A STUDY ON WAGE DISTRIBUTION IN KOREA AND JAPAN

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I. INTRODUCTION

DUE TO the progress of the Korean and Japanese economies in the late 1960s, wages have significantly increased. It would be interesting to compare the Korean type of wage distribution with the Japanese since, in such a situation, it is anticipated that their patterns of change will be different in different stages of economic development. Fortunately, we can find wage surveys of similar character in both countries: the Wage Survey of Korea (WSK) and the Basic Survey of Wage Structure in Japan (BSWS).[1] Owing to restrictions in data coverage, the study here will be confined almost totally to wages in mining and manufacturing. In Japan, it is known that the wage distribution for workers in these industries plays an important role in determining the total income distribution in the individual base. Although their share in the total Korean labor force is not so high, there has been a remarkable increase in workers in these industries in recent years. Therefore, this study can contribute to the research on income distribution in these two countries.

In measuring the inequality of income distribution, Theil's measure will be used which is more sensitive to small changes in distribution than the Gini coefficients and is more easily decomposed into "within" and "between" inequalities without assuming a specified type of distribution for a population as log-variances would.[2] It will be found that wage differences are remarkable between sex, age, and educational level. Some further examination will be made of these factors.

II. DATA AND THEIL'S MEASURE

Among various kinds of data, we adopted the BSWS and the WSK because the size of the samples is markedly large. The WSK covers workers in all private

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[1] See Bank of Korea [3] and Research Institute of Industrial Development [6] for Korean data. For Japanese data, see the Labor Statistics and Research Division, Minister's Secretariat, Ministry of Labor [4].

[2] For reference to Theil's measure, see Theil [8] [9]. Decomposing the Gini coefficient requires fairly rigid restrictions and Atkinson's measure cannot be decomposed. Income

and public establishments with five or more employees in mining, manufacturing, and electricity throughout Korea,[3] while the BSWS covers all establishments with ten or more regular employees in all industries in Japan.[4] However, we shall use the part of the Japanese reports that corresponds to the Korean data. In both surveys, a two-stage procedure (with stratification) is employed in taking samples: establishments are taken as the first-stage sampling units and employees in each establishment as the final sampling units. Although there are minor differences between these surveys, they can be used for a country-to-country comparison as well as a study of the changes in distribution over time. The concept of wages used in these surveys refers to the monthly earnings in June consisting of regular and extra pay. It should be noted that the figures do not reflect the effects of year-end or Christmas bonuses which are considered to enlarge wage differences. Regular monthly earnings include basic remuneration for normal working units on collective agreements, arbitrary awards or other wage setting decisions, and supplementary wages. Extra monthly earnings consist of premium pay for overtime works, for instance, work on weekends, holidays, and late shifts.

For reference, the method of decomposition of the Theil's measure may be summarized. In a society with n income earners with income z_i ($i=1, 2, \ldots, n$), the average of z's is per capita income:

$$\bar{z}=(1/n)\sum z_i\,, \tag{1}$$

where the summation runs from 1 to n. The income share of the ith individual is each share of total personal income:

$$q_i=z_i/(n\bar{z})\,. \tag{2}$$

Each population share is, of course, $(1/n)$. There are differences between corresponding income and population shares as soon as the z_i's differ. The Theil's measure of inequality is the expected information of the message which transforms the population share into the income share:

$$\begin{aligned} T&=\sum[(1/n)\log n-q_i\log(1/q_i)]\,,\\ &=\log n-\sum q_i\log(1/q_i)\,,\\ &=(1/n)\sum(z_i/\bar{z})\log(z_i/\bar{z})\,, \end{aligned} \tag{3}$$

where the summation runs from 1 to n. The right-hand side of the second line of (3) shows that this measure is equal to the amount by which entropy is reduced below the original maximum. The right-hand side of the third line indicates that T is the mean product of income and its own logarithm with the understanding that per capita income is used as the income unit. This measure satisfies two requirements for a good measure of income inequality; the mean

and assets distribution in Japan has been investigated by Takayama [7] using Theil's measure and a variant of Atkinson's measure which can be decomposed.

[3] Services were included in the 1970 survey.

[4] All industries include mining, construction, manufacturing, wholesale and retail trade, finance and insurance, transportation and communication, and electricity, gas, and water, but exclude services.

product vanishes when all incomes are equal and its value does not change when all incomes are multiplied by the same positive factor. The decomposition can be found as follows: let each of the n income earners belong to one of G groups, $S_1, S_2, \ldots, S_G$,

$$n=\sum n_g\,, \tag{4}$$

where the summation runs from 1 to G, and n_g stands for the number of individuals in S_g. Q_g represents for the income share of S_g:

$$Q_g=\sum_{i\in S_g} q_i\,, \qquad (g=1, 2, \cdots, G)\,. \tag{5}$$

Then,

$$T=\sum_{g=1}^{G} Q_g \log\left(\frac{Q_g}{n_g/n}\right)+\sum_{g=1}^{G} Q_g \sum_{i\in S_g}\frac{q_i}{Q_g}\log\left(\frac{q_i/Q_g}{1/n_g}\right). \tag{6}$$

The first right-hand term of (6) is expected information which deals with population and income shares, and it shows the between-groups income inequality. Since q_i/Q_g is the income share of the ith individual in his group and $1/n_g$ is his population share, the second term is considered to be the weighted average of the within-group inequality. When we admit the Atkinson's measure, we need to decide one parameter arbitrary in order to use it.[5] Therefore, in this paper, attention is given only to the Theil's measure.

III. SOME FINDINGS

A. *Between-Sex and Within-Sex Inequality*

Table I gives us the inequality "within" male and female workers, the one "between" these sexes, and the overall inequality, as well as the percentage of total measure of inequality occupied by its components. It should be noted that the relative within-group-inequality is concerned with the weighted within-one by the income share of the group. As reference, the Gini coefficients for these subgroups are shown in Table II. Although the overall inequality of wages in Japan tended to decrease from 1967 to 1970, the Korean figures remained at a constant level.[6] In Korea, the relative wage disparity between male and female workers enlarged during this period. Great wage differences between sexes are found in Korea in column D of Table III, especially that of low-educated persons—those who graduated from primary or middle schools. The disparity enlarged from 1967 to 1970. Further, the degree of inequality among female workers seems to increase in the same period in Korea. In Japan, while the inequalities within the two groups decreased, the disparity by sex remained at a constant level. The male wage was about double the female in this period.[7]

[5] For Atkinson's measure, see Atkinson [1] [2].

[6] Trends in the Gini coefficients do not necessarily accord with the Theil's measure because of the restrictions of data and of the different weights attached to inequalities in the distribution.

[7] See column D in Table III.

Generally speaking, there is some difference between male and female wages in most countries. The question is whether the difference tends to decrease or increase. It is very probable that the average educational level of male employees is higher than female employees'. With manual workers, some female employees are in subsidiary positions. In Korea where an abundance of labor is found, the real wage has not increased at the high rate of general economic growth. However, from rapid growth was derived a demand for skilled laborers, and it is not unusual that labor scarcity can be found among some types of workers who are technically trained. Since these workers would be male, it is natural that their wages rose in advance of the females'. It should be considered, moreover, that disguised unemployment would be more pronounced among female workers.

Prof. Toshiyuki Mizoguchi has pointed out that the scarcity of labor in Japan decreased the inequality of income distribution in employee households [5]. This could be applied to our explanations on change in wage distribution in

TABLE I

THEIL'S MEASURES OF WAGE AND DECOMPOSITION BY SEX

(In nits and %)

Korean Mining and Manufacturing	Male	Female	Between	Total
1967	0.2328	0.1325	0.0446	0.2632
1970	0.2199	0.1781	0.0823	0.2793
1967	74.8	8.2	17.0	100
1970	51.9	18.6	29.5	100
All Japanese Industries	**Male**	**Female**	**Between**	**Total**
1967	0.0951	0.0801	0.0389	0.1312
1970	0.0823	0.0652	0.0372	0.1173
1967	58.7	11.6	29.7	100
1970	58.0	10.3	31.7	100

Sources: WSK and BSWS.

Note: The Theil's measure of within-inequality is the average of calculations in Tables IV, V, VI, and VII.

TABLE II

GINI COEFFICIENTS OF WAGE DISTRIBUTION

Korean Mining and Manufacturing	Male	Female	Total
1967	0.3712	0.2766	0.3895
1970	0.3518	0.3179	0.3858
All Japanese Industries	**Male**	**Female**	**Total**
1967	0.2423	0.2344	0.2858
1970	0.2258	0.1845	0.2640

Sources: WSK and BSWS.

TABLE III

WAGE DIFFERENTIAL BY SEX AND EDUCATIONAL LEVEL

	All Workers (A)	Male (B)	Female (C)	B/C (%) (D)
Korea 1967:				
Primary school	6.1	7.3	3.9	187
Middle school	7.6	8.7	4.8	181
High school	10.9	11.8	6.8	173
College or university	19.2	19.5	11.7	167
Korea 1970:				
Primary school	12.3	14.9	7.6	196
Middle school	15.2	17.2	9.3	185
High school	22.6	24.3	14.7	165
College or university	38.3	39.0	24.1	162

	All Workers (A)	Male (B)	Female (C)	B/C (%) (D)
Japan 1967:				
Primary and middle school	34.6	41.5	20.1	206
High school	34.6	40.7		
Junior college	57.1	66.0	23.8	223
University	51.8	52.2		
Japan 1970:				
Primary and middle school	56.1	67.3	32.4	208
High school		64.4		
Junior college	66.3	91.6	36.9	215
University		81.7		

Sources: WSK and BSWS.
Note: Value in thousands of won for Korea and in thousands of yen for Japan.

Japan. In the late 1960s, labor shortage occurred not only for male but also among female workers.

Another important reason for the great wage inequality seems to originate from wage differential according to educational level. This is especially true for Korea. There, the average wage level for college or university graduates is about three times that for primary school graduates. In Japan, the corresponding value is only 1.5. As far as average monthly earnings are concerned, the level of education in Korea, conceivably, has greater influence than sex on wage disparity whereas the reverse may be true for Japan.

B. *Inter-generational and Intra-generational Inequality*

It has been pointed out that the seniority rule (or order) in wage determination is one of the important special characteristics in Japan and Korea. The evidence is shown in Tables IV and V. However, the seniority rule seems to be valid only for male workers in both countries as in Figures 1 and 2. Certainly, the degree of between-inequality is significantly high for males in both countries. The relative wage disparity among age groups decreased from 1967 to 1970 for both sexes

TABLE IV

THEIL'S MEASURES OF MALE WAGE AND DECOMPOSITION BY AGE

(In nits and %)

Korean Mining and Manufacturing	19 Years or Less	20–24 Years	25–29 Years	30–34 Years	35–44 Years	45–54 Years	55 Years and Over	Between	Total
1967	0.1348	0.1206	0.1246	0.1524	0.1948	0.2196	0.3009	0.0574	0.2328
1970	0.2205	0.1262	0.1231	0.1174	0.1255	0.1448		0.1094	0.2199
1967	1.8	3.9	11.2	16.2	26.1	15.3		25.5	100
1970	5.0	5.1	7.8	9.0	11.7	16.5		44.9	100

All Japanese Industries	19 Years or Less	20–24 Years	25–29 Years	30–34 Years	35–39 Years	40–49 Years	50–59 Years	Between	Total
1967	0.0474	0.0379	0.0392	0.0447	0.0519	0.0678	0.0996	0.0381	0.0953
1970	0.0399	0.0406	0.0389	0.0396	0.0470	0.0567	0.0854	0.0290	0.0823
1967	2.5	4.8	6.9	8.0	8.4	29.3		40.1	100
1970	1.7	6.2	8.2	8.2	8.8	30.5		36.3	100

Sources: WSK and BSWS.

TABLE V

THEIL'S MEASURES OF FEMALE WAGE AND DECOMPOSITION BY AGE

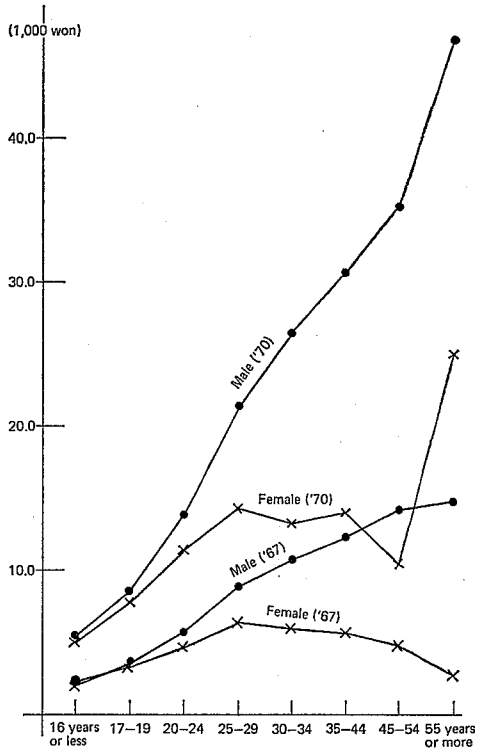
(In nits and %)

Korean Mining and Manufacturing	19 Years or Less	20–24 Years	25–29 Years	30–34 Years	35–44 Years	45 Years and Over	Between	Total
1967	0.0925	0.0971	0.1043	0.1601	0.1689	0.2665	0.0253	0.1325
1970	0.1506	0.1269	0.1324	0.1787	0.2259	0.1430	0.0275	0.1781
1967	13.5	37.4	13.5	6.6	7.1	2.8	19.1	100
1970	7.5	10.9	14.3	17.4	24.0	11.4	14.5	100

All Japanese Industries	19 Years or Less	20–24 Years	25–29 Years	30–34 Years	35–39 Years	40–49 Years	50–59 Years	Between	Total
1967	0.0235	0.0306	0.0588	0.1000	0.1425	0.1491	0.1639	0.0058	0.0801
1970	0.0178	0.0233	0.0461	0.0778	0.1002	0.1184	0.1390	0.0039	0.0652
1967	6.1	11.1	8.4	9.6	15.6	41.8		7.2	100
1970	4.5	12.2	7.9	8.0	12.6	48.7		6.1	100

Sources: WSK and BSWS.

Fig. 1. Relationship between Monthly Earnings and Age in Korea



Source: WSK.

in Japan and for females in Korea. The decrease of the share of between-inequality for Japanese male workers can be explained by the decline of between-inequality and the increase in the number of persons in the 20–29 age group.[8] A similar explanation could be used for Japanese female workers regarding age groups from 40 to 59. It should be noted that the within-inequalities of Japanese female workers decreased for all age groups.

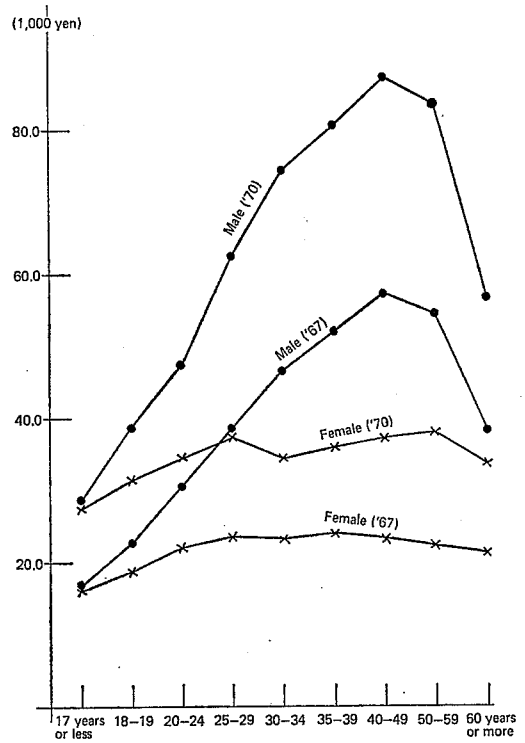
In Korea, between-inequality rose rapidly from 1967 to 1970 for male workers. This may be related to the increase of between-inequality and the decline of within-inequality for age groups from 30 to 44. The share of between-inequality decreased for Korean female workers, because within-inequality increased for the 30 to 44 age group.[9] It is noteworthy that the trends of relative inequality regarding the age groups moved in opposite directions for male and female workers.

When within-inequality is examined in comparison with total inequality, there are differences by country and by sex. Among Japanese male workers, within-

[8] Inequality "within" the 20 to 24 age group has also increased.

[9] The share of within-inequality has increased for the 30 to 44 age group, which is partly due to an increased population share for this group.

Fig. 2. Relationship between Monthly Earnings and Age in Japan



Source: BSWS.

inequality is large for the 40 and over group, while Korean male workers have relatively large inequalities in age group of 45 and over. The middle age groups, therefore, play an important role in determining total inequality of male workers. With female workers in Korea, the share of within-inequality is large in the 20–24 group in 1967 and in the 35–44 group in 1970.

C. *Wage Differential by Size of Establishment*

In analyzing wage distribution, it is, of course, necessary to touch upon the so-called dual structure of industries. Since our reports give wage level according to size of establishment, this problem can be examined to some extent. The results are given in Tables VI and VII. A decrease is found in between-inequality by both sex and country. It should be noted that between-inequality for Korean male workers is very large. Decline of the total inequality of Korean male workers comes principally from a decrease in between-inequality because within-inequality moves differently according to size of establishment. Increase in the total inequality of female Korean workers can be explained by a rise of within-inequality in all subgroups. In contrast, a decline was found in both between- and within-inequality for Japanese male and female workers. In the Japanese situation, economic growth and scarcity of labor made the wage dif-

TABLE VI

THEIL'S MEASURES OF MALE WAGE AND DECOMPOSITION BY SIZE OF ESTABLISHMENT

(In nits and %)

Korean Mining and Manufacturing	5–9 Persons	10–29[a] Persons	30–99[b] Persons	100–199 Persons	200–499 Persons	500 Persons and Over	Between	Total
1967	0.1577	0.2026	0.2380	0.2488	0.2323	0.1539	0.0361	0.2328
1970	0.1710	0.1912	0.1839	0.1875	0.1673	0.1925	0.0262	0.2199
1967	6.9	12.5	19.8	11.9	15.7	18.0	15.2	100
1970	8.5	11.9	15.6	16.4	16.1	18.9	12.6	100

All Japanese Industries	10–99 Persons	100–999 Persons	1,000 Persons and Over	Between	Total
1967	0.0924	0.0901	0.0895	0.0050	0.0953
1970	0.0812	0.0772	0.0807	0.0035	0.0823
1967	27.9	24.5	42.4	5.2	100
1970	26.0	25.5	44.3	4.2	100

Sources: WSK and BSWS.

[a] From 10 to 49 persons in 1970.

[b] From 50 to 99 persons in 1970.

TABLE VII

THEIL'S MEASURES OF FEMALE WAGE AND DECOMPOSITION BY SIZE OF ESTABLISHMENT

(In nits and %)

Korean Mining and Manufacturing	5–9 Persons	10–29[a] Persons	30–99[b] Persons	100–199 Persons	200–499 Persons	500 Persons and Over	Between	Total
1967	0.1180	0.1411	0.1120	0.1302	0.1354	0.1078	0.0102	0.1325
1970	0.1791	0.1405	0.1784	0.1782	0.1578	0.1529	0.0071	0.1781
1967	4.3	13.7	16.6	13.4	15.9	28.2	7.9	100
1970	13.9	12.8	16.6	20.0	16.5	16.1	4.1	100

All Japanese Industries	10–99 Persons	100–999 Persons	1,000 Persons and Over	Between	Total
1967	0.0661	0.0552	0.0939	0.0069	0.0801
1970	0.0574	0.0401	0.0754	0.0060	0.0652
1967	29.3	18.7	43.3	8.7	100
1970	27.7	17.3	45.8	9.2	100

Sources: WSK and BSWS.

[a] From 10 to 49 persons in 1970.

[b] From 50 to 99 persons in 1970.

TABLE VIII

WAGE DIFFERENTIAL BY SIZE OF ESTABLISHMENT AND EDUCATIONAL LEVEL IN KOREA

(%)

		Total	5–9 Persons	10–29[a] Persons	30–99[b] Persons	100–199 Persons	200–499 Persons	500 Persons and Over
Primary school	1967	100 (6.1)	83.6	85.2	90.2	93.4	109.8	147.5
	1970	100 (13.9)	80.6	84.9	100.0	100.7	119.4	132.4
Middle school	1967	100 (7.6)	84.2	89.5	92.1	96.1	109.2	114.5
	1970	100 (17.4)	81.6	85.1	103.4	100.5	106.9	119.0
High school	1967	100 (10.9)	72.5	85.3	96.3	94.5	112.8	110.1
	1970	100 (24.7)	62.8	83.0	104.0	100.0	101.6	114.6
College and university	1967	100 (19.2)	58.3	76.0	88.5	100.5	112.5	119.8
	1970	100 (40.5)	51.9	77.8	92.1	101.7	103.7	118.0

Source: WSK.

Note: Figures in parentheses are average monthly earnings in thousand won.

[a] From 10 to 49 persons in 1970.

[b] From 50 to 99 persons in 1970.

ferences between large and small establishments decrease. It is very interesting that the differences decreased in Korea where an abundance of labor existed.

There still remains the problem relating to the cross effects in wage difference between size of establishment and level of education, because large firms employ workers of a relatively higher educational level. Figures in Table VIII are relative average wages by establishment group and level of education. At every level of education, large establishments pay higher wages than small ones and the wage disparity of college graduates does not decline. Wage disparity may be influenced more by establishment size for college graduates than for middle or high school graduates. High school graduates in 1967 Korea, for example, in establishments with 30–99 employees were better paid than in those with 100–199 employees. Therefore, it is difficult to say exactly whether wages for middle and high school graduates differ by size of establishment. In Korea, it is likely that the large wage disparity among establishments is due mainly to wage differences in male college graduates as well as the composition of workers by educational levels.

IV. CONCLUDING REMARKS

The major results of this study are:

(1) Although total inequality of wages decreased in Japan from 1967 to 1970, that of Korean wages did not decrease.

(2) Rapid economic growth in Korea spread out disparity by sex, while in Japan scarcity of labor during industrial expansion did not allow the trend of wage differentials between sexes to increase.

(3) As far as the average monthly earnings are concerned, wage difference by level of education is larger than wage difference by sex in Korea, but the reverse is true in Japan.

(4) Seniority as a wage determiner is influential for male workers in both countries. All relative wage disparities between age groups, except for that of Korean male workers, decreased in this period.

(5) There is a decline in relative wage disparity by size of establishments for both sexes and both countries. For all levels of education, large establishments paid higher wages than small ones, especially, in Korea.

Factors determining wage disparity are sex, educational level, age, and size of establishment. However, it is necessary to investigate other factors, such as industry, occupation, region, duration of service, or professional career. It is difficult to investigate the wage structure in Korea for these latter factors because of data restrictions, but some examination is possible for Japan.

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