

## THE CHANGE OF EDUCATIONAL EARNINGS INEQUALITY

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*By applying decomposition analysis in this study I have explored the effect of education in each of six occupational categories between 1986 and 1989. Previous studies have shown that earnings inequality came about because of the more homogeneous earnings within each category in industry, occupation, and firm size, but not in education. However, if the occupational variable is controlled, education does not show the same trend. First, in the administration and service categories, earnings inequality of the educational level unexpectedly increased during 1986-89, due to widened variations within each educational level. Second, in the professional and production categories, earnings inequality was reduced due to more homogeneous earnings within each educational level. Third, in the clerical and sales categories, earnings inequality decreased due to less variation in mean earnings between educational levels.*

### INTRODUCTION

Changes in inequality have occurred most frequently during the period of rapid economic growth in Korea. This is interesting, but it is complex since various structural changes have also taken place along with national growth. A substantial number of valuable studies have proven this (Kuznets 1977; Adelman and Robinson 1978; Kim and Roemer 1979; Mason *et al.* 1980; Park *et al.* 1980; Bai 1982; Bauer and Shin 1987; Deyo 1989; Koo 1990; Chung 1991; Lee 1992).

Lee's study (1992) testing Kuznet's inverted U-shaped hypothesis shows that earnings inequality decreased from 1975 to 1989 in all five categories (industry, occupation, education, firm size, and region) due to the homogeneous earnings within each sector except education. This finding indicates that 'between' variance is always a small proportion of 'total' variance. The remaining larger amounts are explained by 'within' variance, which is difficult to pinpoint. In education, Lee (1992) argues that Kuznet's inverted U-shaped hypothesis is applicable in part in the case of earnings inequality in Korea. The earnings inequality shows the decreasing pattern which is the latter part of the inverted U-shaped curve. But the way reduction was actually achieved was not anticipated by the hypothesis. The reduction of earnings inequality came about because of similar earnings within each sector. The effect of converging mean earnings between sectors

was not great, which was expected from Kuznets' theory. However, the reduction of educational levels, unlike the other four variables, was based on the similar effects of changes 'within' and 'between' category.

Lee's (1992) study suggests to us that the educational variable reveals something different than the other four variables (industry, occupation, firm size, and region). In this paper, I will examine whether the difference can be maintained when controlling other variables. For this purpose, I selected occupation as the control variable since this variable is more closely related to education. The specific questions to keep in mind here are: (1) Does the education category follow the same trend even after the occupational variable is controlled; and (2) If it does or does not follow the same trend, what are the factors that brought about this change in earnings distribution?

## BACKGROUND

There is agreement about the relatively equal income distribution in the 1960s, but divergent views in the mid-1970s. Korea not only was successful in achieving unusually rapid economic growth during the 1960s, but also boasted a very equitable income distribution (Kim 1980). This notion was popularized by the work of Paukert (1973), who claimed that Korea's Gini Index in 1966 was .26. However, the data that he used has been strongly criticized for its quality (Choo 1980).

One of the causes that made for a relatively equal distribution during this period was government policy. The adoption of export-oriented industrialization in the early 1960s through the early 1970s brought about an improved income distribution, and we can estimate that (at least until the early 1970s) this industrialization policy was an important impulsive factor. This policy concentrated on the labor-intensive export industry rather than on the capital-intensive import-substitution industry, so it increased employment especially in urban areas. The real wage also increased about 10 percent in the manufacturing sector from 1965-79, and income distribution for urban employees improved from 1965-70 (Kim 1980).

When we talk about the 1970s, the change in the distribution becomes unclear. Choo (1980, 1982) argues that income distribution in Korea was less unequal during the period 1965-70, but became more unequal during the period 1970-76. His study shows that income inequality in Korea rose substantially during this period in each of three categories—farm households, urban employer households, and urban employee households. The Gini Index among urban employee households, for example, dropped from .399

in 1965 to .304 in 1970, but it sharply increased to .355 in 1976.

Earnings inequality during the 1980s decrease steadily (Table 1). By the Gini Index, the amount of earnings inequality reduction of the second half was larger than that of the first half of 1980s. By percentage of population, the lower 40% expands its amount up to 21.46 and the upper 20% decreases to 38.99 in 1989. The lower-upper ratio also improved from .410 to .550, too. One reason for this improvement can be explained by the labor union movement and the minimum wage system introduced in 1988 (Chung 1991).

Income and earnings are frequently used variables in economic distribution studies. However, they differ slightly from each other. The earnings refer to wages and salaries coming from paid occupations, and income refers to earnings in addition to unearned money derived from investments. The pattern of overall income distribution in Korea has fluctuated during the period 1965-88, but less is known about the distribution for each category, such as rural household income, urban household income, wealth, etc. One reason for the lack of in-depth study in income distribution is defective data. Compared with income data, earnings data are relatively easy to gather and are of better quality (Bai and Park 1978; Park 1980; Lee 1992).

In order to understand the income/earnings inequality we must consider the changing labor structure of this period since this influences the distribution. Bai (1982) argues that the labor market in Korea passed a "turning point" around the mid-1970s with regard to surplus labor. This has given way to a labor shortage, meaning that Korea has already passed the phase of having an unlimited supply of labor, especially less-skilled labor. It is limited now because after having passed the turning point, companies could not obtain less-skilled workers without increasing their wages. According to Bai (1989), Korea passed the turning point by 1975, Taiwan by 1968, and Japan by 1960.

TABLE 1. THE DISTRIBUTION OF RELATIVE EARNINGS

	1980	1986	1989
Lower 40%(A)	18.15	19.22	21.46
Upper 20%(B)	44.23	41.95	38.99
Ratio (A/B)	.410	.458	.550
Gini Index	.367	.342	.303

Source: Ministry of Labor, *Report on Occupational Wage Survey* (cited from Chung 1991).

## AN EXPANSION OF EDUCATIONAL OPPORTUNITY

When the export-oriented industrialization program began in Korea, the nascent manufacturing sector was not automated - it was labor intensive and depended on a steady supply of unskilled workers. The manufacturing sector was based on light industry, such as textiles. The required labor supply came mostly from rural-urban migration with a high proportion of female workers. The workers moved into big cities such as Seoul and Pusan with vague anticipation of better opportunities in big cities. The supply of educated workers also played into the hands of this policy. The government had made efforts to elevate the educational level since 1945. However, the expansion of high-level education was not sufficient to provide the necessary labor force for economic development. The bottleneck of high-level education peaked in 1975. The labor surplus in unskilled jobs and shortage in high-skilled jobs occurred in 1975; this affected the labor structure, earnings differential, and finally, earnings inequality.

After 1945, the Korean Government widened access to schools and education. In 1948, the government declared that all citizens were entitled to free primary education. The number of primary school students eventually grew from 3.9 million in 1961 to 5.7 million in 1970. Primary school education was virtually nationwide by the mid-1960s. The number of primary school children peaked between 1970 and 1980 as the post-Korean War baby boomers came of school age. The number of primary school children decreased slowly until 1989; this trend will continue due to successful family planning.

Table 2 provides the basic numbers for this educational expansion. As the number of primary school students increased, the number of junior high school and high school students increased also. The former increased about five times from 1961 to 1975, and the latter increased about four times. The number of college students increased about one and one-half times during the same period. The increase in the number of college students was smaller than the increased number of junior high school and high school students. Along with the increase in total numbers, the increase in the number of females in high school was impressive (Chang 1980, p.86). While the number of boys attending high school increased 2.8 times, the number of girls went up 8 times over the same period. The ratio of girls to boys at the high school level increased from 18:100 in 1953 to 81:100 in 1970.

Until 1975 the ratio of junior high school students to high school students was one-half, but in 1989 the ratio was equal. The increasing number of

TABLE 2. NUMBER OF STUDENTS BY EDUCATIONAL LEVEL, 1961-89 (1,000)

	1961	1970	1975	1980	1984	1989
Primary	3,855	5,749	5,599	5,658	5,041	4,894
Jr. High	621	1,319	2,027	2,472	2,735	2,371
High	279	590	1,123	1,697	2,092	2,325
College	143	146	209	403	870	1,021

Source: Economic Planning Board, *Korea Statistical Yearbook*, each year.

students attending high school was dramatic and their contribution to economic development was inevitable. There was a great increase in the number of students in junior college—from 86,000 in 1977 to 149,000 in 1989. The ratio of females to males increased from 34:100 to 54:100 during this period. The rate of increase of female junior college students is greater than that of males. During this period the number of male students increased 2.3 times (from 64,444 to 149,061) and the number of female students increased 3.7 times (from 21,676 to 81,221).

Compared with the junior college population, the female to male ratio of college students did not increase much: 34:100 to 37:100 during the same period. However, the number of female college graduates increased 3.7 times (from 63,324 to 232,972) during this period. The small increase in ratio is due to the sharp increase in male college graduates whose number increased 3.4 times (from 188,005 to 637,198) (KEPB 1989). We notice that the proportion of females increased in junior college and that of males increased in college. The number of college students doubled from 1961 to 1975 and increased five times from 1975 to 1989. Even doubling the number of college students from 1961 to 1975 was insufficient in terms of industrial supply and demand and therefore created a bottleneck. However, the five-fold increase between 1975 and 1989 seems to have alleviated this situation.

According to Bauer and Shin (1987, p.24), males concentrate on engineering and the social sciences, but females concentrate on teacher training. One reason women concentrate on teacher training is that teaching is considered one of the best jobs in Korea; this position allows women the opportunity to have a career and be a housewife. In many occupations overtime work is not unusual. However, teachers can come home after the regular working hours and have winter and summer vacations. Under normal labor conditions women rarely have special holidays or maternity leave, so teaching is considered to be a highly desirable career.

As the economy modernized and as the educational system expanded in size, the educational level of an employee became a national norm in

determining that person's earnings. This explains the decreasing earnings inequality within the industrial, occupational, educational level, firm size, and regional categories (Lee 1992). The standardization of hiring practices and promotion policy are the basis of this increasing homogeneity.

It is difficult to achieve both quality and quantity at the same time. The quality of education was not equal to the expansion of the system and of the number of students. The class room was usually crowded and the number of students per teacher was high from primary school through high school during the 1970s. The relative quality of education is indicated by the number of students per teacher. The number of students per teacher in primary school has decreased from 56.9 in 1970 to 36.9 in 1989; in junior high school, from 42.0 to 29.0; and in high school, from 29.7 to 27.4 (KEPB 1970, 1989). The quality of education improved during this period. The lower quality of education in the 1970s was the effect of the rapidly increasing quantity of students.

In Korea, higher education is mandatory and highly important in gaining entry into a high-paying occupation. Western societies made a rather smooth progression in technological advancement. In Korea, however, modern industrial skills were brought from abroad as ready-made knowledge that required formal educational skills. Korean industrialists depended upon academically earned knowledge rather than upon traditional skills. Thus in the labor market, educational attainment of workers had the first priority.

Education is regarded as an indirect means of transmitting economic status from one generation to another. Park (1980) finds that there is a significant positive relationship between family background and children's educational levels in Korea. A person having a better family background obtains a better education and eventually gets higher earnings. However, Park also argues that there seems to be no sociopolitical barriers which limit the opportunities of the poor. Since the government encourages education, every person has the right to have at least a junior high school education at no cost. Social forces—such as the imperfection of the capital market, cost of information about the labor market, etc.—seem to be the major factors which tend to work against the poor.

If we look at educational earnings differentials after dividing each occupation, then we might find other aspects of earnings differentials, but herein the general trend is demonstrated. The earnings differentials by educational levels increased from 1971 to 1975 and decreased thereafter (Table 3). Throughout the period from 1971 to 1989, the difference between earnings differentials for college graduates compared with high school

TABLE 3. EARNINGS DIFFERENTIALS BY EDUCATIONAL LEVEL

Education	1971	1975	1980	1989
Primary	100.0	100.0		
Jr. High	120.3	118.1	100.0	100.0
High	178.8	190.8	137.6	114.8
Jr. College	259.8	200.4	136.1	
College	313.2	409.1	298.9	209.2

Source: Ministry of Labor, *Report on Occupational Wage Survey*, each year.

graduates was always greater than for high school graduates compared with primary school graduates. This is evidence for the increasing emphasis on education at the higher levels.

The education is one of the most important variables in explaining earnings differentials in Korea. As we see Table 3, the earnings differentials among primary school graduates, junior high school graduates, and high school graduates are not large. But, between high school graduates and junior college graduates-especially between high school graduates and college graduates-the differentials are large.

There exists the earnings gap for the entrance salary as well as for the average salary. The major reason for the gap between the entrance salary for high school graduates and that for college graduates is the traditional bias toward more educated employees. The official duties in most companies clearly vary with the level of education. This separated system of official duties begins with entrance into the company with two tracks, one for high school and one for college graduates. When a company recruits new workers, the number of recruits, their qualifications, and other conditions are specified in its advertisements. The company actually recruits from two separate labor markets.

When the markets are separated into two different groups based on educational level, the opportunities for access to higher earnings and satisfactory jobs are based on the level of education. High school graduates thus have a disadvantage in gaining high earning jobs. Educational level is used as a screening device for entrance and promotion.

In the process of economic development in Korea, just as in other developing countries, the number of college graduates was insufficient. Considering the low number of college graduates, their opportunities for high-wage positions increased year by year. Therefore, a high school graduate who was experienced earned less than the average new college graduate. According to Park (1983), the earnings differential between male

college graduates and male high school graduates is composed of three parts and education has the greatest effect. He mentions that the effect of occupation and industry contributes 27.2 percent of the total earnings differential; the effect of the age is 34.2 percent; and the effect of education is 38.6 percent.

## DATA AND METHOD

In this chapter I have used the *Report on Occupational Wage Survey*, which provides information on earnings by gender, industry, occupation, education, and firm size, prepared by the Ministry of Labor in Korea. The purpose of the survey is to provide basic information to adjust economic policy and to improve the wage system by analyzing working conditions.

This survey provides individual earnings which are based on information gathered from employees working in firms of 10 or more employees in all industries in the private sector (Ministry of Labor 1989, p. 3). Therefore, a shortcoming of the data is the exclusion of both small firms (with fewer than 10 employees) and employees in the public sector. For this study, a 10 percent sample was randomly selected for the years of 1986 and 1989 which contain about 30,000 cases and 65,000 cases, respectively.

Earnings is total monthly earnings. Education consists of five levels which are primary, junior high school, high school, junior college, and college graduates. Occupation has seven subparts which are professional, administration, clerical, sales, service, production, and agriculture, but agriculture was deleted because of the smaller number of cases.

There are many analytical tools to use in conceptualizing and measuring inequality: the frequency distributions, the percentage distributions, the cumulative distributions, the rates, the ratios, and various indexes. Each provides a different kind of insight into the data and serves as the basis of different measures of inequality. In this study, the variance of the logarithms is used essentially. This measure provides us inequality both 'within' and 'between' groups.

Variance of the logarithms is used by the simple logic that the more variation among the earnings, the more inequality. One standard against which variation is defined is the average. Variation can be defined then as the spread or dispersion of a set of scores from the mean. However, in this study the variance of the logarithms is used instead of the variance, because the latter is trapped by the criterion of scale invariance (Allison 1978, p.866).

The variance of the logarithms is more sensitive to changes which occur in the lower ranges of income distribution than it is to the middle or the

high ranges (Allison 1978; Atkinson 1970). This measure is obtained by taking the logarithms of each person's earnings and computing the variance of the transformed scores.

The variance of the logarithms was calculated for 1986 and 1989 to measure the inequality changes between those two years. The total variance of the logarithms of 1986 is  $V_{86}$  (capital letter), and 1989 is  $v_{89}$  (small letter). This total earnings inequality can be derived by a one-way analysis of variance and the equations (1, 2) are as follows:

$$V_{86} = \sum_i P_i (M_i - \sum_i P_i M_i)^2 + \sum_i P_i V_i \quad (1)$$

$$v_{89} = \sum_i p_i (m_i - \sum_i p_i m_i)^2 + \sum_i p_i v_i \quad (2)$$

where  $V_{86}$  refers to the total variance of the logarithms of earnings of 1986,  $M_i$  refers to the mean of the logarithms of earnings in the  $i$ -th educational level (primary, junior high school, high school, junior college, college),  $V_i$  refers to the variance of natural log earnings in the  $i$ -th educational level, and  $P_i$  refers to the proportion of natural log earnings in the  $i$ -th educational level. For 1989, I use symbols analogous to  $V_{86}$ ,  $M_i$ ,  $V_i$ , and  $P_i$ — $v_{89}$ ,  $m_i$ ,  $v_i$ , and  $p_i$ , respectively.

As many statistics textbooks define it, the variance is a measure of dispersion indicating an average of squared deviations of scores about the mean. To get an average value, the squared deviations are divided by the number of cases or multiplied by the proportions. In this study, the proportions are used, and the weights ( $P_i$ ) represent the proportion of each sector, and they add up to one. For example, the sectors of occupation are professional, administration, clerical, etc., and the sectors of the educational level are the primary school, the junior high school, high school, junior college, and college graduate.

The total variance (the left side of the equal sign) of the logarithms is obtained by adding the between variance (the first term of the right side of the equal sign) and the within variance (the second term of the right side of the equal sign). The between variance is a weighted variance of each sector mean. It retains the amount of inequality that is produced by each sector having different mean earnings. The within variance is a weighted mean of each variance. It shows the amount of inequality that is produced by each subdivision's having different levels of inequality within it. It should be noted that total inequality is composed of three elements; proportion, mean, and variance.

When interpreting the difference between two crude rates of the same

phenomenon for two populations, demographers and other social scientists have been careful to recognize structural differences in the populations that might partially or wholly explain the difference. A comparison of two crude labor force participation rates, for example, may differ from a comparison based on the corresponding "standardized" rates—standardizing, say, with respect to age and education status. When calculating the difference between two rates, controlling several factors, one might also want to study the contribution of each of these factors to the possible disparity between comparisons based on crude rates and standardized rates.

One of the forms of standardization is the decomposition analysis (Kitagawa 1955, 1964; Das Gupta 1978). The procedure involves splitting the difference between two rates into components due to differences in specific rates and due to differences in composition. To calculate the variation of inequality, I decompose the difference between two variances of the logarithms,  $V_{86}$  and  $v_{89}$ , which refer to total variance of the logarithms of earnings for 1986 and for 1989, respectively. Here, the standard year is 1986, and if inequality decreased from 1986 to 1989, then  $v_{89}$  would be smaller than  $V_{86}$  and  $v_{89}-V_{86}$  would become negative. The  $v_{89}$  and  $V_{86}$  are exactly the same in equations (1) and (2), respectively. The formula for  $v_{89}-V_{86}$  is explained in equation (3).

$$v_{89} - V_{86} = \underbrace{\sum_i p_i (m_i - \sum_i p_i m_i)^2}_{\text{<between>}} + \sum_i p_i v_i - \underbrace{\sum_i P_i (M_i - \sum_i P_i M_i)^2}_{\text{<within>}} + \sum_i P_i V_i \quad (3)$$

The <between> part is calculated for "change in earnings between variables" and rewritten in equation (4), and the <within> part is calculated for "change in earnings within variables" and is seen in equation (5).

$$\begin{aligned} & \sum_i p_i (m_i - \sum_i p_i m_i)^2 - \sum_i P_i (M_i - \sum_i P_i M_i)^2 \\ &= \sum_i (M_i - \sum_i P_i M_i)^2 (p_i - P_i) \\ &+ \sum_i P_i [(m_i - \sum_i p_i m_i)^2 - (M_i - \sum_i P_i M_i)^2] \\ &+ \sum_i (p_i - P_i) [(m_i - \sum_i p_i m_i)^2 - (M_i - \sum_i P_i M_i)^2] \end{aligned} \quad (4)$$

The differences in <between> variables become three components: a composition part, a rates part, and an interaction part. The first part (compositions) on the right-hand side of equation (4) measures the effect of changes in the composition, given the rate (i.e., means) for 1986. The second part (rates) measures the effect of changes in rates, given the composition of 1986 (used as the standard). In other words, it measures the difference between the two rates. Unfortunately, these two parts do not add up to  $v_{89} - V_{86}$ , and we have a third part that accounts for the interaction between rates and compositions. The third part (interaction) measures the effect of changes both in rates and in composition.

$$\begin{aligned} \sum_i p_i v_i - \sum_i P_i - V_i &= \sum_i V_i (p_i - P_i) \\ &+ \sum_i P_i (v_i - V_i) \\ &+ \sum_i (p_i - P_i)(v_i - V_i) \end{aligned} \quad (5)$$

The <within> part is explained in equation (5). The differences in <within> variables also become three components: a composition part, a rates part, and an interaction part. The first part on the right-hand side of equation (5) measures the effect of changes in the composition, given the rate (i.e., variances) of 1986, or saying the standard rates are  $V_i$ . The second part measures the effect of changes in rate, given the composition of 1986. In other words, it is the difference between the two rates, with that of 1986 as the standard. The third part measures the effect of changes both in rates and in composition.

The decomposition analysis consists of six parts in each variable. If variations in educational structure, for example, are related to variations in inequality, then the composition part must be relatively large. In this case, the percent employed across the educational sectors between 1986 and 1989 affects the variation of inequality. If the variation in inequality is due to other factors, then the rates part must be relatively large. In this case, the proportion of within variance among total variance is so large that we cannot insist that education itself is highly related to variations in inequality. We can estimate to what extent total variations in education are related to variations among education levels and to variations within education. If the interaction part is large, then it is difficult for us to measure the effects separately because we must interpret both the rates effect and the composition effect at the same time.

## EMPIRICAL RESULTS

I begin with some descriptive statistics to think about the changing equality in the educational level controlling the occupation variables such as professional, administration, clerical, sales, service, and production. Eta squared measures what proportion of the original variance of the dependent variable occurs only when the independent variable also varies, or refers to the proportion of the total variance that is estimated by the between-sector variance.

In both years every category has low Eta squared with smaller than .3, except sales (Table 4). These results indicate that the overwhelming majority of total inequality comes from within-sector inequality rather than from between-sector inequality except in sales category. The sales category in 1986 shows that between-sector inequality has a greater effect than within-sector inequality, since the Eta squared reduced from .5978 to .3161, in other words, a fifty percent reduction. It means that compared to other occupational categories, a lot of earnings inequality exists among education levels in the sales category. However, this between-sector inequality decreased during 1986-89.

Table 5 shows the results for the decomposition of the difference in the variance of log earnings between 1986 and 1989. One interesting finding is that inequality increased in two categories (administration and service), but decreased in four categories (professional, production, clerical, and sales). Among the latter four categories, in the professional and production categories, inequality reduction was achieved by within-sector reduction, and it was achieved by between-sector reduction in the clerical and sales categories. The following analysis is divided into those three subparts.

First, the former categories during this 1986-89 period increased educational earnings inequality from .1439 to .1616, and from .1947 to .2184 or by .0176 and .0236, respectively. As was discussed earlier, this total

TABLE 4. ETA SQUARED OF EDUCATIONAL LEVEL BY OCCUPATION

Occupation	1986	1989
Professional	.1987	.1885
Administration	.1813	.1891
Clerical	.2453	.1723
Sales	.5978	.3161
Service	.1165	.0991
Production	.0262	.0242

TABLE 5. DECOMPOSITION OF THE DIFFERENCE IN THE VARIANCE OF LOG EARNINGS, 1986-89

Component	Administration	Service
BC(between composition)	.0017	.0002
BR(between rates)	.0029	-.0004
BI(between interaction)	.0000	-.0008
Sum of Between	.0046	-.0010
WC(within composition)	.0004	-.0002
WR(within rates)	.0136	.0245
WI(within interaction)	-.0009	.0003
Sum of Within	.0131	.0246
Variance for 1989	.1616	.2184
Variance for 1986	.1439	.1947
Total difference	.0176	.0236

Component	Professional	Production	Clerical	Sales
BC	-.0016	.0009	.0023	-.0294
BR	-.0078	-.0016	-.0265	-.0672
BI	-.0010	-.0004	-.0006	.0169
Sum of Between	-.0104	-.0011	-.0248	-.0797
WC	-.0024	-.0037	-.0038	.0182
WR	-.0301	-.0259	-.0130	.0005
WI	.0011	-.0002	.0016	-.0131
Sum of Within	-.0314	-.029	-.0152	.0056
Variance for 1989	.2134	.1774	.2057	.1317
Variance for 1986	.2551	.2083	.2458	.2058
Total difference	-.0418	-.0308	-.0401	-.0741

Note: The components do not sum up exactly to the total due to an error in rounding.

difference can be decomposed into components mirroring composition, rate, and interaction. In those two categories earnings inequality increased in both the between-education level and within-education level (if we do not consider service's between-education levels score of  $-.001$  seriously). Education does not diminish the earnings inequality, and inequality exists between and within the education level in those two categories. For example, in the administration category, the earnings of primary school graduates, the earnings of junior high school graduates, the earnings of high school graduates, etc. became unequal.

In the administration and service categories, WR (within rates) contributed most to the unequal growth and this is difficult to explain. In

1989, inequality of earnings among people having the same educational background became more widely varied and scattered than in 1986. In the administration category, the variance of the largest groups, college graduates (66%) and high school graduates (23%), increased from .1137 to .1332 and from .1219 to .1353, respectively, during 1986-89. In the service category, this pattern is maintained. In the service category, the variance of the largest bands, high school graduates (40%) and junior high school graduates (33%), increased from .1557 to .2036 and from .1772 to .2054, respectively, during 1986-89.

The contribution of BR (between rates) is small. However, since BR is the variation in mean earnings across educational levels, mean earnings in the administration category varied more in 1989 than in 1986 and added to the increased inequality.

Second, the decomposition of inequality decreased categories, especially the professional and production categories indicates that educational earnings inequality went down from .2551 to .2134 and from .2083 to .1774, respectively. In these categories, the within-sector part rather than the between-sector part contributes to inequality reduction. The WRs (within rates) of the two categories are  $-.0301$  and  $-.0259$ , respectively, which is the largest part among six parts (BC, BR, BI, WC, WR, WI). In the professional category, college graduates (55%) and high school graduates (26%) are the largest segment, and their variance increased from .1905 to .1694 and from .2295 to .1962, respectively. Therefore, in these two categories, earnings inequality was lower due to earnings equalization within each education level. For example, in the professional category the earnings among high school graduates, junior college graduates, college graduates, and so on were consistent and less varied.

Third, in the clerical and sales categories, the between-sector part rather than the within-sector part contributes to an inequality reduction. The BRs (between rates) of the two categories are  $-.0265$  and  $-.0672$ , respectively, which is the widest variation among the other six parts. In these two categories, earnings inequality was reduced due to fewer earnings variations between each educational level. The negative BR component shows that the variation in mean earnings across educational levels was smaller in 1989. For example, in the clerical category the mean earnings variations between high school graduates, junior college graduates, and college graduates depressed in 1989.

Some factors can explain the earnings changes and the inequality changes—the market factor and the socioeconomic factor. First, the market factor implies the demand-supply of labor which changes the labor

structure, wage system, and wage inequality. One must consider the shift of workers from production to service because of the characteristics of the production job—dirty, difficult, and dangerous, which affects the exceeding of labor demand over supply (Chung 1991; Lee 1992). Second, the socioeconomic factor affects the wage system. Since the democratic movement in 1987, the number of labor union members increased from 1 million in 1986 to 1.9 million in 1989 (Chung 1991, p.69). This heightened union membership increased their wages by striking and bargaining.

The reduction of 'between' component in clerical and sales categories can be understood by the labor union movement and unemployment of the highly educated person. The labor union movement focused on the reduction of earnings differentials between high school graduates and college graduates. The expansion of educational opportunity produced a lot of college graduates which created an oversupply of highly educated persons and caused the wage gap between high school graduates and college graduates.

However, it is difficult to explain why those factors did not equally affect the other four occupational categories—administration, service, professional, and production. For example, those same market and socioeconomic factors increased inequality in administration and service categories. It is necessary to consider the different characteristics of each occupation, the role and effect of education in each occupation. Or, one might add the industry, firm size, and gender variables on to divide effect and assess the separated effect.

## CONCLUSION

By applying decomposition analysis, this article explored the effect of education in each occupational category. Controlling the occupation variable, education does not show the same trend. In a previous study (Lee 1992), the between-sector effect was as large as the within-sector effect only in the educational variable. But, the within-sector effect contributed more effectively in the other four variables (industry, occupation, firm size, and region). In this study, the occupational variable is controlled, and the educational variable does not show consistency.

First, in the administration and service categories, earnings inequality in the educational level actually increased from 1986-89. In these two categories, earnings inequality 'within' and 'between' education levels worsened. Among the six decomposition components, WR (within rates) increased in inequality during 1986-89.

Second, in the professional and production categories, earnings inequality was reduced due to the within-sector effect. In these two categories, WR contributed to a reduction in inequality of educational earnings. This means that, for example, a group's earnings having the same level of education was less varied in 1989 compared with 1986.

Third, in the clerical and sales categories, earnings inequality was decreased due to the between-sector effect. In these two categories earnings differences between groups having different educational levels were reduced.

This study indicates that the effect of education was different in each occupational category. The educational level shows different effects on earnings in each occupation. One unexpected finding is that inequality in the administration and service categories increased during the 1986-89 period. In-depth and micro level study is necessary in each category.

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