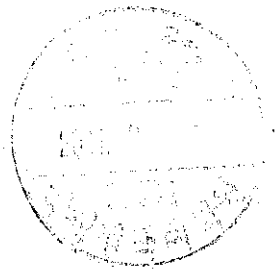

EDUCATIONAL EQUALITY OF KOREA IN 1990s

By

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THESIS

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ABSTRACT

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By

Hong Song Chang

This paper studies the educational equality of Korea in 1990s, by observing higher education advancement of high school students in accordance with 25 administrative districts of Seoul, with method of Gini index, equality measure for a society. The increasing number of higher education institutions, plus stagnant number of students or population has promoted educational equity, and universalized higher education. However, given the equalization policy for General Humanity high school since early 70s, the schools in the area still has shown seriously heterogeneous outcome in term of entering prestigious universities, which generates 'signaling effect' in employment market and positively influences their future income level. To identify factors affecting pupils' performance, a regression is done: with admission situation of Seoul National University, and other two famed universities in 1999 as dependent variables, and income proxy variables and education level of the districts etc. as explanatory variables. The average schooling year of residents has strongly positive relation with admission of the famed and four-year universities. Moreover, private educational spending or *guaweibi* also positively influences pupils' entering only top three universities, not other types of institutions. In sum, advancement to higher education after secondary schooling has been distributed comparatively equally, which is resulted from the increased junior colleges. Based on this observation of disparity of education performance, heavily influenced by parents' scocio-economic status, the Korean education system can be hardly regarded as egalitarian.

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I. INTRODUCTION

Education is one of few remained arena in which state still has initiative over free market. In terms of policy, education is an important segment of social security and foundation for social justice. Besides its traditional function, the education works as corridors of social mobility between classes and of heritage between generations. That is why the chance of education must be fairly and equally distributed to every member of society.

This paper studies the educational equality of Korea by observing higher education advancement of high school graduates in accordance with 25 administrative districts of Seoul in the1990s. First, with method of Gini index, income equality measure for a society, the advancement ratio of districts is compared by means of four indicators. They are: (1) AHr_d, All graduates to advancers in all higher education; (2) $A4r_d$, All graduates to advancers in 4 year universities; (3) $G4r_d$, General high school graduates to advancers in 4 year universities; (4) HHr_d, General Humanity high school graduates to advancers in all higher education. The increasing number of higher education institutions, plus stagnant number of students or population has promoted educational equity, and universalized higher education. However, given the equalization policy for General Humanity high school since the early 70s, the schools in the area still have shown seriously heterogeneous outcome in term of entering prestigious universities, which renders *signaling effect* in labor market and positively influence their future income streams.

To explain these uneven educational outcomes among districts, regressions are done. The dependent variables are the admission ratios to Seoul National University, and other two famed universities, and advancement ratio to 4-year universities and higher education in 1999. Private educational spending, income proxy variables, and average education level of the districts and private high school ratio are used as explanatory variables. The average schooling year of residents has shown strongly positive relation with admission of the three famed and four-year universities, and even with dropout rates. Moreover, private educational spending or *guaweibi* also positively influences pupils' entering top three universities, but not other types of

institutions. In addition, pupil's performance is found to have relation with the private school ratio of the region.

In sum, the advancement to higher education after secondary schooling has been distributed comparatively equally, which can be attributed to the increase of junior colleges. But the advancement to four-year universities and especially top prestigious universities, which provide better quality of education and also influence pupils' future income level, is seriously affected by such long-term family factors as income level, and parents' educational level. Based on this observation of disparity of education performance, which is heavily influenced by parents' socio-economic status, the Korean education system can hardly be regarded as egalitarian.

Introducing literatures on economic analysis of education in the next part, the paper observes the equality of advancement in 1990s in Seoul by means of Gini index in part II. After presenting the relationship between private educational spending and university entrance in part III, and the paper reports regression of advancement of 1999 in IV. Lastly, a brief conclusion follows.

A. LITERATURE SURVEY

The economic approach in the education issue can be classified into two categories. One is macro economic or human capital approach, which focuses on the role of education in national economy. For example, the contribution of education to economic growth, educational outcome (Krueger and Lindahl: 2000), cost of schooling and its opportunity cost, and size of educational investment, and optimum size (Kim Young Chul: 1982), and rate of return of educational investment (Kong Eun Bae: 1994). These studies concern 'how big the pie is', or 'how much cost-effective an educational system country has is'.

In terms of level of analysis, this approach uses the method of cross-section of countries or comparative studies. In a cross country study Lee and Barro (1997) compared the efficiency of education by using of test scores, per student public educational spending, attribution to economic development.

However, different educational systems, or curriculum among countries make a standard test unfeasible, and hinder international comparison of educational efficiency. In addition, controlling policy variables and societal and cultural difference is another difficult task in scientific research.

The other approach concerns 'how the pie is distributed'. This focuses on the equality of chance in education. As market principle substitutes for government management in more of the economy and policy arena, consequently, a social policy including that of education invites more researches working on counterattacking the side effects of free market principle.

Cameron and Heckman (1999) reported that disparity in levels of educational attainment between majority and minority groups in United States of America has translated into growing disparity in earnings between the two groups. They found that it is the long-run factors associated with parental background and income and not short-term credit constraints facing college students that account for the differential educational attainment by race and ethnicity to the new labor market for skilled labor.

Yoon Jung Il (1977, pp 171-172) proved that the amount of private spending on student is the most important variable in educational performance of high school student. In the research he studied multi-causality between academic performance and such environmental variables as monthly income of household, per capita monthly income, per capita private spending, average educational year of parents, and the vocation of parents. He also analyzed that the per capita private spending on education is likely to be affected by household monthly average income, residing area, siblings, vocation of parents, average educational year of parents, and average total income of household, by order of importance.

Kim Heung Ju (1998) studied, by each schooling course, the relationship between features of private educational spending with such variables as residing area, gender, parents' education and vocation, average household income, and experience of *guawei*. According to the study, the size of private educational expenditure of general high school students should be influenced by order of importance, gender, education year of parents, and school area.

Also in overseas researches recognize that out-of-school factors – family background and socio-economic factors - more directly affect academic performance of students in secondary course than school resources do (Hanushek 1986, 1995). Of them are family income, education level of parents, specifically that of father, and vocation of father (Psa and Woodhall, 1985, pp. 114) and nutrition (Pollitt, 1990).

But at the same time school resources also have relationship with outcome of education. (Heynemen and Loxley: 1983, Card and Krueger: 1996, Altonji and Dunn: 1996, Hedges, Laine, and Greenwald: 1994, Kremer:1995) Moreover, the quality of teachers (Behrman and Birdshall: 1983, Card and Krueger: 1992), and the availability of textbooks and other instructional materials (Fuller:1986) could not be overlooked.

Researchers use various indicators to measure the education quality or outcome. Most of them, test score (Yoon Jung Il: 1997, Lee and Barro: 1997), dropout rates, repetition rates (Lee and Barro: 1997), employment and wage in labor market, advancement rate (Cameron and Heckman: 1999) are commonly used as indices for educational outcome.

At level of intra-national analysis, researches on education are often concerned with social policy and equity. They premise the importance of education as equality of chance and income redistribution. Also pupil performance and family factors are main subjects of studies. Students in affluent family have more chance to have better education, while pupils in poor family are likely to get a relatively lower quality of schooling and education. (Downes and Figlio, 1999) Plus, many studies argue that poverty has been inherited to next generation through education. (Solon:1992, Zimmerman:1992, Corcoran et al.:1992, Shea: 1997)

II. ADVANCEMENT RATES AND GINI INDEX FROM 1990 TO 1999

A. SCOPE OF ANALYSIS

The reason for choosing Seoul as the sample of analysis is that the city has big income gaps among 25 administrative districts. Moreover, the city still abides by equalization policy on high school so that students are not entitled to choose their school, but are randomly assigned to schools in their districts. As a consequence the high school is prone to indicate students' family factor, such as income level of family, and education years of parents.

Seoul in which one quarter of national population and all class of people live has 25 administrative districts. The income gaps among them is so significant that the difference is suitable to reflect the family factors in student performance very well. Moreover, given equalization policy, the school resources are controlled by local authority, and the school choice of students is restricted. Students and their families are forced to purchase same education service under the implicit assumption that all the education service is equalized[1]. But as shown in the following part, the outcome is significantly different.

The uneven performance of districts would not be serious problem when students are entitled to choose their high school. Students want to go to a school of which students show better accomplishment owing to the peer effect in part. But school choice is so restricted in most of cities in Korea including Seoul Metropolitan City in which one quarter of national population lives. Students and their families can directly choose schools by applying to Vocational high school, or Special Purpose high school on the one hand. But still most of students go to General Humanity high school in that Special Purpose high school is so hard for them to get in and Vocational high school is branded as low quality education. On the other hand the whole family can increase the chance of better education of their children by moving into new districts which allegedly have more good schools. However, districts with more good schools are likely to claim higher living cost, hindering mobility of family and school

[1] Some other cities or regions have got rid of the equalization policy for high school. In some others

choice.

The paper first observes the advancement of high school graduates from 1990 to 1999 in 25 administrative districts of Seoul.[2] High schools in Korea are categorized into two types: General (hereafter, GH), and Vocational (hereafter, VH). And GH includes General Humanity (hereafter, GHH), and Special Purpose (hereafter, SPH).[3]

Higher Educational institutions (hereafter, HE) encompass four-year colleges and universities (teachers' college included; hereafter, 4yr), vocational colleges, and miscellaneous schools. For more detailed analysis in later part, Seoul National University (hereafter, SNU) and Top 3 (hereafter, T3) universities are separated from four-year universities.

Given the numbers of graduates, denominator, and those of advancers, nominator, of each district every year, the following four indicators of advancement rates(r, $0<r<1$) are computed every year. (districts, d=1, 2, ... 25).

(a) AHr_d: All graduates to advancers to all higher education
(b) $A4r_d$: All graduates to advancers to 4yr
(c) $G4r_d$: GH graduates to advancers to 4yr
(d) HHr_d: GHH graduates to advancers to all higher education

B. ANALYSIS METHOD

In addition to comparing four indices above of districts, we can also observe the equality or difference of performance of them by computing the Gini coefficients out of each index.[4] In this study the Gini index and Lorenz curve are employed to

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with the policy students are given school choice in form of application-and-lottery system.
[2] Until 1994 the city has 22 districts and three new districts, Gwangjin, Gangbook, Guemchon, joined in the city in 1995.
[3] GHH is under the influence of equalization policy. Seoul has total 15 SPH: two of science, one of physical training, six of art, and six of foreign language.
[4] The Gini index is a statistic that describes the degree of income inequality of a Lorenz curve. A Lorenz curve demonstrates the concentration of income in a population by plotting cumulative percentage of income (on the y-axis) versus cumulative percentage of population (on the x-axis). Coronado et al. (2000)

measure the distribution of advancement among districts.

A Lorenz curve is constructed by first ordering districts by advancement (or entrance) rate, from lowest to highest, and then graduates are accumulated on the x-axis and advancers on the y-axis. These cumulative amounts are normalized to percentages of the total cumulative graduates and advancers, and a curve is constructed. Since they are percentages of totals, the x- and y- axes both have limits of (0,1), and the area of the box is 1.0. Any distribution of advancement other than strict equality results in a Lorenz curve that is continuous from (0,0) to (1,1) and is on or below the equal advancement line at all points.

The Gini Index is the area between the equal advancement line and the Loren curve, divided by the area beneath the equal advancement line (which is ½). A Gini value of 0 indicates that the Lorenz curve is coincident with the equal advancement line, while a value of 1 indicates that the Lorenz curve follows the x-axis up to the last districts, and then rises vertically (total advancement inequality, where all advancers are concentrated in on district).

For computation, think of the Lorenz curve as a histogram. The bars of the histogram rise in height for each consecutive district. The total area of the histogram is the sum of the areas of all of these bars. The area is calculated as:

$$A_{LC} = \sum_{d=1}^{N} \frac{Gd}{Gd+1-Gd} + \frac{1}{2} \sum_{d=1}^{N} \frac{Ed-Ed-1}{Gd-Gd-1}$$

advancement rate, r_d = advancers/graduates ($r_1 < r_2 < \ldots < r_{25}$)

N = districts

G = cumulative graduates / total graduates, ($G_{25} = 1$)

E = cumulative advancers (or entrants) / total advancers (or entrants), ($E_{25} = 1$)

Where d indexes districts which are ranked by advancement rate, r from lowest to highest, N is cumulative number of districts. G is E is cumulative graduates and advancers divided by total number of graduates and advancers, respectively. Since the total area under the equality line is 0.5, the area between the equality line and the

Lorenz curve is $0.5 - A_{LC}$. Thus the Gini index is:[5]

$$\text{Gini} = \frac{0.5 - A_{LC}}{0.5}$$

The more this curve is distant from the 45-degree diagonal line, the bigger the coefficient is. Bigger Gini coefficients imply that the equality among districts is undermined.

The number of graduates, advancers of GH and VH to 4-year universities and colleges, and vocational colleges, and higher education is annually published by Educational Committee in Seoul Education Statistical Yearbook. The yearbook just indicates the graduates and advancers of GH and VH, but those of SPH from those GH are not indicated except in the1999 volume. To obtain the advancement status of just GHH and to calculate (4) HH, SPH's is excluded from GH.[6]

C. RESULTS[7]

Figure 1 describes the pupils' performance of districts from 1991 to 1999. The trends are connected Gini indices of each indicator. When the trend goes down or southeastward, it is more likely for districts to equally share higher education advancement. First, concerning advancement to higher education, (1) AH, and four-year colleges and universities (2) A4, the trends of Gini indices indicate the equity is getting better as time goes. The narrowing gap in educational performance among district can be contributed to the increased chance of higher education.

However, GH graduates' 4-year entrance, (3) G4, and GHH graduates' higher education advancement, (4) HH have not been showing any positive progress recently.

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[5] The Gini index is author's calculation and checked with spreadsheet calculation presented by Shujie Yao. Shujie Yao, "On the decomposition of Gini coefficients by population class and income source: a spreadsheet approach and application" Applied Economics, Vol. 31 (1999), 1249-1264

[6] Since the advancement status of SPH was not indicated in the Yearbook, the advancement ratio of 1999 is applied to other years and deducted from GH.

[7] There have been many literatures on educational equality, but few of them are employing the method of Gini coefficient. One exception is Tan, Mingat (1999). They computed the coefficient to show the distribution of public educational expenses. The average of Gini coefficient of Asia in the mid 1980s was 0.434, and that of Korea was 0.159, which was the lowest at the time.

Even though both of indices dropped in 1992 and 1995, but after that, they have been tilted upward, saying worsening equality.

Figure.1 Equality of Higher Education Advancement

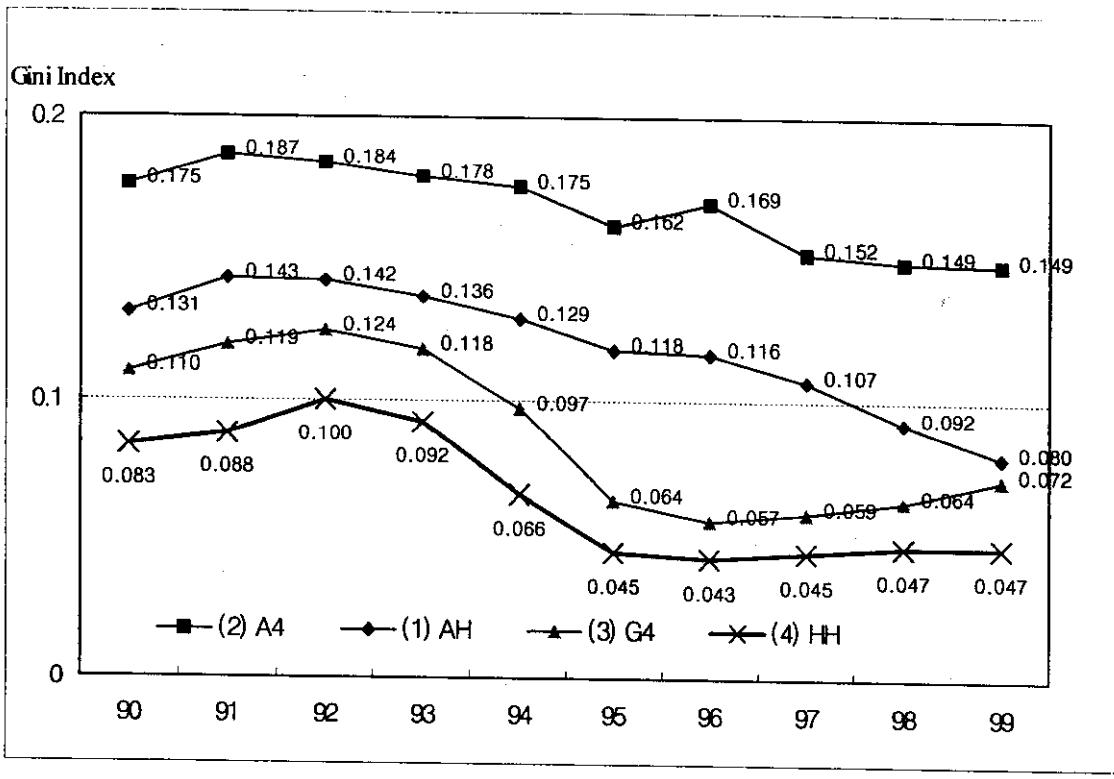
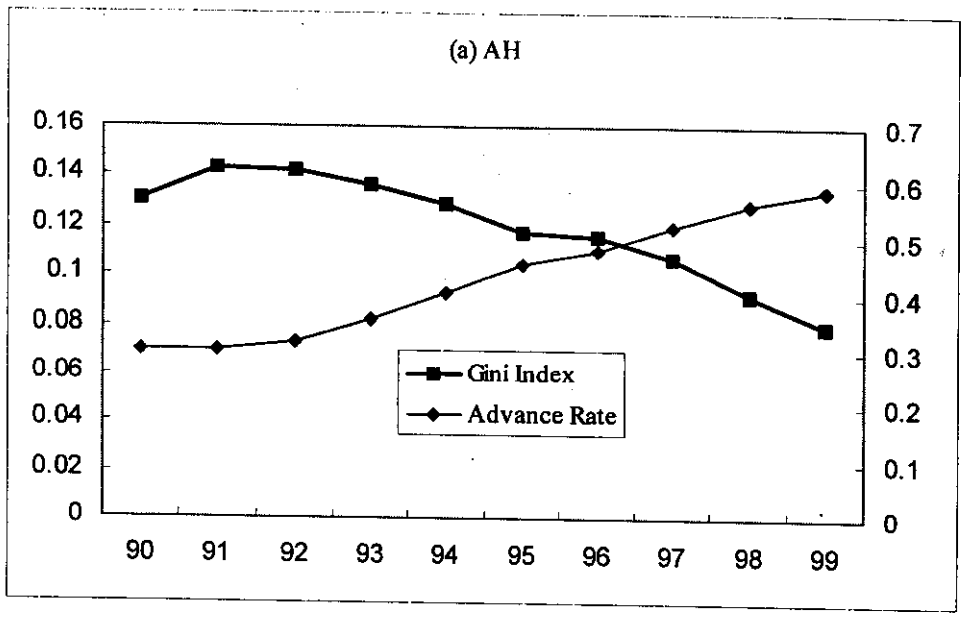
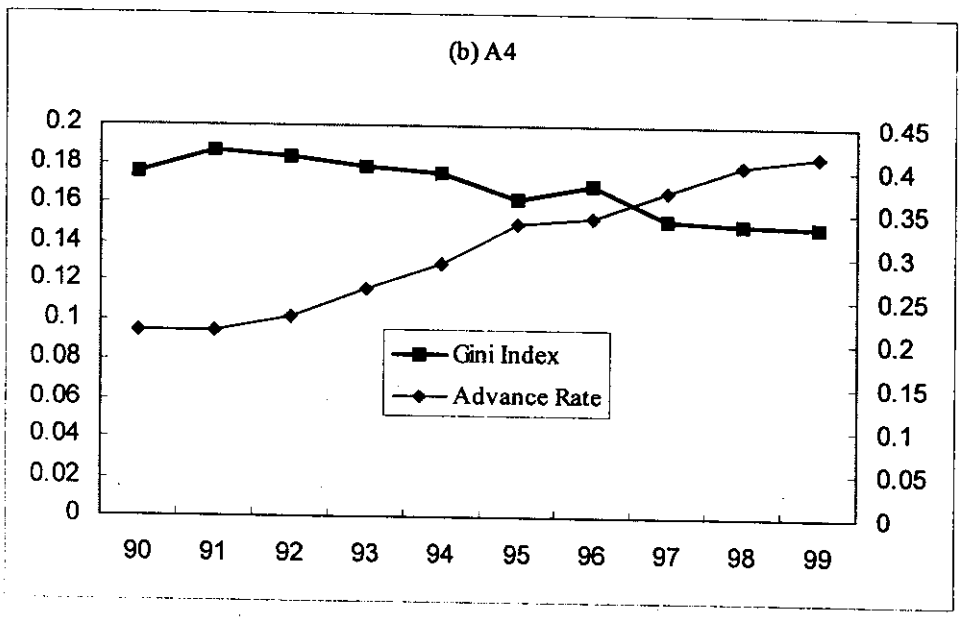
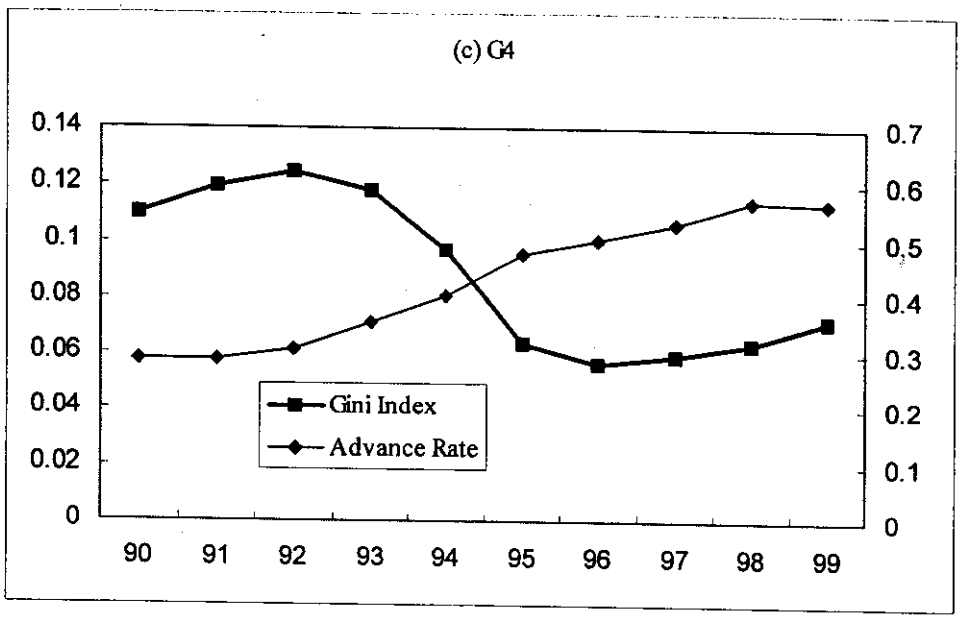


Figure 2 describes the average advancement rates and Gini indices for every year of four indicators. The indicator (1) AH, (2) A4 display improving equality and increasing advancement at the same time. 'The bigger pie is, the better for every body.' However, trends in (3) G4, (4) HH reveal worsening equality in spite of increasing advancement after 1996. In addition, the sharp drop of Gini indices between 1992 and 1995 is in part resulted from the decreased number of students and graduates over the nation, as shown in Table 1.

Figure 2. Average Advancement Rates and Gini Indices by Indicators






(c) G4
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Gini Index
Advance Rate
90
91
92
93
94
95
96
97
98
99

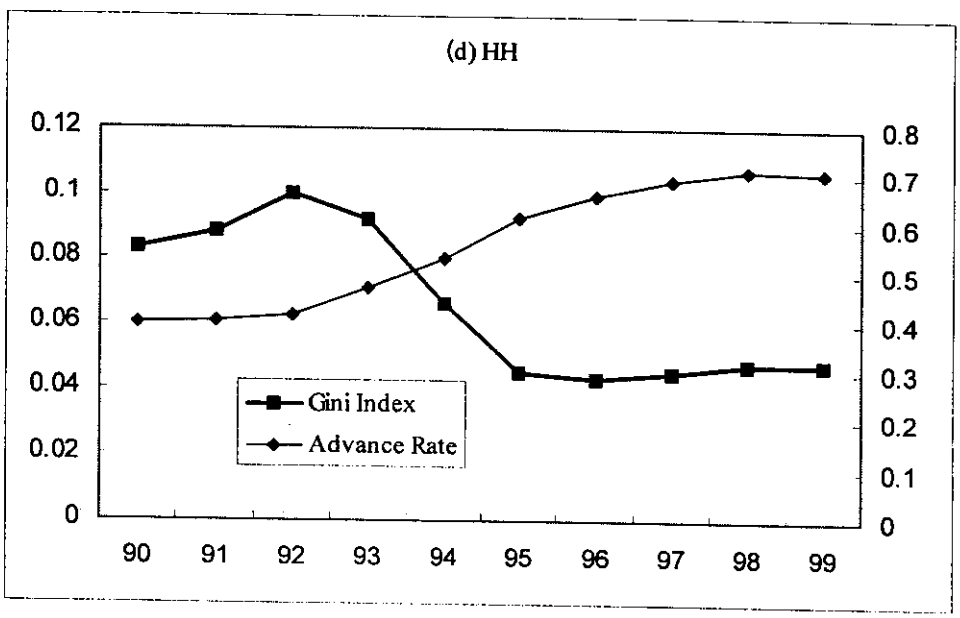

(d) HH
0.12
0.1
0.08
0.06
0.04
0.02
0
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Gini Index
Advance Rate
90
91
92
93
94
95
96
97
98
99

Table 1 Advancement Ratios

	High School Graduates	Junior college		College and Univ.		Higher Education	
	A	B	C=B/A	D	E=D/A	F=B+D+m[i)]	G=F/A
year	No.	No.	Ratio	No.	Ratio	No.	Ratio
1964	115,776	8,542	7.4%	26,955	23.3%	37,378	32.3%
1975	263,369	19,702	7.5%	33,620	12.8%	53,764	20.4%
1980	516,955	80,620	15.6%	120,377	23.3%	202,363	39.1%
1990	761,922	87,131	11.4%	170,881	22.4%	261,194	34.3%
1995	649,653	223,689	34.4%	258,584	39.8%	484,581	74.6%
1999	747,723	306,802	41.0%	324,118	43.3%	631,163	84.4%

Source: Korea Statistical Yearbook, various volumes, National Statistical Office

Note) i)'Higher education' includes miscellaneous undergraduate courses (m) as well as junior college, college and universities. The numbers of students are those of same year. No one-year time lag.

In the latest survey, 1999, the advancement ratio to higher education is 84.4 percent, telling that higher education is already universalized in Korea.[8] Especially in 1990s the rapid increase of junior vocational college absorbed many of higher education consumer. The number of college and University goers is 1.96 times more than that of Junior college goers in 1990, however just 1.06 times in 1999, revealing drastic increase of junior colleges.

Meanwhile the drastic increase of higher education institutions in 1990-95 period, the number of high school graduates has decreased, making advancement easier and more equitable.[9]

[8] This advancement ratio includes the advancement of those who already graduated high school a year before or earlier.

[9] In addition, for those days, the whole population of Seoul showed decrease. Many of them had moved out to so called *new-city* in Kyung-gi province, a suburb residential area around the metropolitan city. More competent students are likely to move out. But it needs more empirical proof.

III. PRIVATE SPENDING AND HIGHER EDUCATION ADVANCEMENT

Table 2 reports the size of educational spending and its composition from the late 70s up to late 90s. This table is based on the researches that Korea Education Development Institute has performed regularly to study the educational expenditure size from kindergarten to higher education. But here in this table, elementary and secondary course indicate the course from elementary school to high school, approximate age from 7 to 19, which does not include kindergarten below and higher education above. Separating these courses from the rest of course is to investigate whether the privates spending has relationship with educational performance.

<Table.2> Education Spending: Its Composition and Changes

year		1977	1982	1985	1990	1994	1998
Total education spending: for elementary, and secondary course							(million Won)
current price		1,052,333	3,948,194	6,842,555	13,562,643	23,587,591	39,684,668
constant price [i]		5,366,411	8,858,995	14,191,074	21,590,261	29,034,673	39,684,668
Per pupil education spending: for elementary and secondary course						(thousand Won)	
current price		116	395	699	1,361	2,721	4,856
constant price		592	887	1,449	2,166	3,349	4,856
Ratio education spending to GDP							(%)
Elmen. & secd. course		5.9	7.3	8.4	7.6	7.3	8.9
All course		7.1	10.4	11.5	10.1	10.6	13.5
Ratio of per pupil spending to GDP per capita[ii]							(%)
Elmen. & secd. students		23.6	28.6	35.1	32.6	37.6	50.7
All students [iii]		27.0	36.5	40.9	37.3	41.1	55.5
Composition of education spending: for elementary and secondary school							(%)
Public spending	gov't share	39.2	37.4	30.8	32.5	37.3	37.8
	family share	26.7	23.0	16.5	12.8	10.3	9.4
Private spending	*guaweibi*[iv]	11.7	5.8	10.6	16.1	24.0	32.6
	others	22.4	33.8	42.1	38.6	28.5	20.2

Note

i) = constant price = current price x (Consumer Price Index of 1998/CPI of current year)

ii) = (total education spending for elementary & secondary course/ no. of students of elementary & secondary schools)/(GDP per capita)

iii) = (total education spending/no. of total students)/(GDP per capita)

iv) = percentage of guaweibi out of total educational spending in elementary and secondary school students
={(total private spending on education in elementary course x guaweibi percentage of each elementary school student) + (total private spending in junior high school course x guawei percentage of each junior high school student) + (total private spending in high school course x guaweibi percentage of each high school student)}/(total educational spending for elementary and secondary school course)

The number of each elementary, middle school, high school students, and population is obtained from Major Indicators of Korean Economy, National Statistical Office, September, 1999. Total numbers of student are from Statistical Yearbook of Korea (NSO). GDP and CPI are from the Bank of Korea's website, www.bok.or.kr.
Source
Yoon Jung Il, Facts and Problem of Education Finance (in Korean), Korea Education Development Institute, 1977
Kim Young Chul, Size of Education Investment and Optimum Unit Educational Spending (in Korean), Korea Education Development Institute, 1982
Kong Eun Bea, Size of Education Investment and Rate of Return (in Korean), Korea Education Development Institute, 1985
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Total size and its percentage in total economy of education spending have been steadily growing since the research had begun. Especially the latest research in 1998 shows that per pupil spending of elementary and secondary schools exceeds the half of GDP per capita, indicating the burden of educational spending is fairly high level.

It is more interesting to observe the composition of those of elementary and secondary school students. Concerning public spending or in-school education, the government share has shown no major changes, meanwhile family share has been dropping from 26.7% in 1977 to just 9.4% in 1998. That is to say at least in schooling, the burden of family has been alleviated significantly.

But the lightened burden in schooling does not guarantee the alleviation of household in educational expense. Brief look at the private spending accounts of it. Since 1985 the private spending overwhelmed the public spending. More specifically speaking, *guaweibi*, or private tutoring and cramming school fee out of private spending shows drastic increase. Except in 1982, the ratio has kept rising and reached up to the level of government share of public education spending. In the 1990s, it has jumped from 16.1 percent in 1990 to 24.0 percent in 1994 to 32.4 percent in 1998. Considering the underreporting tendency of *guaweibi*, the actual size and ratio would be much bigger than expectation.[10]

[10] The decrease of private spending in 1982 results from the total prohibition of guawei in 1980.

Figure. 3 Lorenz Curve of Top University Entrance: 1999

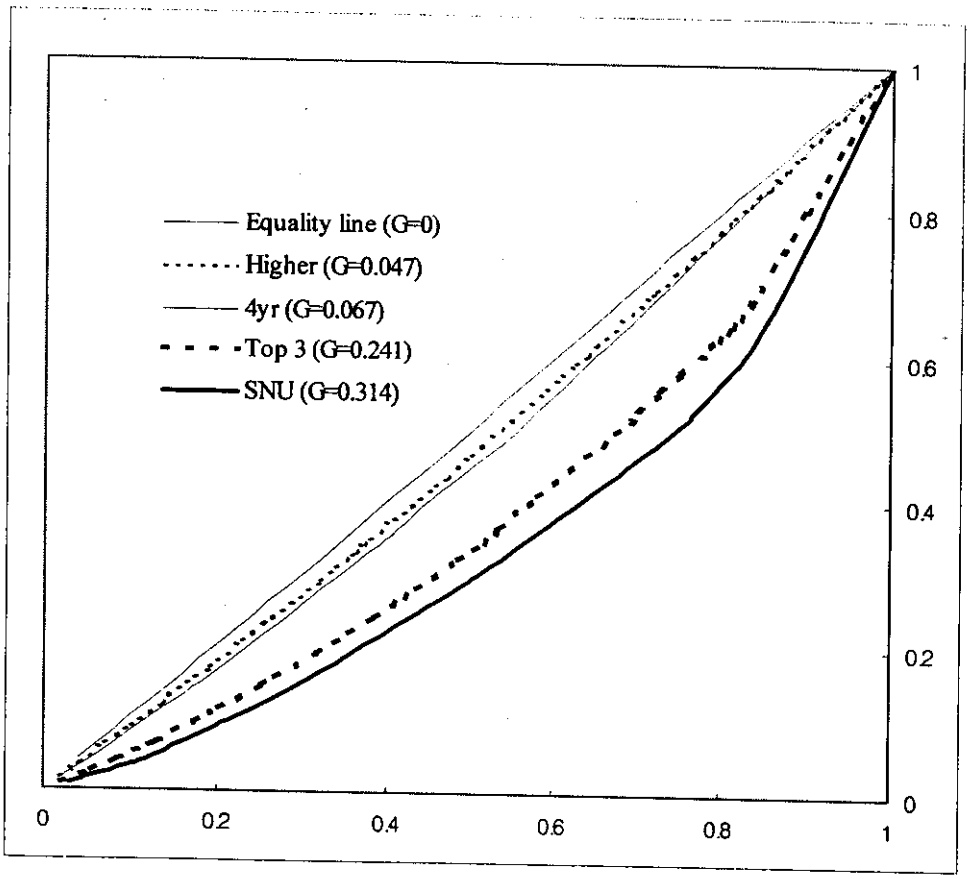


Figure 3 shows more detailed status of advancement of each district students who graduated GHH, or equalized schools. From the top, each line is Loren curve indicating the different performance of districts' students based upon the advancement to higher education institutions, four-year colleges and universities, and admittance to top three universities and to Seoul National University.[11]

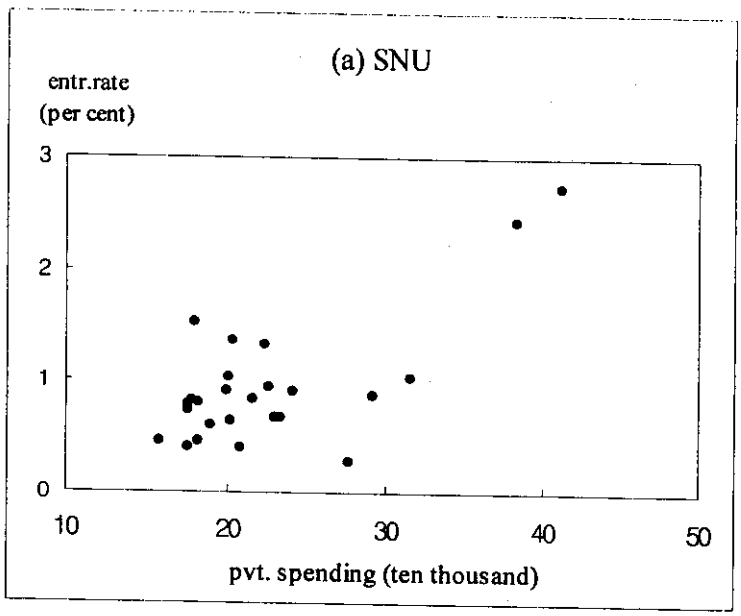
Equal performance or perfect equity can result in 45-degree line, which is possible if all districts have same advancement ratios and admittance ratios. As access for better education is more difficult, the equality is also worsening or Gini index increasing. The index for higher education is 0.047, meanwhile those of top three universities and SNU are 0.241, and 0.314, respectively.

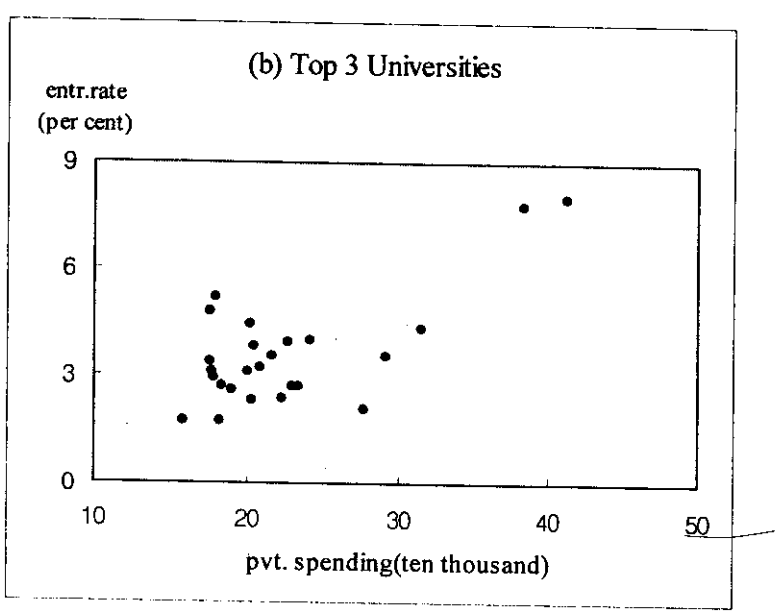
[11] Information of admission of SNU, and top three universities are collected from admission affairs of each institution.

Based upon the observation so far, it can be summed that the chance for higher education has been given equitably, but the equity has been undermined as for better education, i.e. prestigious universities. The chance of entering top universities, which is also chance of high income level, has not been given fairly. The problem is that this phenomenon is observed under equalization policy. Given equalization policy, schools are supposed to have homogeneous school resources and education quality. But the educational outcome among districts in terms of advancement displays huge heterogeneity.

Before accounting of this heterogeneity with other explanatory variables in part IV, the correlation between private educational spending and admittance to SNU and other two famed universities are described in Figure 4, which visually show the strong positive relation between them. The correlation coefficients are 0.711 and 0.703, respectively.

Figure. 4 Private Education Spending and Entrance to Universities





IV. REGRESSION OF SCHOOLING OUTCOME IN 1999

A. DEPENDENT VARIABLES

This paper studies the performance of only GHH, whose schooling quality is supposed to be equated. The dependent variables, educational outcomes, are advancement rate, dropout rate, and studying-abroad rate. The advancement rate is computed by dividing the number of entrants by number of graduates. The number of entrants is observed on the basis of the following institutions: (1) Seoul National University, (2) Top three universities, (3) 4-year universities and colleges, and (4) all higher educational institutions. Graduates and entrants are all those of the year 1999, so that those who already graduated high school before 1999 can be one of entrants of 1999. Since the advancement from secondary to higher education is now universal, as shown in Table 1, it is better to differentiate those institutions to find relationship between explanatory variables and performance.

Out of total students from first to third grade, dropout rate is the ratio of student numbers who temporarily or perpetually quit their current school. However, of them excepted are those claiming health problems and death, and taking the test of graduation certificate. Their excuses for quitting are not directly related to the education quality of their attending schools. Studying-abroad rate is considered as another indicator for schooling quality. Families unsatisfied with their child's schooling and at the same time if they are rich enough to send them abroad are prone to do so.

B. EXPLANATORY VARIABLES

To account for different educational outcomes of districts in 1999, this paper mainly focuses on family factors. Of them, income proxy variables are private spending on education; housing cost; land tax; automobile tax; and inhabitant tax. Besides these income variables, the average level of education is also family factors, and the ratio of private school of each district is added for proxy for school resource.

Private spending on education is average monthly expense for out-of-school

education, i.e. tutoring, cram school, and educational and supplementary material. The source of this data is the survey done by Consumer Protection Association in 1997. The sample of this paper is family, which has elementary, junior or high school students.[12]

Housing cost is districts' average price for one *pyung* of apartment and multi-family housing building in 2000, which is published by National Tax Office. To get per capita land tax of each district, the burden of residents' out of total amount of levied land tax in 1997, excluding that of corporation, is divided by number of district population. Automobile tax is per capita burden of the tax levied on owner drivers' cars just of non-business usage in 1997. Inhabitant tax is per capita burden of inhabitant tax levied on residents by pro rata income rates in 1998. The tax data are available at Seoul Local Tax Annual, published by Seoul Metropolitan City every September.

Ratio of private school is computed by dividing the number of private school graduates by total number of graduates in district in 1999. The data is from Statistical Yearbook of Education, annually published by Seoul Educational Administrative Office.

Education level of district is average education year of residents, 25 year-old above. The data are from 1995 Population and Housing Survey, executed and published by National Statistical Office every five year. The survey has the numbers of graduates and drop-outers of each level of education. So for instance the number of elementary graduates is multiplied by 6, and that of graduate course graduates by 18. And those who did not fully finish their course or drop-outers get half term of the course, plus the year of the previous course, for example 7.5 for middle school drop-outers. After calculating the total years of education of the resident age 25 above and summing them, they are divided total number of resident who are above 25.

Since the inputs variables may influence pupils' performance with a lag. In the paper, of these variables, the private spending, education level of residents, and local tax have time lag with the outcome.

[12] The original survey also includes the private expense on kindergarten students' education.

It is not easy to come by reliable proxy variables for income level of each district. Aggregate income tax or Global income tax, one of national taxes, which could be more reliable income proxy than those indicators above, is managed by another local tax administrative division, which is not identical with administrative districts. The local taxes above are so hard to disentangle the burden of residents from that of business, which has little relationship with residents' income level.

C. RESULTS

The regression results in the table are from the following equation;

$$r_i = \alpha + \beta_1 \times pvt + \beta_2 \times pvtschl + \beta_3 \times edu + \beta_4 \times house + \beta_5 \times land + \varepsilon$$

where r_I denotes each of entrance rate (r) for each district (d); pvt denotes private educational spending; pvtschl denotes private school ratio; edu denotes average education year of district's residents; house denotes average per-*pyung* price of apartment and multi-family house; land denotes per capita land tax for district's residents; and denotes unmeasured factors influencing pupil performance.

The results show the strong effects of family input on student achievement. Most of all average education year of resident, which can be interpreted as that of parents, has strong positive effect on entering top three universities and four-year universities, but on advancing to general higher education.

The average private educational spending of districts also significantly affects students' joining in Seoul National University and other two famed universities, as shown in column 1, 2, and 4.

<Table.3> School Outcome: (a) Advancement Rate of 1999

	SNU		SKY		4yr		Higher	
	1	2	3	4	5	6	7	8
Constant	-5.175**	-5.199***	-19.712***	-18.913***	-25.776	-36.243	61.600*	46.430
	(-3.454)	(-3.701)	(-5.196)	(-5.236)	(-1.147)	(-1.603)	(1.9660	(1.465)
pvt	0.038*	0.037**	0.045	0.070*	0.261	-0.063	0.740	0.269
	(1.832)	(2.345)	(0.872)	(1.733)	(0.847)	(-0.250)	(1.720)	(0.756)
pvtschl	-0.717*	-0.713**	0.434	0.311	8.333	9.937*	2.231	4.556
	(-2.044)	(-2.120)	(0.488)	(0.360)	(1.585)	(1.836)	(0.304)	(0.600)
edu	0.522**	0.525***	1.990***	1.881***	6.153**	7.584***	-0.466	1.608
	(3.368)	(3.729)	(5.072)	(5.194)	(2.648)	(3.346)	(-0.144)	(0.506)
house	-0.005	-0.005	-0.027	-0.020	0.033	-0.054	0.033	-0.092
	(-0.514)	(-0.593)	(-1.170)	(-0.959)	(0.242)	(-0.413)	(0.177)	(-0.504)
land	0.000	-	0.004	-	-0.049	-	-0.071*	-
	(-0.057)		(0.771)		(-1.704)		(-1.770)	
d.f.	19	20	19	20	19	20	19	20
R^2	0.706	0.721	0.743	0.748	0.472	0.422	0.037	-0.065

t value in parenthesis
***: p<0.01 **: p<0.05 *: p<0.1

However, the ratio of private high school in district turns out to have relation with the performance, which is not uniform at all. In column 1 and 2, with Seoul National University as dependent variable, the ratio shows negative effects. Public schools send more of their graduates to the university than private schools do. But concerning the entrance to other top universities it has not shown strong relation, but the column 6 tells graduates of private schools are more likely to advance to higher education than those of public school.

This paper cannot give a good account for this phenomenon, which needs more data and longer period observation. And it should be checked whether it is influenced by adoption various admission system from mid-90s, for example quota for rural area

students, for principal recommendation, for specialty student, and so on. So factors of school resource should not be neglected in the analysis.

The regression also includes other measures of family factors, proxy for family income. The variables of housing price of districts and land tax are presented in the table, which have not shown significant effects on the performance. Plus other income proxies, automobile tax, and inhabitant tax, were included in regression, but turned out insignificant, and are not presented in the table.

Table 3 (b) presents the relation of the variables with dropout rates and abroad rates. Interestingly, the average education year of resident has strongly positive effects both on dropout and abroad rates. The higher parents' education level is, the harder the schools make their parents satisfied. More specifically those who going and studying abroad have more strong relation with their parents' education level. The result confirms the assumption that both rich and highly educated parents are more likely to send their children abroad.

Column 9 reports that private educational spending and dropout rates have negative relation. This result makes sense in that students or their parents want to get high performance with more spending, while attending current schools. Private education helps students to stick to regular schooling in a sense.

<Table.3> School Outcome: (b) Dropout and Going Abroad rate

	Drop-out		Abroad	
	9	10	11	12
Constant	-3.038*	-2.377	-1.920***	-1.740***
	(-1.798)	(-1.425)	(-4.567)	(-4.158)
pvt	-0.043*	-0.022	-0.003	0.002
	(-1.846)	(-1.192)	(-0.536)	(0.525)
pvtschl	0.275	0.173	0.213**	0.185*
	(0.695)	(0.434)	(2.162)	(1.849)
edu	0.422**	0.331*	0.184***	0.159***
	(2.413)	(1.981)	(4.229)	(3.798)
house	-0.010	-0.005	-0.002	-0.001
	(-1.005)	(-0.489)	(-0.964)	(-0.392)
land	0.003	-	0.001	-
	(1.431)		(1.559)	
d.f.	19	20	19	20
R^2	0.064	0.015	0.606	0.578

t value in parenthesis
***: p<0.01 **: p<0.05 *: p<0.1

V. CONCLUSION

This paper investigated the equality of education of Korea in 1990s by observing the higher education advancement of high school graduates with the sample of Seoul. In sum, first, the advancement to higher education after secondary schooling has been distributed comparatively equally. This universalized higher education can be attributed to the increased number of institutions, especially junior colleges.

However, the admittance to the prestigious universities, which allegedly give better quality of education, is shown strongly correlated with private educational spending. Moreover, the regressions tell that the advancement to four-year universities and especially to the top prestigious universities is seriously affected by such long-term family factors as income level, parents' educational level. Based on this observation of disparity of education performance, which is heavily influenced by parents' socio-economic status, the Korean education system can hardly be regarded egalitarian.

This paper alone could not enough to support the argument that the Korean education has not been equal or fair. Researches with longer range, wider scope of observation, and with more scientific and technical approach are expected to follow.