—	—	—	—
	SZ_2	a_8	—	—	—	—	—	—
	SZ_3	a_9	—	—	—	—	—	—
EE^2		a_{10}	—	—	—	—	—	—
	SZ_2	a_{11}	—	—	—	—	—	—
	SZ_3	a_{12}	—	—	—	—	—	—
IE		a_{13}	0.03579	0.00502	0.03430	−0.00120*	0.02066	−0.00444
	SZ_2	a_{14}	0.02177	0.01592	0.00293	0.00861	0.00379	−0.00095*
	SZ_3	a_{15}	0.06095	0.05076	0.03205	0.03729	0.04768	0.05658
IE^2		a_{16}	−0.00070	0.00003*	−0.00058	0.00022	−0.00010	0.00046
	SZ_2	a_{17}	−0.00033	−0.00018	0.00037	0.00016	0.00013	0.00027
	SZ_3	a_{18}	−0.00200	−0.00141	−0.00086	−0.00091	−0.00141	−0.00156
OE_2		a_{19}	—	0.05976	—	0.06097	—	0.07786
	SZ_2	a_{20}	—	−0.01157*	—	−0.02396	—	0.00569*
	SZ_3	a_{21}	—	0.12241	—	0.06526	—	0.06393
OE_3		a_{22}	—	0.14490	—	0.13598	—	0.13509
	SZ_2	a_{23}	—	−0.01407*	—	−0.05023	—	−0.00047*
	SZ_3	a_{24}	—	0.10147	—	0.03160	—	0.00809*
OE_4		a_{25}	—	0.23301	—	0.23685	—	0.20470
	SZ_2	a_{26}	—	−0.00555*	—	−0.07415	—	0.01733*
	SZ_3	a_{27}	—	0.08948	—	−0.01767*	—	−0.06133
OE_5		a_{28}	—	0.39043	—	0.43332	—	0.34445
	SZ_2	a_{29}	—	0.03524	—	−0.04710	—	0.03475
	SZ_3	a_{30}	—	−0.03479	—	−0.08809	—	−0.13427
AGE		a_{31}	0.02730	0.01844	0.00005*	−0.00544	0.01071	0.00399
	SZ_2	a_{32}	−0.01113	−0.00978	0.01623	0.01627	0.00771	0.00718
	SZ_3	a_{33}	−0.00897	−0.00155*	0.02246	0.02569	0.02286	0.02945
AGE^2		a_{34}	−0.00034	−0.00025	−0.00002	0.00002	−0.00014	−0.00008
	SZ_2	a_{35}	0.00014	0.00013	−0.00021	−0.00021	−0.00008	−0.00007
	SZ_3	a_{36}	0.00017	0.00010	−0.00024	−0.00027	−0.00019	−0.00026
		Const.	−0.25656	−0.14322	1.03582	1.10727	1.25420	1.32437
		$\bar{R}^2$	0.35971	0.38406	0.41086	0.43781	0.37452	0.39354

where we have the $IE \cdot EE$ Model if AGE and AGE^2 are omitted, and the $IE \cdot AGE$ Model if EE and EE^2 are omitted.

2. *Data and Estimation of the Models*

We use the micro data collected by the Ministry of Labor for compiling the *Basic Survey on Wage Structure* in 1970, 1975, and 1980. The reason for using the micro data is that the official data source does not provide three-way cross-tabulation by age, internal experience (length of service), and occupational experience.

The size of the sample is very large, and differs from year to year (see Table 2). In order to see the characteristics of the data, some statistics are compared between the micro and the official data for the year 1980. Table 3 reveals that for male workers, the percentage shares of workers in large firms and those with higher educational levels are lower in the micro data. This is because workers in managerial positions are completely excluded in the data used here. Lower hourly wages in the micro data reflect this fact.

The occupations considered are different for the years shown in Table 2. The analysis will proceed without compiling the data for common occupations. An occupation with the same classification code may change in terms of job contents. This greatly reduces the need for recompilation of the data.

The models are estimated by OLS, and the results are presented in Table 4-1 to 4-4. The first two Tables are for male workers, and the last two for female workers. Tables 4-1 and 4-3 give the estimates of the $IE \cdot EE$ Model, and Tables 4-2 and 4-4 those of the $IE \cdot AGE$ Model. Coefficients of determination adjusted for degree of freedom ($\bar{R}^2$) are given at the bottom of the Tables, and parameter estimates with asterisks are not significant at the conventional standard.

IV. *Quantitative Analysis of Internal Structure*

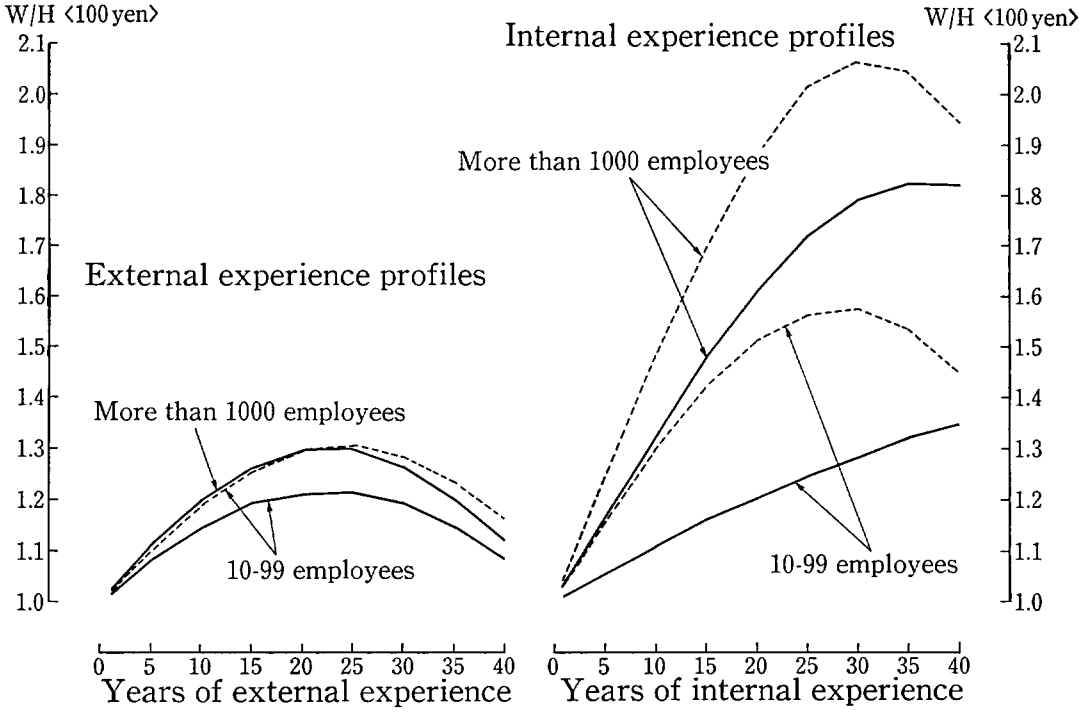
1. *An Approach by Skill Hypothesis*

At the outset, let us examine the estimated results of the $IE \cdot EE$ Model. V. Stoikov's paper is the first attempt to apply the $IE \cdot EE$ Model to the internal wage structure of Japanese manufacturing industries,[22] though there are minor differences in interaction terms between Stoikov's original model and the $IE \cdot EE$ Model. The effect of internal and external experiences (i.e., IE and EE) on the internal wage structure are depicted in Figure 8. Several findings can be pointed out.

(1) The solid lines are wage curves calculated from equation (4-B) in Table 4-1. Since this equation includes years of occupational experience as an independent variable, wage curves measure the net effects of internal and external experiences, excluding the effect of occupational experience. On the other hand, the dotted lines are drawn by using equation (4-A) in Table 4-1, therefore, wages are inclusive of the effect of occupational experience.

[22] Stoikov (1973). The same line of analysis is found in Yashiro (1979) and Shimada (1981).

FIG. 8. EFFECTS ON EXTERNAL EXPERIENCE (*EE*) AND INTERNAL EXPERIENCE (*IE*) ON WAGES, MALE WORKERS, 1980



Note: Dotted and solid lines are calculated respectively from equation (4-A) and (4-B) in Table 4-1.

A comparison between those two curves reveals that an elimination of the effect of occupational experience shifts internal experience profiles downwards more remarkably than external experience profiles. This fact signifies that the considerable part of what has been recognized as the effect of internal experience or specific human capital by the preceding research should be attributed to the effect of occupational experience or general human capital. Therefore, the effect of specific skill has been overestimated.

A downward shift of the wage curve can also found in external experience profiles, when the effect of occupational experience is excluded. In Figure 8, this shift is shown only for firms with 10–99 employees (in the case of firms with 1,000 or more employees, the dotted line is omitted because it is closely adjacent to the solid line). A downward shift of external experience profiles from the dotted to solid lines is clearer for small firms. In large firms, the length of internal experience and occupational experience are on average 12.1 and 10.2 years respectively, while in small firms they are 7.6 and 9.3 years. Therefore, for small-firm employees, external experience partly overlaps the experience with current occupation. This is the reason why the elimination of the effect of occupational experience brings about a greater downward shift of external experience profiles in small firms than in large firms.

(2) Returning to Figure 8, a comparison of solid lines between small and large firms makes clear that the effects of both internal and external experiences are greater in large firms. According to the hypothesis which explains the Nenko wage system on the basis

of firm specific human capital, the effect of external experience should be negligible in large firms where the Nenko system is most prevalent. However, Figure 8 shows that a given level of hourly wage is maintainable if a decrease in internal experience is offset by an increase in external experience. That is, as was mentioned by V. Stoikov, internal and external experiences are interchangeable. From this it follows that we can not support the hypothesis which depends heavily on specific human capital or skill specificity.

2. *An Approach Using the Living Cost Compensation Hypothesis*

The above discussion is an interpretation of the internal wage structure from the viewpoint of skill hypothesis. However, this is not the only hypothesis which can be used. Thus we proceed to an examination of another hypothesis by using the $IE \cdot AGE$ Model.

(1) Tables 4-1 and 4-2 are the estimated results of regression models for male workers. Compare equation (5-B) based on the $IE \cdot AGE$ Model with equation (4-B) based on the $IE \cdot EE$ Model. Coefficients of determination are larger in equation (5-B). Another important fact is that the parameter estimates of AGE are statistically significant except for a few interaction terms.

Some previous quantitative studies in Japan have adopted the age variable as a proxy of living cost compensation for respective age groups.[23] However, it is difficult to find studies in the U.S. which follow the same line of thought. J. Mincer's remarks represent a prevailing view in the U.S. concerning analysis of the internal wage structure. Mincer states that "there is evidence that work experience is much more important than age in affecting productivity and earnings."[24] Even when age is taken into consideration as a variable, it is interpreted either as "potential experience"[25] or as "nonmarket acquisition of human capital which the individual acquires as he ages."[26]

As mentioned above, age is used in this paper as a proxy of cost of living compensation by age. However, since persons with higher educational levels generally marry later, a more appropriate measure of living cost by age is not simply age itself but the number of elapsed years since the completion of schooling. This can be calculated as

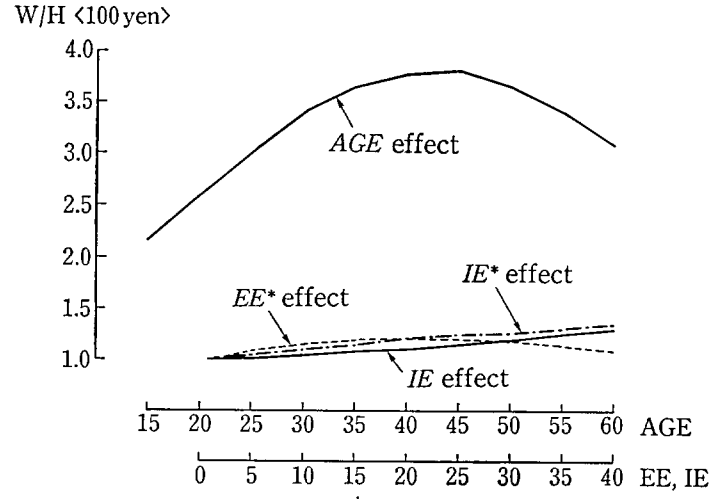
$$AGE-ALS=EE+IE.$$

$AGE-ALS$ is equal to the years of work experience for male workers who have been continuously engaged in jobs after leaving school, apart from a short period of unemployment. Though Mincer insists that work experience is much more important than age, $EE+IE$ should be interpreted, from the standpoint of the living cost compensation hypothesis, as an index showing changes in living costs over the life cycle of independent workers.

(2) The reasons for giving priority to the living cost compensation hypothesis are as follows. Firstly, the $IE \cdot AGE$ Model, which does not decompose age into its components, gives us higher coefficients of determination than the $IE \cdot EE$ Model, which decomposes age into human capital indices such as age of leaving school, external experience, and internal experience. Secondly, as is shown in Figure 9, the effects of internal and external experiences are far smaller than the effect of age. In this Figure, the effects of EE^* and IE^* are those

[23] Ono (1973) and Tachibanaki (1975).
[24] Mincer (1974), p. 65.
[25] Hanushek and Quigley (1978).
[26] Lazear (1976).

FIG. 9. EFFECTS OF AGE (*AGE*), EXTERNAL EXPERIENCE (*EE**), AND INTERNAL EXPERIENCE (*IE*, *IE**) ON WAGES, MALE WORKERS, 1980



Notes: i) Effects of *EE** and *IE** are calculated from equation (4-B) in Table 4-1, and those of *AGE* and *IE* from equation (5-B) in Table 4-2.
ii) Size effect is assumed to be zero.

TABLE 5. EFFECTS OF VARIOUS FACTORS, FOR ALL FIRM SIZES, 1980

	Male workers			Female workers		
	(1)	Rate of contribution (2)	Rate of contribution (3)	(4)	Rate of contribution (5)	Rate of contribution (6)
Constant terms	0.58402	27.0%	—%	1.20335	67.2%	—%
Education	0.04623	2.1	2.9	0.12134	6.8	20.7
Internal experience	0.08260	3.8	5.2	0.05877	3.3	10.0
Occupational experience	0.12359	5.7	7.8	0.16742	9.4	28.6
Age	1.32805	61.8	84.0	0.23856	13.3	40.7
Total	2.16452	100.0	100.0	1.78945	100.0	100.0

Notes: i) Equation (5-B) in Tables 4-2 and 4-4 is used for calculating the rates of contribution.
ii) Columns (1) and (4) are obtained by multiplying parameter estimates by average values of respective explanatory variables.
iii) The rates of contribution are for *ln W/H*.

of internal and external experiences calculated by the *IE* • *EE* Model, and the effects of *AGE* and *IE* are those of age and internal experience calculated by the *IE* • *AGE* Model. In either case, the components of wage changes which can be attributed to human capital variables are extremely smaller compared with that attributable to age. This fact suggests that age should be considered as intrinsically different from internal and external experiences.

(3) Based on the above analysis, let us decompose internal wages (natural logarithms of hourly wages) into their components. An example of decomposition is shown in Table 5, where columns (1) and (4) are obtained by multiplying parameter estimates of regression equations by average values of explanatory variables. The relative importance (the rate of

TABLE 6. THE RATES OF CONTRIBUTION TO THE DISCREPANCY BETWEEN THE STARTING WAGE OF A JUNIOR HIGH SCHOOL GRADUATE AND THE SAGE OF AN EMPLOYEE WITH AVERAGE ATTRIBUTES, 1980

	Male workers		Female workers	
	10–99	More than 1000	10–99	More than 1000
Education	10.0%	9.5%	36.4%	15.9%
Internal experience	5.4	12.1	0.3	34.9
Occupational experience	23.8	15.6	65.2	17.8
Age	60.8	62.8	−1.9	31.4
Total	100.0	100.0	100.0	100.0

Notes: i) Equation (5-B) in Tables 4-2 and 4-4 is used for calculating the rates of contribution.
ii) The starting wage of a junior high school graduate is obtained by assuming $ED_2=IE=OE_2=OE_3=OE_4=OE_5=0$ and $AGE=15$. The wage of an employee with average attributes is obtained by assuming $ED_2=1$, $IE=10$, $OE_5=1$, and $AGE=40$.

TABLE 7. COMPARISON OF THE RATES OF CONTRIBUTION BETWEEN OBSERVATION YEARS, MALE WORKERS IN LARGE FIRMS WITH MORE THAN 1000 EMPLOYEES

	1970	1975	1980
Education	10.5%	8.7%	9.5%
Internal experience	6.9	10.8	12.1
Occupational experience	14.6	17.5	15.6
Age	68.0	63.8	62.8
Total	100.0	100.0	100.0

Notes: See notes in Table 6.

contribution) of respective variables is given in columns (2) and (5). For male workers, the rate of contribution of age variable is 61.8 percent, being larger than that of other variables. For female workers, in contrast, the rate of contribution of age is only 13.3 percent, whereas the constant term occupies a very large share. Thus the relative importance of the variables is recalculated in columns (3) and (6) by eliminating the effect of the constant term. The share of the age effect is 84.0 percent for male workers and 40.7 percent for female workers. The second largest percentage share is the effect of occupational experience for female workers, 28.6 percent, while it amounts to only 7.8 percent for male workers.

In the above, constant terms were excluded in calculating the rates of contribution of respective variables. They are sometimes negatively estimated, depending on the period under observation and model specifications. This may justify their elimination, but the economic meaning of this calculus is not clear. It seems more reasonable to decompose the difference between the starting wage of junior high school graduates and the wage of workers with nearly average attributes. This latter group is assumed to be those who have graduated from senior high school ($ED_2=1$), have worked at their current firm for ten years ($IE=10$), have more than ten years experience in their present occupation ($OE_5=1$), and are 40 years of age.

The results of these calculations are presented in Tables 6 and 7. A comparison of the effects of the variables between different size firms reveals that the rates of contribution of internal experience and age are greater in large firms than in small ones. The percentage share of the age effect is more than 60 percent, being far more important than the effects of

the variables related to within-firm training, such as length of service (internal experience) and length of occupational experience. From this we can see that a hypothesis which is heavily dependent upon the skill factor does not account for the actual situation.

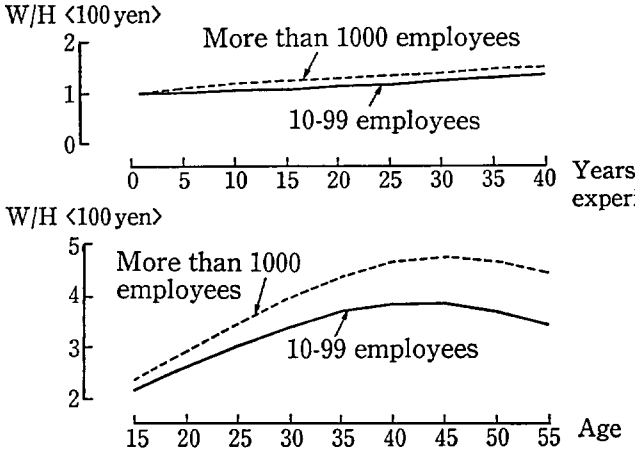
From the data on which Table 6 is based, the component of male hourly wages that can be attributed to ten years of internal experience is calculated at 105 yen and 114 yen for small and large firms respectively; the difference between them being negligible. In addition, as is clear from Figure 10, internal experience profiles of hourly wages are very flat. It is often emphasized that wage differentials by internal experience enhance workers' incentive to remain with the firm, but such slight differentials as are found in Figure 10 are, to this author, not significant enough to stimulate their propensity to remain with the firm.

In Japan remarkable differences in this propensity are observed between small and large firms. However, they do not result solely from a difference in internal experience profiles between the different size firms. Even if the internal experience profiles are flat, the existence of wage differentials by size due to other factors, such as age, as is shown in Figure 10, causes workers in large firms to remain with their present firms.

According to Table 6, for female workers in small firms, the shares of the effects of occupational experience and education are 65.2 percent and 36.4 percent respectively, while that of age is negative. For female workers in large firms, on the other hand, the share of the age effect is positive and increases, but is only half that for male workers. Thus, for male workers, the primary income earners in households, the internal wage structure is characterized by living cost compensation.

Table 7 shows a comparison of the rates of contribution for selected years. Though confined to large firms with 1,000 or more employees, it is found that the rate of contribution of internal experience slightly increased and that of age decreased. It has long been claimed that the Nenko wage system should be reformed to allow more accurate evaluation of workers' ability. However, Table 7 shows that only minor changes have occurred in the Nenko wage system.

FIG. 10. EFFECTS OF INTERNAL EXPERIENCE AND AGE, MALE WORKERS, 1980



Note: Equation (5-B) in Table 4-2 is used.

TABLE 8. COMPARISON OF THE RATES OF CONTRIBUTION BETWEEN JAPAN AND U.K.

	Japan (1978)		U.K. (1976)	
	Blue collar	White collar	Blue collar	White collar
Internal experience	26.4%	14.3%	17.4%	12.6%
Age	73.6	85.7	82.6	87.4
Total	100.0	100.0	100.0	100.0

Note: See the explanations in the text.

(4) Is it a unique feature of the Japanese internal wage structure that the percentage share of the age effect is overwhelmingly large? Though simple in nature, a comparison between Japan and the U.K. proves very interesting. *An Analysis of the Labor Market in 1978* (the *Labor White Paper*) published by the Ministry of Labor provides us with the estimated results of equations regressing wages against internal experience and age (both include quadratic terms).[27] On the basis of these equations, the difference between the starting wages of 15 year old male workers and the wages of 40 year old male workers with ten years internal experience was decomposed into the effects of internal experience and age. The results of the calculations shown in Table 8 clarify that the share of the age effect is very high both in Japan and the U.K. and a larger proportion of internal wages is attributed to age in the U.K. than in Japan.

Though preliminary, the above analysis suggests that the living cost compensating factor may operate in internal wages in the U.K. This inference is not inconsistent with the existence of a rigorous job evaluation system in which wages are determined according to certain criteria such as degree of skill, responsibility, physical effort, and so on. What is important here is to establish a practical method of using the wage system. Suppose, for example, that workers are promoted to a higher wage position, as they get older and have higher living expenses. In this case, the age profiles of wages will be seen. In this author's opinion, this method of determining wages is quite reasonable. Employers are able to satisfy the demand of older workers by inter-generational transfers of labor productivity. In view of the facts mentioned above, it seems that the skill hypothesis places too much emphasis on one side of the coin; namely the effect of skills on the intenal wage structure.

V. *Summary of The Findings and Their Implications*

The analysis in this paper is based on the micro data of the *Basic Survey on Wage Structure*. According to this survey, the difference between the starting wage of a male worker who has just graduated from junior high school and the wage of a male worker with average attributes can be decomposed into several elements. Approximately 60 percent of the difference is explained by the age factor and the remaining 40 percent by human capital factors such as education, internal experience, and occupational experience. A decomposi-

[27] Regression equation is of the following type;
$$W=a_0+a_1\,AGE+a_2\,AGE^2+a_3\,IE+a_4\,IE^2$$
For the details, see Ministry of Labor (1979), Reference materials, pp. 102–103.

tion of the 40 percent into respective human capital factors differs from size to size. Since the relative share of the education effect is about 10 percentage points irrespective of firm size, 30 percentage points are attributable to within-firm training, such as O-J-T and Off-J-T.

The above facts do not refute the skill hypothesis, but rather emphasize the importance of the age effect. In this paper, age is interpreted as a proxy of living costs by age. This interpretation is based on the following two facts. The first is that the model which does not decompose the age variable into human capital indices, such as the age of leaving school, external experience, and internal experience, gives us higher coefficients of determination than the model which decomposes the age variable into its components. The second fact is that the effects of internal and external experiences are far smaller than the effect of age. This fact suggests that age should be considered as a factor intrinsically different from human capital variables.

If we are correct in interpreting the age effect as living cost compensation, the facts mentioned above lead us to an important understanding of the internal wage structure; that is, living cost compensation is much more essential than degree of skill and educational attainment in determining internal wages. Skill hypothesis, therefore, should be limited in the scope of applicability.

Even if education, internal experience, and occupational experience remain constant, wages tend to increase as a worker ages. As is indicated by a simple comparison between Japan and the U.K., living cost compensation may be common to other countries. In so far as living expenses increase as a household head gets older, it is quite natural that the internal wage structure reflects his monetary needs. International comparisons of household expenditure between several countries clarify that household consumption changes according to the age of the head of the household. The skill hypothesis emphasizes that production processes exist which affect internal wages, while the living cost compensation hypothesis focuses on the worker's day-to-day existence as the dominant effect on wages. The main point presented in this paper is that the latter factor is more important than the former.

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