

Measuring and Explaining Income Inequality in Korea*

Kyungsoo Choi**

I. Introduction

This paper addresses the issue of measuring and explaining income inequality changes in Korea during the past twenty years. This is a very old issue, but it is currently a very hot issue that draws much public attention since the deterioration of income distribution is very widely felt and much worried by the public. The balance between growth and equality has even emerged as a political issue.

Up to the mid 1990s, Korea has been known as an showcase country where economic growth is accompanied by an improvement in income distribution. Actually from the early 1980s to the mid-1990s, for which period a detailed empirical analysis is possible, income inequality has been improved in all respects. However, in the aftermath of the economic crisis that broke out at the end of 1997, the income distribution suddenly deteriorated. Currently, the income inequality in Korea is almost at the level of the early 1980s, or even worse depending upon how the inequality is measured. If we look at the inequality trends in the past twenty years, it has a literary “U” shape—declining all the way from the early 1980s to the mid 1990s, and ascending back to the level where it used to be in the early 1980s.

As the after-Crisis rise of income inequality is very rapid, one may have interpreted the rise as an evidence of the sufferings during the aftermath of the Crisis, and expect that the rise would disappear as the impacts of the Crisis subsides. But after five years from the Crisis, the inequality is still here, without showing signs of returning to its previous level. This raises another fundamental question. “Was the improvement of income distribution accompanied by efficiency improvements?” The Crisis at the end of 1997 was a foreign currency crisis caused by macroeconomic mismanagement, but at the same time it was a banking crisis caused by enormous non-performing loans that has been accumulated by economic inefficiencies in the past. It may be that the income distribution improvement has been achieved at a cost of efficiency loss, which took its toll on equality after decades.

To address such issues, I perform a detailed empirical analysis of existing data in this

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** choi@kdi.re.kr, Korea Development Institute.

paper in the period of 1982 to 2002. Further, I decompose the inequality changes vertically (by income sources) and horizontally (by population sub-groups) to identify sources of the changes.

From the analysis, several trendy long-term changes are identified that may raise inequality in the long run: Family sizes are becoming smaller, female participation rises whose income is positively correlated with husbands' income, and the shares of household with female and the elderly heads increase. Such changes have existed in the past and expected to persist, raising the overall inequality in the future. However, although the changes have been accelerated recently, they are not the major factors of the sudden change in inequality.

The analysis shows that most of inequality changes can be attributed to the household heads' labor income distribution. During the 1980s and up to the early 1990s, inequality among the educational groups significantly decreased, while inequality within the educational groups did not change much. Hence, the narrowing of income gaps between different educational groups has been the major factor in reducing income inequality in the late 1980s and early 1990s. However, the effects of between educational group inequality reduction are confined only up to the early 1990s, and since then the between group inequality virtually did not change. The continued inequality reduction until the mid 1990s is attributed to the reduction in within group inequality reduction among the educational groups. It is important that such within groups inequality reduction was realized while real incomes are rising.

The situation is reversed after the Crisis. Within group inequality among educational groups started to rise in the mid 1990s, before the Crisis. Thus, the Crisis is not the direct cause of widening of inequality at least within the educational groups. The most direct cause of after-the-Crisis inequality widening is the rise of inequality among the least educated group. After 1998, household heads' real incomes in the least educated group declined in all income groups especially among the low-income group. And the inequality rise is attributed to loss of job opportunities among them especially in the low-income groups rather than to wage decline. Other educational groups suffered much less working hours reduction and smaller inequality widening among them.

This paper is organized as follows: In the next chapter, I review the past trends of income inequality. In Chapter III, I introduce the data and briefly summarize the inequality trend in the data, followed by some sensitivity check to determine proper measure of inequality. Then I perform vertical decomposition of inequality to see the

source of inequality variation, and horizontal decomposition to identify how inequality changed. Chapter IV concludes the paper.

II. Past Inequality Trends

Korea is externally known as a country whose income distribution inequality is relatively 'mild.' Sometimes, Korea is touted as a rare case where rapid economic growth has been achieved with income inequality improvement. Some even pointed out that the initial condition of Korea in income distribution—that is, Korea had near perfect income distribution equality after the Korean War in 1950~1953—motivated the people and contributed to her rapid economic growth. However, internally inequality issue has been very sharply raised in Korea at times. In the late 1980s, when the economy was booming and land and housing prices hiked, concerns over widening inequality in asset holdings were very sharply raised. Recently, as the earnings distribution is deteriorating under an economic restructuring process that is intended to raise the overall efficiency of the economy after the economic Crisis at the end of 1997, the inequality issue is again drawing national attention.

In the past, there has been a gap between the published inequality statistics and the inequality perceived. In the late 1980s, the Gini index continued to fall, while the public generally felt widening inequality. Two factors are usually pointed out to account for the gap: One is that the income survey was incomplete and its resultant statistics is not very reliable before the 1980s, and the other is that while published inequality statistics are on the earnings inequality, the public is more sensitive to wealth distribution inequalities. (Joung-woo Lee and Seong-hyeon Whang, 1998) The high economic growth in the 1970s and 1980s was accompanied by high inflation and sharp rise of land and housing prices, which must have worsened wealth distribution given that the wealth is more unequally distributed than the earnings. However, data on individuals' asset holdings are not sufficient and unreliable due to the under-reporting practices to evade tax levies, and thus they are not published. The different trends in wealth distribution and income distribution may explain the gap between the published and the 'felt' inequality trends. On the other hand, the current inequality issue is regarding earnings inequality, for which good data sets are available for the period since 1982 and empirical investigation is feasible.

The main data set for measuring income distribution in Korea is the Household Income and Expenditure Survey (HIES), which is a survey over wage/salary worker headed households with two or more members living in the urban area. The survey

started in 1963 by the Korea National Statistics Office (NSO). Prior to 1975, the survey was based upon the households' responses to interview questions and less reliable. Since then the surveyed households are asked to record income and expenditure, and the survey is based upon such records. Currently, data sets since 1982 are available for research purposes, and the analysis period of this research is set according to such data conditions.

For the 1960s and 1970s, income distribution inequality statistics are estimated values from combined data sets of various sources. Choo (1979) estimated income distribution inequality in Korea in 1965, 1970, and 1976 based upon the HIES and Farm Household Economy Survey data sets. Incomes of non-wage worker headed households, for which the data do not exist, are projected using their savings records and substituted in his estimates. Table 1 reports his estimates along with the 'official' statistics of the Economic Planning Board from the Social Statistics Survey for the years 1980, 1985, 1988, and 1993.

Table 1. Income Distribution Inequality Trends in Korea: 1965~1993

	1965	1970	1976	1980	1985	1988	1993
Lower 40% (A)	19.3	19.6	16.8	16.0	17.7	19.6	20.4
Upper 20% (B)	4	3	5	6	1	8	2
Declie ratio (A/B)	41.8	41.6	45.3	45.3	43.7	42.2	39.2
	1	2	4	9	1	4	9
	.462	.471	.371	3538	.405	.465	.519
	6	6	6		2	9	7
Gini index	.343	.332	.390	.389	.344	.335	.309
	9	2	8	1	9	5	7

Source: Choo (1979), EPB (1987,1990) cited from Lee and Whang (1998).

The trend of income distribution inequality during the period covered in Table 1 is summarized as follows. The inequality in Korea from the mid 1960s to the 1980s changed in different directions: First, income distribution improved at the initial period of industrialization in the second half of the 1960s. Secondly, during the 1970s income distribution deteriorated. And finally, income distribution improved in the 1980s.

Income distribution improvement in the second half of the 1960s is explained by the onset of industrialization. In the 1960s, government-led and export-oriented economic growth strategy supported labor-intensive industries and resulted growing labor

incomes, which contributed to equalizing income distribution as labor incomes are more equally distributed than property incomes. (Lee and Whang, 1998) Leipziger et al. (1992) point out that in the 1960, labor movement from the rural to urban sector reduced inequality in the rural sector, while the urban sector was still small in size and inequality was not serious there.

[Figure 1]

During the 1970s, income distribution deteriorated. The 1970s was the decade of rapid economic growth and high inflation in Korea. (See Figure 1.) Inflation rate jumped to 20% in the 1970s from the 1960s' 10% level, accompanied by real estate price hike. In the period, heavy and chemical industries was heavily subsidized as a part of development strategy. Tax levies were reduced and bank loans were assigned at privileged 'policy' interest rates, which were often below the inflation rates, to companies in the industries which were already intrinsically monopolistic. Choo (1982) notes that the Gini index value among the employer and self-employed households jumped to 0.449 in 1976 from 0.353 in 1970, which is significantly higher than the Gini index value of 0.327 in the rural sector and that of 0.355 among the urban wage worker households in 1976. He suggested that urbanization and emergence of high income groups in the urban sector accounts for a significant part of the income inequality widening in the 1970s. Leipziger et al. (1992) explain the rise of income inequality similarly. Their explanation is that as the excess labor depleted in the rural sector, income inequality stopped to fall in the sector, while the urban and industrialized sector with higher income inequality expanded in the 1970s. However, such explanations are not very persuasive because income distribution improved in the 1980s, when the urban and industrialized sector continued to grow. The inequality changes within the urban and industrialized sector need to be explained, if such a description is to be more complete.

In the 1980s, the Gini index continued to fall. It stood at 0.3540 in 1985, at 0.3360 in 1988 and further dropped to 0.3097 in 1993. The deciles ratio, the ratio of the income of lower 40% to that of upper 20%, continued to rise.¹ Several explanations for the 1980s' income distribution improvement are: First, throughout the 1980s inflation rates were stable. Second, measures were taken to relieve workers' tax burdens, while preferential strategic bank loans to large companies were reduced. Third, demands for the unskilled workers increased while supply of the low educated reduced, resulting the wage gap between educational groups to decline. As we will see later in this paper,

¹ See Table 1.

empirical evidences show that inequality reduced both between and within educational groups along with real income growth among all decile groups.

However, in the second half of the 1980s, inequality widening became a very pressing social issue and the feeling of relative deprivation was prevalent among the public. The apparent discrepancy between the statistics and the general perception is explained differently by different scholars. Some scholars questioned the reliability of 'official' statistics. Some of them came up with different estimates of Gini indices by applying different estimation methods to the data sets (usually by estimating independently the incomes of those not contained in the data sets) or by using independent surveys. They claimed that income distribution in Korea did not actually improve in the 1980s unlike the trends of the 'official' statistics, and many of them suggested that the Gini index values were in fact significantly higher than the official figures. However, not only the estimates were widely different among themselves, but also results from studies that used the same data sets but applied different methods contradictory among them, which made the results less credible. Other scholars claimed that the generally felt sense of widening inequality was due to the recognition of distributional injustice in the period rather than the actual income change. In the late 1980s, real estate prices hiked and property speculation was prevalent. The high non-labor incomes in the period, which were generated by speculation and tax evasion but which were not reported in official surveys, not only hurt the sense of equality and 'distributional justice,' but also may have deteriorated the actual income distribution. Still others tried to explain the gap between statistics and the general feeling with the uniqueness of the Korean population. The Koreans had a very strong feeling for homogeneity through their long history of being an ethnically homogeneous people. Further, as Korea had been in poverty for a long time and experienced the Korean War in 1950~53, the initial condition of income distribution was nearly perfectly equitable, the entire population suffering from poverty. They claimed that against such background, differences in income growth and widening gaps in living standards might have been felt more strongly than in advanced countries with long history of industrialization, regardless of the actual state of income distribution.

III. Measuring and Explaining Inequality Changes

This paper analyzes income distribution inequality changes in Korea from 1982 to 2002. I begin by introducing the data sets used in the study.

1. Data

In measuring and explaining the inequality, the study relies on two sets of data—the Household Income and Expenditure Survey (HIES) and the National Survey of Household Income and Expenditure (NSHIE), both of which collected by the Korea National Statistical Office (KNSO). The two data sets are the most commonly used ones for income distribution analysis in Korea, from which the government statistics are also produced. I describe briefly the data sets in this section.

A. The HIES (Household Income and Expenditure Survey) data

The HIES is the primary survey for income distribution in Korea. The Korea National Statistical Office (KNSO) publishes the survey results every quarter. The survey began in 1963, since then, there have been several major amendments in survey methods and items. Currently, the data set since 1982 is available for research purposes. The data set is the most often used in income and expenditure analysis. Besides being the official data sets from which the published statistics are reproduced, the data sets have the advantage that they contain consistent information on income and expenditure for the longest period of time compared to other data sets.

The HIES data set is a quarterly data set, but the survey itself is conducted monthly by the KNSO over about 5,500 households. Each household observation in the data set has three records corresponding to the number of months in the quarter but information on the survey month is not provided and just the quarter in which the survey is done is known. In the data set, non-responses are not uncommon, and many of the records are filled in with a ‘hot-deck procedure’—that is, the missing record is replaced with a replication of some other randomly chosen record in the month from a household with similar characteristics.²

The data set also has some nontrivial defects. One is that since the HIES sample is a subset of a larger sample for employment survey—the Economically Active Population Survey (EAPS), and the latter is changed completely every five years, the HIES series has discontinuities every five years. In Korea, a population census is conducted every five years in the years ending with 0 or 5, and after three years (ending with 3 or 8), the EAPS sample is resampled (from January survey) based

² For example, in the 2002 data set, 19.4% of total observations are registered as non-responses and thus filled in by a hot-deck procedure.

upon the census results to improve the representativeness of the sample. The recent re-sampling years after 1982 were 1988, 1993, 1998, and 2003. Although such a sample change is inevitable, the practice impairs the consistency across the years. Incidentally, 1998 was a re-sampling year, which is the first year after the Crisis at the same time. Hence some of the after-the-Crisis changes are mixed with the re-sampling effects, which create some noise in analyzing the former. For example, unemployment rate soared and inequality jumped in 1998 compared to a year ago, and some people claim that part of the change is due to the sample change. On the other hand, an advantage of the HIES sample being a sub-sample of the EAPS sample is that the two data sets can be matched, from which a labor market information can be obtained for the HIES observations. In fact, the information is utilized in section 6 of this chapter when I analyze the working hours by income classes.

Another major weakness of the HIES is its limited coverage. The HIES sample contains households headed by a wage/salary worker and dwelling in the urban area, and among them, single-member households, farmer or fisher headed households, foreigner, and composite households are excluded. The reason for excluding such households is said to prevent possible irregularities caused by households whose incomes are not easily surveyed or regularly reported. Further, the HIES data reports income only for those households whose heads are wage/salary workers. The reason for such limited coverage is, according to KNSO, that the self-employed' or employers' responses for their incomes are hardly reliable, and hence including their income would make the whole survey less credible. In the NSHIE (2000) data set, which also excludes non-urban households but includes income data for single-member households and households whose heads are self-employed, employers or non-employed, households whose heads are wage/salary workers and which have multiple members are 48.4% of total households. Hence, the HIES data covers less than half of total urban households.³

Lastly, the HIES data set does not contain information on asset holdings. Inferences on capital gains, which may actually affect 'inequality' more seriously than income, are not possible from the data set.

In the HIES data, income is composed of regular and non-regular income. Non-regular income is the part of income that does not occur periodically or repeatedly: typically, they are retirement pay, gifts, congratulatory or condolence money, etc.⁴

³ In the NSHIE (2000) data set, single-member households are 15.1% and self-employed, employer, or non-employed headed households are 44.7% of total households.

⁴ These items are close to some kinds of 'funds' rather than income. They could be classified as cash

Regular income is categorized as (i) labor income, (ii) business income, (iii) asset income, and (iv) transfer income. Labor income is again divided into three sources: the household head's, the spouse's, and other members' income. Hence, individual labor incomes are known only for the head's and the spouse's, and other household members' labor incomes are shown only in their sums. Since many wage/salary workers are household members of wage worker headed households or they belong to non-wage worker headed households whose labor incomes are not reported, the HIES data set is a very poor data set for wages. Transfer income includes private transfers (subsidies) and public transfers. The quarterly HIES data contains only the total of transfer income but the yearly HIES data have separate items for private and public transfers without markings for survey quarters.

B. NSHIE (National Survey of Household Income and Expenditure) data

The NSHIE is a much more extensive survey than HIES, and it can make up for some of the weakness of HIES, the limited coverage. Its sample is comprised of approximately 30,000 households and includes single-member households and farmer/fisher households which are excluded from the HIES sample. It also has more survey items than the HIES.

The NSHIE has been conducted three times (in 1991, 1996, and 2001) with intervals of five years. However, the survey items have not been consistent and survey results in different years are not comparable with one another. For example, the 1991 and 1996, surveys were conducted between October to December, and incomes in the year up to the survey date were recorded, while the 2001 survey was in May and yearly incomes in the previous year (2000) were recorded. As in the case of the HIES, the survey sample is a subsample of the EAPS sample, and re-sampled every five years. Thus, the NSHIE results in different years are from different samples.

The main advantage of using the NSHIE data sets is that not only a wider range of households are included than in the HIES data sets, but also incomes of the self-employed and employer households, which are not reported in the HIES data sets, are recorded in the NSHIE data set.⁵ Thus, the NSHIE data sets are much more useful for cross-section comparisons than for comparison across times. For example, from the NSHIE data, we can measure how far the HIES mean income deviates from the population mean and what the trend of the deviation is across years. For international

asset gains rather than income.

⁵ The 1996 NSHIE data set contains income data for employer and self-employed headed households only for the yearly income category. The 2001 data set has their monthly incomes.

comparison, data on incomes of the self-employed and employers are required, and the NSHIE data is appropriate. (See Hyun and Lim, 2002)

2. Real Income Trends

I start with a description of the general income trends shown in the HIES data set. Figure 2 reports the general real income growth trends by income sources among the urban worker families (specifically, wage/salary worker headed families). The yearly incomes are averages of the four quarters' real incomes obtained by deflating nominal incomes with the corresponding quarter's CPI index with base year 2000.

[Figure 2]

As reported in Figure 2, most of total income is regular income, and labor income is the most important income source of the regular income in urban worker families' income structure.⁶ Regular income takes up on average 95% of the total income, and labor income is about 90% of the regular income.⁷ And the share is fairly constant throughout the period. As a result, the total, regular, and labor incomes have very similar trends. (See Table A.1 for income statistics by sources.) Real incomes of urban worker families have grown steadily, with some acceleration in the late 1980s, until the Crisis at the end of 1997. Urban worker families were particularly hard hit in the aftermath of the crisis and their real incomes declined significantly in 1998, but they are steadily growing again since then. (See Table A.2 for income growth rates by sources.)

The head's labor income has become consistently less important as the major source of household's labor income, while the spouse's and other members' labor incomes have been growing in their shares during the past twenty years. The head's share dropped from 90% in the early 1980s to 80% in 2002, whereas the spouse's share rose from 4% to 11% and other members' share rose from 5% to 9%. (See Figure 3) The trend is very clear and consistent throughout the period. The trend seems to be a direct result of consistently rising female labor participation in the Korean labor market. In 1998, that is immediately after the Crisis, the head's share jumped and the spouse's and other members' shares dropped as the female and young workers suffered more by the recession.

⁶ The importance of labor income as the major source of income is actually greater than this, because labor income is also the most important source of non-regular income. Retirement pay is the major non-regular income, which is in fact part of the labor income.

⁷ See Table A.3.

[Figure 3]

The shares of other income sources also did not vary much during the last 20 years. The share of business income rose from slightly above 2 percent in the early 1980s to about 4% recently and that of non-regular income rose from 2% to 6% in the same period, while the shares of asset income and transfers are roughly constant at around 3% throughout the period. (See Table A.2. in Appendix.)

A more detailed description of income composition by sources is given in Table A.4. The figures are derived from an annual version of the HIES data set of 2001. KNSO provides the HIES data sets in quarterly and annual versions. Annual versions contain full survey items with no markings for survey quarters, whereas quarterly versions have survey quarters but income sources are given only up to the 3 digit classifications—that is, labor income, business income, etc. For example, quarterly versions report only the total transfers, and the shares of public (pensions and other social benefits) and private transfers among them are given only in annual versions. The detailed composition of non-regular income is also given only in annual data sets.

According to the annual data set for 2001, non-regular income is composed of predominantly (85.8%) ‘other non-regular income’ which are non-regular lump sum incomes except from gift money and sales of non-assets such as retirement pay and compensations for property loss, accidents, etc. One might conjecture that fluctuations in non-regular income may be due to changes in retirement pay as the compensations have less reasons to fluctuate, but such a conjecture need to be confirmed by a further analysis of the data—the growth rates of non-regular income shows a pro-cyclical pattern. Besides, the annual data suggest that asset income of urban worker families are composed mostly of interest payments and rents, among transfer income the majority is private subsidies (70%) and public transfers takes up only a small portion of the total income.

3. Inequality Index Trends

The general inequality changes can be summarized by the trends of major inequality indices. The indices can be simply computed from the income decile group means of households’ total income published by KNSO.⁸ Table 2 and Figure 4A reports the trend of six major indices. They show very clear and similar trends: Income inequality

⁸ The classification is according to the total income levels of individual records—not individual households. Hence, it is possible that the three records of each household in the quarter can belong to different income classes.

did not change much during the mid 1980; it reduce from the late 1980s to the early 1990; it stayed at the low level during the mid 1990s; and after the Crisis it suddenly increased and stays at the level until recently. As such, this study will primarily focus on the income inequality reduction from the 1980s to the early 1990, and its widening after the economic crisis. Figure 4B provides the index values as a ratio to their period means for an easier comparison among them. The normalization reveals almost identical patterns among the indices. The variation is the largest in GE(2) and the smallest in Gini index.

[Figure 4]

It is known that $GE(\alpha)$ with larger α is more sensitive at the upper end of distribution.⁹ Since in the Figure 4B, GE(2) varies more than GE(0) except in 1998, one may speculate that most of income inequality variation in Korea is due to changes at the upper end of distribution. But the movement of deciles shows otherwise. Figure 5 plots the income decile ratios of D9/D1, D9/D5, and D5/D1.¹⁰ The deciles show that up to the mid 1990s income inequality reduced from middle to top (D9/D5), whereas inequality widening after the mid 1990s occurred from middle to bottom (D5/D1). This pattern of income decile changes, that is, income inequality in Korea has been improved and deteriorated in different manners will provide an important piece of information later when I try to “explain” the income distribution changes in Korea.

[Figure 5]

⁹ General entropy measures (GE) of inequality are defined as follows:

$$GE(0) = (1/n) \sum_{i=1}^n \log(\bar{y} / y_i)$$

$$GE(1) = (1/n) \sum_{i=1}^n (y_i / \bar{y}) \log((y_i / \bar{y}))$$

$$GE(2) = (1/2)[1/n \sum (y_i / \bar{y})^2 - 1] = (1/2)(1/n\bar{y}^2) \sum (y_i - \bar{y})^2 = (1/2)SCV$$

GE(0) corresponds to the mean log deviation, GE(1) is Theil index, and GE(2) is 1/2 of the squared coefficient of variation (CV). Atkinson measure is as follows:

$$Atkinson(\varepsilon) = 1 - \left[(1/n) \sum (y_i / \bar{y})^{1-\varepsilon} \right]^{\frac{1}{1-\varepsilon}}$$

¹⁰ The income deciles are derived as means of quarterly income deciles among all the households surveyed in the quarter in the HIES. That is, unlike in the case of income inequality indices, deciles among all the households, not the means of ten income groups, are used.

Table 2. Trends of Major Income Inequality Indices: 1982~2002

	Gini	GE(0)	GE(1)	GE(2)	Atk(0.5)	Atk(1.0)	CV
1982	0.309	0.161	0.068	0.176	0.077	0.147	0.594
1983	0.309	0.159	0.069	0.178	0.076	0.146	0.597
1984	0.311	0.162	0.069	0.178	0.077	0.148	0.596
1985	0.311	0.163	0.069	0.180	0.078	0.149	0.599
1986	0.307	0.159	0.067	0.172	0.076	0.145	0.587
1987	0.307	0.158	0.067	0.171	0.075	0.145	0.585
1988	0.302	0.152	0.065	0.167	0.073	0.139	0.578
1989	0.304	0.153	0.066	0.172	0.074	0.141	0.586
1990	0.295	0.145	0.062	0.160	0.070	0.134	0.566
1991	0.287	0.137	0.059	0.150	0.066	0.127	0.547
1992	0.284	0.135	0.057	0.143	0.065	0.125	0.536
1993	0.281	0.132	0.056	0.140	0.063	0.122	0.530
1994	0.285	0.134	0.057	0.144	0.064	0.125	0.536
1995	0.284	0.134	0.057	0.141	0.064	0.124	0.532
1996	0.291	0.142	0.059	0.148	0.067	0.131	0.544
1997	0.283	0.135	0.056	0.138	0.064	0.125	0.525
1998	0.316	0.172	0.071	0.182	0.081	0.156	0.603
1999	0.320	0.175	0.074	0.190	0.083	0.159	0.616
2000	0.317	0.170	0.072	0.188	0.081	0.155	0.613
2001	0.320	0.172	0.073	0.189	0.082	0.156	0.615
2002	0.312	0.163	0.069	0.177	0.078	0.149	0.595

Note: Each index is the average of quarterly index values computed from means of decile income classes grouped by their total income levels.

4. Sensitivity Analysis

Before vertical and horizontal decomposition of inequality, I do some sensitivity analysis in this section, especially since the index values in section 3 are derived from decile income group means and not from individual household observations.

A. Family size adjustment

Since household incomes are total of all members' incomes, inequality among them is subject to change if household sizes change. The household size in the HIES data continuously decreased during the last twenty years. The average size was 4.39 in 1982, 3.97 in 1990, and 3.46 in 2002. On the other hand, average number of workers in the family steadily increased.

Table 3. Household size and number of workers

	1982	1985	1990	1995	2000	2002
Average family size	4.39	4.18	3.97	3.71	3.54	3.46
Workers per HH	1.27	1.30	1.43	1.54	1.51	1.54

Source: KNSO, from the HIES data sets.

Adjustment for household sizes are commonly done by converting household incomes to individual incomes by dividing them either with the household size or the square root of the household size to take into account ‘economies of scale’ in consumption.

Figure 6 shows the result of household size adjustment for Gini index for mean incomes of decile groups. The decile income groups are naturally regrouped according to the newly defined individual incomes.¹¹ The size adjustment increases the Gini index in 1982~83 and 1994~45, in which household size reduction was slower, more than in other years. The result is quite surprising. The size adjustment makes inequality change a steady and continuous process, not confined to specific periods. It continuously declined until 1993, and changed direction since then. After size adjustment, it seems that inequality changed in all years except in 1997, in which the change was in opposite direction, rather than inequality changed in exceptional years.

Adjustment with the square root of the household size makes the shift in the same direction but at a less degree (Figure 6). The household size adjustment produced virtually the same result in case of other measures-- GE(0), GE(1), and GE(2), as in the Gini index. The figures are abbreviated.

[Figure 6]

B. Number of Income Groups

The index values given in previous sections are those calculated from the means of decile income groups. Using the means is computationally simpler and enables one to avoid dealing with zero income cases in computing GE(0) or GE(1) measures. However, grouping may bias the estimates. Inequality among group means is, in fact,

¹¹ Specifically, the household income is divided by the (square root of) number of household members and the household weight is multiplied by the household size.

equivalent to ‘between group’ inequality without any ‘within group’ inequality.

To check the sensitivity of inequality indices to groupings, I compare Gini index values computed from 10, 25, 50, 100, and individual household incomes in Figure 7 (with no adjustment for household sizes). As expected, the Gini index from finer groupings is significantly larger—that from 100 group means is about 2 percent higher than that from 10 group means, but the difference between 25 and 100 groups is relatively small. Further, the difference is very uniform across years. Hence using coarser groups does not seem to distort the trend much.

[Figure 7]

The Gini index from individual observations is significantly higher than that from 100 group means especially from 1994 to 2000. The difference seems to be due to non-regular income, which does not occur regularly and has very large variation among individuals.

If incomes are adjusted for household sizes, a similar result as in the previous subsection is obtained. The indices show a much more continuous trends. Also, the same results are obtained for other General Entropy measures: Those from finer income groups have larger values, but the difference is small with more than 25 group means. And, with finer groups or individual observations, household size adjustment makes the trends look more continuous.

C. Changes in the Coverage of the HIES

Since the HIES covers only the urban worker families—that is, families whose head is a wage/salary worker and who lives in the urban area, the coverage may have extended during the last twenty years as the share of wage/salary workers has increased and urbanization continued in Korea. As such changes have been continued during the last twenty years, the effects can be considered as trendy—that is, they may have influenced all the index values in the same direction, rather than reversing the direction of inequality changes.

However, such an effect can only be evaluated when a data set that covers the whole population or at least with wider coverage is available. I will discuss this point in the horizontal decomposition section.

4. Results from Vertical Decomposition

To identify which component of households' income has resulted inequality changes, we can decompose inequality index vertically—that is, by income sources. Since the GE(2) measure allows a simple vertical decomposition, I report the vertical decomposition results for GE(2). In decomposition, individual household observations are used, and all the incomes are adjusted for household sizes.

Figure 8 shows each income source's GE(2) trend. GE(2) of non-regular income and transfer income distribution are very large, and they are not included in the figure. Panel A shows that GE(2) of total income varies much widely than those of regular and labor incomes, suggesting that most of the variation in total income is in non-regular income. GE(2) of asset, business, and labor incomes of spouse and other members are large, and they are given in Panel B in different scales. Noteworthy in Panel B is the difference in the direction of changes: Asset income distribution is becoming more unequal, probably as asset accumulation speeds are different among households. Spouses' labor incomes are more equally distributed as more female are joining the labor market.¹² Non-regular income and transfers show very irregular patterns: Non-regular income inequality was high in 1982~84, low in 1985~97, and jumped in 1998 and remains high. Inequality in transfers was high in the mid 1990s, and low recently.

[Figure 8A]

[Figure 8B]

Table 5 reports the results of vertical decomposition. It turns out that the much of the hike in GE(2) of total income distribution is attributed to the rise in non-regular income distribution inequality (Figure 8A). It accounts for more than half of total inequality recently, although its share is just about 6 to 7 percent. Further, the total of non-regular income did not jump in 1998, only its variation enlarged. Non-regular income is the part of income that is not repeated in its nature—such as retirement pay, celebration or condolence money in weddings or funerals, and other subsidies of non-regular types.¹³ Such money is some type of fund money, and it is questionable that

¹² The share of spouse whose labor income is positive increase from 10% in 1982 to 25% in 2002.

¹³ According to NSHIE 2000 data, 58.7% of total non-regular income is retirement pay, 13.4% is celebration or condolence money, and 18.0% is 'non-regular' subsidies. Non-regular income moves pro-cyclically, and its ratio to regular income is higher in high income groups.

such money should be counted as ‘income’ and not as ‘asset gains.’ Anyway, its sudden increase after 1998 is commonly thought of as a result of increased retirement pay which became much more frequent as the economy was under restructuring.

Table 5. Vertical Decomposition of GE(2) Measure: Shares in the Total Inequality

	Regular Income	Labor Income ¹⁾	Head's Labor Income ²⁾	Spouse's Labor Income ²⁾	Others' Labor Income ²⁾	Business Income ¹⁾	Asset Income ¹⁾	Transfer Income ¹⁾	Non- regular
1982	0.927	0.885	0.901	0.081	0.019	0.014	0.039	0.061	0.073
1983	0.917	0.889	0.906	0.076	0.018	0.010	0.040	0.062	0.083
1984	0.890	0.887	0.880	0.091	0.029	0.014	0.045	0.054	0.110
1985	0.926	0.867	0.881	0.083	0.035	0.027	0.042	0.064	0.074
1986	0.933	0.871	0.857	0.106	0.036	0.026	0.052	0.052	0.067
1987	0.908	0.845	0.849	0.108	0.044	0.024	0.053	0.078	0.092
1988	0.898	0.873	0.840	0.118	0.042	0.022	0.045	0.060	0.102
1989	0.867	0.859	0.840	0.091	0.069	0.043	0.036	0.062	0.133
1990	0.788	0.809	0.818	0.108	0.074	0.041	0.055	0.095	0.212
1991	0.814	0.755	0.800	0.125	0.075	0.046	0.046	0.153	0.186
1992	0.840	0.727	0.791	0.154	0.055	0.046	0.040	0.188	0.160
1993	0.838	0.778	0.734	0.188	0.078	0.043	0.049	0.130	0.162
1994	0.760	0.740	0.716	0.202	0.082	0.037	0.057	0.166	0.240
1995	0.787	0.773	0.705	0.208	0.087	0.042	0.050	0.135	0.214
1996	0.773	0.803	0.710	0.201	0.089	0.042	0.053	0.102	0.227
1997	0.782	0.756	0.694	0.210	0.096	0.041	0.054	0.149	0.218
1998	0.480	0.795	0.730	0.212	0.058	0.043	0.041	0.121	0.520
1999	0.533	0.789	0.750	0.199	0.052	0.055	0.050	0.106	0.467
2000	0.398	0.874	0.724	0.204	0.072	0.041	0.034	0.051	0.602
2001	0.444	0.883	0.697	0.225	0.078	0.043	0.032	0.041	0.556
2002	0.570	0.875	0.696	0.244	0.060	0.054	0.030	0.042	0.430

Note: Derived from individual household observations adjusted for HH sizes

- 1) proportion to total regular income inequality
- 2) proportion to total labor income inequality

[Figure 9A]

[Figure 9B]

[Figure 9C]

Labor income is consistently responsible for about 90% of total regular income distribution inequality. In labor income distribution inequality, the share of heads' labor incomes has dropped from about 90% in the 1980s to 70%, recently, while the share of spouses labor incomes rose from 10% to 20%, and other members' share rose

from 4% to 10%. While spouses' labor income distribution inequality is dropping, its contribution to total inequality is rising as their incomes are positively correlated with the heads' and female labor participation is increasing. Although the spouses' and other members' labor incomes' contribution to overall inequality is rising, the rise is steady and did not jump after the Crisis.

The contribution of business income in regular income inequality rose from 1% to 7%, and that of asset income declined from 5% to 3%. They show opposite patterns: Business income has become more equally distributed but their contribution to inequality has risen. Asset income is more unequally distributed but its contribution is towards equality.

The contribution of transfer income does not show any trend, fluctuating from 3% to 10% in the period. Social safety nets, such as unemployment benefits and welfare payment, are strengthened significantly after the Crisis. The fall in the contribution of transfers may be a result of such policies—that is, public transfers may be counterbalancing private transfers, lowering their contribution to total inequality.

Thus, the major cause for enlarged inequality since 1998 is widening earnings distribution inequality especially among the heads' earnings. Hence, in the next section, I focus on how their distribution has widened by decomposing horizontally.

5. Results from Horizontal Decomposition

In this section, I try to find out how the households' and the heads' labor income distribution has changed by decomposing the change horizontally —i.e., by population sub-groups. Specifically, I address the following question. During the past twenty years, the household structure in Korea has fundamentally changed. Also, during the late 1980s, wage gaps were drastically reduced by labor demand and supply changes and also by union activities. How important are these factors in determining income inequalities? And, as we have seen, the trend of inequality changed direction in the mid 1990s, and it suddenly widened after the Crisis. What are the causes and why they worked in different directions?

The major changes in household structure in the HIES data sets are as follows (Table 7): First, the educational level of heads has remarkably upgraded. In 1985, 20% of household heads had college degrees (including 2-year college), but in 2002, the one-third of household heads are college graduates. Second, there has been general aging

of population. The mean age of heads has increased from 36.0 in 1982 to 41.6 in 2002. By age groups, the share of household heads in their twenties was 27% in 1982 but it is 11.6% in 2002. On the other hand, just 8.7% of heads were in their fifties and 1.2% were above 60. But in 2002, the share is 15.8% and 6.5%. Lastly, the share of female heads has increased. It was 11.2% in 1982, but it is 17.6 now. Increasing female heads does not necessarily mean that more households have single parent. According to the KNSO's definition, a household head is one whose income is the major source of household income. If the wife's income is larger than the husband's, then the wife is the head. Increasing female heads may well be a result of increased economic activity of women.

Another objective in reviewing distribution of household characteristics is to check the significance of sample change. The HIES sample has been changed in 1988, 1993, and 1998, and between the years the same households are surveyed. Hence the data set has a panel data nature in the years, and sample change may significantly alter the household distribution. Table 7 shows that distribution of household characteristics does not change much in the same sample. An exception is the 1998 sample change. The share of male household has increased, but as it returned to the 1997 level in 1999 without sample change, its rise in 1998 can be attributed to the economic situation in 1998, in which female employment dropped, rather than to the sample change. However, as the heads' educational composition has changed permanently, we can recognize the significance of the 1998 sample change.

Table 7: Distribution of Household Head's Personal Characteristics

(unit: %)

	Head's		Head's Mean Age	< high school	high school	some college
	Sex Male	Female				
1982	88.8	11.2	36.0	-	-	-
1983	87.7	12.3	36.1	-	-	-
1984	87.3	12.7	35.8	-	-	-
1985	87.9	12.1	36.0	39.2	40.8	20.0
1986	87.5	12.5	36.3	37.0	41.2	21.8
1987	87.8	12.2	36.2	35.8	43.2	21.0
1988*	89.0	11.0	36.7	35.5	43.0	21.5
1989	88.9	11.1	36.9	30.3	45.8	23.9
1990	89.3	10.7	37.1	30.4	47.9	21.7
1991	89.4	10.6	37.9	31.0	46.8	22.2
1992	89.9	10.1	38.3	27.8	45.5	26.7
1993*	88.8	11.2	38.4	26.2	45.5	28.3
1994	87.2	12.8	38.8	25.4	45.4	29.2

Table 7: Distribution of Household Head's Personal Characteristics

(unit: %)

	Head's Sex		Head's Mean Age	< high school	high school	some college
	Male	Female				
1995	86.6	13.4	39.3	25.4	44.2	30.4
1996	85.9	14.1	40.0	25.1	43.8	31.1
1997	85.4	14.6	40.3	27.0	43.0	29.9
1998*	88.3	11.7	39.9	21.0	45.0	34.0
1999	85.4	14.6	40.4	21.4	45.6	33.0
2000	83.6	16.4	40.9	22.9	44.8	32.3
2001	83.3	16.7	41.4	22.5	44.5	33.0
2002	82.4	17.6	41.6	21.9	43.9	34.2

Note: Asterisk (*) marks the sample change years.

Decomposition by The Head's Educational Level

In Korea, decomposition by the heads' educational level seems to be most important among other groupings. In Korea, different educational groups were affected by the labor market conditions differently at times. If labor incomes are the prime factor in determining inequality, changes of inequality among educational groups should have been different. In Korea, it has been frequently claimed that shrinking wage gap in the late 1980s caused the income distribution improvement in the period. But the distribution of heads' age and educational distribution also improved in the period. More households had college graduate and middle-aged heads. Thus, in this subsection, I will first try to determine whether inequality really decreased in the period by reducing wage gap among the educational groups. Also interesting is the inequality widening process after the Crisis. It is commonly thought that less educated were hit harder by the Crisis and during the ensuing recession, while the some of the more educated even benefited in the restructuring process.

The wage gap reduction in the late 1980s was caused by two factors: One is the advancement of political democracy, which lifted up all the restrictions for union activities. And the other is the change in supply and demand conditions. The supply of the low-educated dropped rapidly in the late 1980s, causing 'labor shortage' among the manual labor.

In empirical analysis, I use individual household observations data after adjustment for household sizes, and GE(1) measure for inequality. Since horizontal

decomposition is feasible either with GE(1) and GE(2), we can choose between the two. GE(2) measures are very sensitive to outliers, and they rise in the boom period of 1988~1989 deviating from its falling trend, probably as a result of some high incomes at the upper tail. Hence, I choose to use GE(1) for which the rise in 1988~89 is smaller.¹⁴ The HIES data prior to 1985 do not contain information on heads' educational level. Hence the period for horizontal decomposition is confined to 1985~2002. In grouping, I use three groups by the head's educational level: less than high school (primary and junior middle school graduates), high school graduates, and some college (college graduates including 2-year colleges). The results from decomposition of household labor income are very similar to those from the heads' labor income.¹⁵¹⁶ As the latter shows clearer results, I will introduce and explain the latter.

Figure 12 reports the result of horizontal decomposition of head's labor income by head's educational levels. The figure shows that 'between group' inequality, that is, inequality among educational groups, fell significantly in the late 1980s. Since then it is roughly constant, rising a little bit in 1999 and 2000. The within group inequality did not change much since the mid 1980s to 1997—it just decreased somewhat in the 1990s. Since 1998, it started to rise and stays at the higher level. Hence, the decline in inequality in the late 1980s is mostly explained by the reduction in between group inequality—among the total decline of GE(1) of 0.025 during 1985~1990, 0.023 is attributed to between group inequality decline. The result is quite surprising in that usually most of inequality changes are explained by 'within group' inequality changes, and cases in which inequality changes are attributed 'between group' changes are rare. GE(1) of head's labor income declined 0.014 during 1990~95, of which just 0.004 is attributed to between group changes, and it increased 0.025 during 1995~2000, of which just 0.007 is due to between group changes.

[Figure 12]

[Figure 13]

In the late 1980s, as the union activities were fully granted, suppressed demands for wage increase among the production workers quickly erupted. Labor disputes were prevalent, but as a result, the wage levels of the less educated—high school graduates

¹⁴ In computing GE(1) measure, observations with zero or negative income are simply deleted. In the data set, the proportion of such households is very small.

¹⁵ The results from using GE(0) is similar to those from GE(1) measures.

¹⁶ Such result is not at all surprising since the head is defined as the major earner for the household.

and less than high school—increased sharply, narrowing the educational wage gap. The dominant wage payment system in Korea before the 1990s was the seniority system, in which wages are mostly determined by education, age, and experience, and personal differences within companies are small. It seems that under such wage system, shrinking wage differentials among educational groups decreased the overall inequality.

On the other hand, merit-based wage system, which started to be introduced in the mid 1990s, came widely adopted since 1998, as companies tried to save labor cost and better motivate their employees. Such trend is shown in Figure 13, which shows the trend of GE(1) by educational groups. In the figure ‘less than H’ means ‘less than high school’ and ‘high sch’ means high school graduates. The trend shows that inequalities within educational groups generally decreased up to the mid 1990s, and since then they started to rise, accelerating since 1998.¹⁷ The steady rise of inequalities within educational groups seems to be related to the general transition towards an economy in which market principles, efficiency, and individual performance is emphasized, and merit-based system is the dominant payment system. The big jump in inequalities among the least educated after 1998 is also observed when other measures are used. This group’s income is likely to be influenced by the shift of payment system. Rather, they seem to be related to job availabilities--that is, reduction of working hours among the unskilled as we will shortly see.

Within group inequality reduction in the mid 1990s may be related to the age distribution. Before looking into what happened among the least educated after 1998, I survey the effects of changing composition of the heads’ age and gender structure on income distribution.

Aging of Household Heads and Growing Share of Female Headed Households

Among the long-term changes of household characteristics, the most conspicuous are the aging of household heads and the growing share of female households. The average age of heads was 36.0 in 1982 but it is 41.6 as of 2002. The share of female-headed households was 11.2% of total households in 1982, but it is 17.6% in 2002. In this section, I check the effects of such changes.

When the population is grouped by the household heads’ ages and horizontally

¹⁷ The rise of inequality among the college graduates in 1998 and 1999 seems to reflect high incomes among those in large companies in the period when the Korean economy was booming.

decomposed, most of inequality variation is explained by ‘between groups’ variation and the share of ‘within group’ variation is very small, implying that income inequality among the age group is far greater than across the age groups.¹⁸ By age groups, within group inequality is the higher, the older the head is. Households whose heads are above 60 or in their fifties have significantly higher inequality among them than the younger groups. Hence, one can deduce that population aging may lead to larger inequality among households. But if we look at the trend of inequality in regular income, which includes other members’ income and transfers, the differences in inequalities across heads’ age groups are much smaller, suggesting that households whose head is old have other sources of income.

[Figure 14]

Within group inequalities declined from the late 1980s to the early 1990s in all groups. The period of decline does not exactly coincide with the period of educational between group inequality reduction, which suggests that there should be other factors that contributed to inequality reduction other than the educational wage gap reduction. Noteworthy is the rise in inequality since 1998. Inequality rises in all age groups, but it rises fastest among the elderly group, that is, among the households whose heads are in their fifties. This suggests that the impact of the Crisis was larger for the elderly than the young. It is also important that widening inequalities among the elderly heads’ income began in mid 1990s, before the Crisis. As the business profits fell in the second half of the 1990s, the elderly seems to be already losing jobs, the trend of which accelerated in the aftermath of the Crisis.

Thus, one may conclude that population aging produces a secular trend of widening inequality, but it is not the major cause for the increased inequality after the Crisis or since the mid 1990s.¹⁹ Between group inequality among households with heads in different age groups increased but the extent of increase is very small.

The effect of growing female-headed households is very similar. If we group households by their head’s sex, the ‘between group’ effect is very small. Income variation within male- or female-headed households is far greater than the difference

¹⁸ The grouping by head’s age is made in five groups as 20-29, 30-39, 40-49, 50-59, and 60+, where households whose head is under 20 are deleted. The between group inequality accounts for just about 1% of total inequality.

¹⁹ For example, GE(1) among 59-59 is higher by 0.1 than 20-49 average and that of 60+ is higher by 0.17 on average between 1982~2002. In the period, their share (in case of GE(1), its income share) increased from 10% to 18% in total, hence roughly 5% (or 0.01) increase in GE(1) can be attributed to population aging, whereas GE(1) is at least 20% higher by the end of the 1990s compared to its lowest

of incomes between the groups. Also the ‘within group’ inequality trend is very similar in the two groups. (See Figure 15.) Inequality among the female-headed households is larger than that among the male-headed households—generally, the difference is about 30% in all major incomes, such as heads’ labor income, total labor income, and regular income. As the share of female-headed households is rising steadily, from 11.2% in 1982 to 17.6% in 2002, it raises income inequality, but its effect is not large. If the share rises from 12% to 17% in the 20 years, it would raise the GE(1) value by 1.5%.

[Figure 15]

The Effect of 1998 Re-sampling

One of the important potential factors that might change the inequality trends is the effect of re-sampling of the HIES data in 1998. The effect of 1998 re-sampling may be more significant than re-samplings in other years, since it significantly changes the distribution of the household heads’ characteristics. For example, the share of female-headed households dropped from 14.6% in 1997 to 11.7% in 1998; the share of households with heads whose educational levels are less than high schools dropped from 27.0% in 1997 to 21.0 in 1998; and those with college educated head increased from 29.9% to 34.0% in 1998.

As the difference in household characteristics in the sample is significant between the two years, one may try to adjust the weights attached to observations such that the 1998 sample have the same distribution in major household characteristics as the 1997 sample. However, the changes in household characteristics between 1997 and 1998 are in the direction of raising the inequality index, with smaller shares of the female-headed households and low-educated households. Thus, I do not try to adjust the weights and re-evaluate the inequality indices. Instead, I use a different data set to compare the inequality index change between the pre- and post-Crisis years.

What happened to the Income Distribution of Low-educated After the Crisis?

From the horizontal and vertical decomposition results, we can conclude that post Crisis increase of inequality is closely related to widening heads’ labor income distribution, especially among the less educated. Population aging and increasing female heads have contributed to widening of income inequality, but they are secular

trends and they do not account for the sudden rise in inequality after the Crisis. Thus, I address the critical issue of ‘what happened to the income distribution of the low-educated after the Crisis?’ in this subsection.

Before looking into the issue, if I introduce briefly the results of horizontal decomposition by both education and age groups, the results are as follows: The between group inequality among the 15 education-age groups (3 educational by 5 age groups) shows a downward trend in the late 1980s to the early 1990s and tilts up slightly after the Crisis, confirming the previous result that although the ‘between group’ inequality reduction among the educational classes in the late 1980s contributed to the reduction of inequality, its effect is confined to the period. Slight rise of ‘between group’ inequality after the Crisis is due to the widened mean incomes among the groups, which is mainly caused by real income drop among the less educated and the elderly group. The age/educational group decomposition confirms importance of real income drop among the low educated in explaining the inequality widening after the Crisis.

To see what happened among the low educated since the Crisis, I use the HIES-EAPS combined data set. Since the HIES sample is a subset of the EAPS sample, observations in the two data sets can be matched in principle. The KNSO provided such combined data sets for the periods after 1993. The time span for analysis is determined by the data availability condition for this research, which is from 1993 to 2001. Also, to guard against variability of income rather than inequality of income, I use yearly sample—that is, inequality index are derived from households’ annual incomes rather than as annual averages of quarterly inequality indices.

[Figure 16]

An obvious way to review is to see the changes by income groups. Figure 16 plots heads’ real income trend of quintile groups by educational levels. Among the least educated (primary and middle school graduates), heads’ real labor income dropped significantly in 1998 in all quintile groups and increased steadily since then. But all groups except the highest income group did not recover the pre-Crisis level in 2001. In contrast, all quintile group means of college graduate heads reached the pre-Crisis level by 2000. As a result, the income gaps among quintile groups are expanded in the low-education group especially between the middle and bottom quintile group, while the income gaps increased but much mildly among the college educated heads. Hence, it can be inferred that widening inequality especially among the low education group

and from middle to bottom is mainly responsible for the widening inequality after the Crisis. Next, I look at the labor market conditions that have widened income distribution among the low-educated.

[Figure 17]

[Figure 18]

Figure 17 plots working hours and hourly real wage rates by quintile groups among the low-educated, and Figure 18 does the same thing for college educated group for comparison. Data on weekly working hours are obtained from the EAPS data combined with the HIES data, and hourly real wage rate is derived as monthly income divided by 4.3 times weekly working hours deflated with CPI index of base year 2000. Figure 17 shows that decline of real income among the low quintile groups of the less educated is due to reduction of working time rather than decrease in wage rates. Reduction in working hours was especially severe among the low income quintile groups, whereas reduction in real wage rate is not very significant even among them. On the other hand, among the college graduates, working hours did not decrease in all income quintile groups, and real wages have declined but they reached the pre-Crisis level by 2000 in all quintile groups.

Thus, we can conclude that it is the loss of job opportunities especially among the less educated that has caused the income inequality widening. Downgrading of jobs, that is, job losers get lower hierarchy jobs with lower wages has been suggested as a competing explanation for widening income inequality, but this is not supported by data.

Inequality among All Types of Households: Results from the NSHIE data sets

Previously, we have seen that the loss of job opportunities is the prime cause for widened inequality after the Crisis. If this is the case, it is probable that many households lost jobs and hence dropped out of the sample, reducing the measured inequality. To check how important such sample selection effect may be, I estimate inequality index with a larger data set—the NIES data set and compare the results with those from the HIES data sets.

The following Table 8 compares the composition of households by types contained in

the NIES data sets of year 1995 and 2000.²⁰ The NIES classifies households in three types—an employee-headed household, an self-employed (or an employer)-headed household, and those with non-employed heads. As single member households are not survey in the HIES, I consider employee-headed households with a single member as another type of households. Table 8 indeed confirms that after the Crisis, the share of households with employee heads has dropped. In terms of members of households, its share dropped from 60.1% to 55.0% in five years excluding single member households.

Table 8. Composition of Household by Types in the NIES Data Sets

HH type	Households		HH members	
	1995	2000	1995	2000
1: employees	54.4	48.4	60.1	55.0
2: self-employed	26.7	25.8	29.9	29.1
3: non-employed	11.4	18.9	7.7	13.7
4: single member employee	7.5	7.0	2.3	2.2

Source: KNSO, the NIES data sets, 1996 and 2001.

However, the effects of such compositional change can not be directly measured, because the 1995 data set contains income information of only employee-headed households. Table 9 shows the values of inequality measure by household types. Households with non-employed heads have of course large inequality among them, but the difference is small if we consider regular income distribution which includes transfers as well as other members' incomes. If I assume very simply that income shares of employed-headed households drop by 5% and those of other type households increased proportionately, the GE(1) index for all household would increase by about 0.01 which is small compared to the increase in GE(1) of heads' labor income among total employee-headed household from 1995 to 2000, which is 0.04.

Thus, we can say that the loss of job opportunities should have increased inequality beyond what is measured by the HIES data, but most of the inequality rise is already measured by the change in income distribution among employee-headed households and the additional effect of the job losers dropping out of the sample is not large.

²⁰ The NIES were in 1996 and 2001, but they surveyed 1995 and 2000 incomes. Hence I call them 1995 and 2000 data sets.

Table 9. Inequality among Households by Types

	Total GE(1)	HH type 1	HH type 2	HH type 3	HH type 4
total income	0.276	0.183	0.399	0.287	0.168
Regular income	0.266	0.154	0.404	0.268	0.169
labor income	0.263	0.156	0.410	0.354	0.179
head's labor income	0.241	0.180	0.456	0.401	0.179

Source: KNSO, the NIES data sets, 2001.

IV Conclusion

During the past 21 years, that is, from 1982 to 2002, income distribution inequality declined and then increased in Korea. Income distribution improvement continued until the mid 1990s, and its deterioration started then and accelerated by an external shock—the Crisis at the end of 1997.

The income distribution improvement has accelerated at the end of the 1980s when the country moved from an authoritarian regime to a fully democratized country and when the country was in a big boom and the wages hiked aided by strong union activities which were fully granted then. However, a detailed data analysis reveals that union activities do not solely account for the inequality reduction in the period. Inequality was already declining since the early 1980s, and it continued until the mid 1990s when the reduction in inequality among the educational groups already stopped. With expansion of light, labor intensive industries in the 1970s, wages for low-educated have been growing, and successful transition from the light industries to heavy and chemical industries could support increasing wages and the resultant inequality reduction. It is important to note that the inequality reduction was accompanied by real wage growth in all income groups. The effects of union, in this period, seem to be in realizing the income growth for the production workers, for which the conditions were already ripe. It is also important to note that in Korea, college education has been popularized with widened education opportunities since the early 1980s, and by this time period the supply conditions also worked favorably for the low-educated. Supply and demand condition, and also the payment system, in which wages are determined by seniority without much individual differences contributed to the inequality reduction.

However, the late 1980s was at the same a period of high inflation and asset price hike,

which certainly distributed wealth distribution but not captured well by the existing data. Booming economies certainly help to reduce wage gap under the old payment system, but the effects on equality, including the wealth distribution, is still questioned and can not be clearly determined given the data conditions.

Since the 1990s, there are several secular trends that may worsen income distribution steadily: Women's labor participation, whose income is positively correlated with their husbands, is increasing and female household heads are increasing. The family sizes are decreasing, and the population is aging. Such trends are expected to continue in the future but the changes are mild and they do not account for the sudden rise in inequality since the late 1990s. Most of income inequality is still determined by the heads' labor income distribution which is subject to much rapid change depending on the economic conditions.

From the mid-1990s, labor income distribution started to widen within the age and educational classes. Such change seems to be related to the transition of the economy from an industrial oriented to a service economy, but the exact cause is yet to be analyzed. The recession that followed the Crisis hit the low-educated and those whose heads are the elderly particularly severely. And the direct cause was the reduction in job opportunities, shown in the data as working hours reduction, rather than the degrading of job structures, which should appear as real wage decline. The impact would have been severer if there were more low-educated since they are the group that suffered most since the Crisis. The low-educated were not affected temporarily in the aftermath of the Crisis. Their working hours are still shorter compared to the pre-Crisis years. Somehow, the Crisis seems to have accelerated the transition of labor demand from the unskilled to the skilled permanently. Unions did not contribute to income equality in this period. Workers in the unionized sector are in the high income groups among the low-educated, and they did not suffer much from the recession, and quickly recovered their pre-Crisis income levels.

Thus, in the case of Korea, economic growth has certainly contributed to the income distribution improvement in the 1980s, but it did not continue to improve distribution. Or, rigidities in wage distribution and in the economic structure may have hindered economic growth in the second half of the 1990s, resulting widened income inequality at the cost of the low income, low educated group.

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Appendix

A. Vertical and Horizontal Decomposition of Inequality Measures

Horizontal Decomposition: Decomposition by Income Sources

Vertical decomposition of GE(2) measure can be explained very simply as follows: Define the total income by sources as $y = \sum_s y_s$ where y_s is the income from income source s . Let I_s be the decomposition of the total inequality I for income source s , where $I = \sum_s I_s$, and let i_s be the share of income source s in total inequality ($i_s = I_s / I$) the sum of which across s is naturally equal to one ($\sum_s i_s = 1$). In case of GE(2), the share is defined as $i_s = I_s / GE(2) = \rho_s f_s \sqrt{GE(2)_s / GE(2)}$ where $f_s = \bar{y}_s / \bar{y}$ and $GE(2)_s$ is the value of GE(2) measure applied to the distribution of incomes from income source s , y_s .

Horizontal Decomposition: Decomposition by population sub-groups

The horizontal decomposition formula is as follows: Let there be K population sub-groups. Denote the value of $GE(\alpha)$ applied to sub-group j as $GE(\alpha)_j$. The ‘within group’ inequality can be defined as $GE_w(\alpha) = \sum_{j=1}^K g_j GE(\alpha)_j$ where the sub-group weights g_j are given by $g_j = v_j^\alpha w_j^{1-\alpha}$ where v_j and w_j are the income shares and the population shares, respectively of the sub-groups $j=1,2,\dots,K$. The ‘between group’ inequality, $GE_B(\alpha)$, involves re-estimating total inequality when each member of each sub-group j is given the mean income for that sub-group, \bar{y}_j , and then calculating

$$GE_B(\alpha) = \frac{1}{\alpha(\alpha-1)} \left[\frac{1}{n} \sum_{j=1}^K n_j \left(\frac{\bar{y}_j}{\bar{y}} \right)^\alpha - 1 \right],$$

where \bar{y} is the mean income for the whole population, and n_j is the size of sub-group

j where $\sum_j n_j = n$. That is, $GE_B(\alpha) = (\alpha(\alpha-1))^{-1} \left[\sum_{j=1}^K w_j \left(\bar{y}_j / \bar{y} \right)^\alpha - 1 \right]$ Naturally, the decomposition adds up to the value of the total inequality measure—i.e., $GE(\alpha) = GE_w(\alpha) + GE_B(\alpha)$.

B. Tables

Table A.1: Real Income Trends

(unit: thousand year 2000 constant Won)

	Total Income	Regular Income	Labor Income	Busines s Income	Asset Income	Transfer s	Non- regular
1982	726	712	658	14	20	21	14
1983	804	786	725	14	23	24	18
1984	866	845	783	19	23	21	21
1985	905	879	809	21	24	25	26
1986	985	952	871	26	31	23	33
1987	1,115	1,070	973	30	35	30	46
1988	1,217	1,164	1,067	33	35	30	53
1989	1,433	1,358	1,237	35	40	46	75
1990	1,547	1,456	1,327	40	42	46	91
1991	1,737	1,627	1,479	52	42	55	110
1992	1,916	1,796	1,634	55	49	58	120
1993	1,992	1,877	1,720	59	46	52	115
1994	2,158	2,017	1,838	66	53	60	141
1995	2,321	2,184	1,994	76	52	61	137
1996	2,491	2,334	2,127	85	60	63	157
1997	2,536	2,373	2,149	87	59	77	163
1998	2,199	2,056	1,872	80	45	59	143
1999	2,275	2,124	1,916	91	47	70	151
2000	2,387	2,214	2,008	94	45	66	173
2001	2,523	2,347	2,124	102	48	72	176
2002	2,612	2,456	2,225	110	49	73	155

Table A. 2: Real Income Growth Rates by Sources

	Total	Regular	Labor	Business	Asset	Transfers	Non-regular
	Income	Income	Income	Income	Income		
							(unit: %)
1983	10.7	10.4	10.2	-0.8	17.0	17.4	29.1
1984	7.7	7.5	7.9	35.2	-0.9	-13.7	18.1
1985	4.5	4.0	3.4	14.0	4.5	17.5	27.0
1986	8.8	8.3	7.7	21.2	31.6	-5.2	25.1
1987	13.3	12.4	11.7	16.4	13.8	30.4	39.2
1988	9.1	8.9	9.6	10.4	-2.7	-3.0	15.2
1989	17.7	16.7	15.9	6.0	16.2	55.5	41.8
1990	8.0	7.2	7.3	13.7	5.4	0.7	21.7
1991	12.3	11.8	11.4	27.8	-1.3	19.3	21.0
1992	10.3	10.4	10.5	7.3	17.5	4.6	8.9
1993	4.0	4.5	5.3	6.6	-7.0	-9.3	-3.7
1994	8.3	7.5	6.9	11.9	16.6	14.2	22.2
1995	7.5	8.3	8.5	15.6	-2.3	1.9	-2.9
1996	7.4	6.9	6.6	10.9	15.0	3.5	14.8
1997	1.8	1.7	1.0	3.5	-0.4	21.8	3.6
1998	-13.3	-13.3	-12.9	-8.2	-24.9	-22.6	-12.2
1999	3.4	3.3	2.3	14.0	5.3	17.1	5.7
2000	4.9	4.2	4.8	3.0	-4.1	-4.7	14.4
2001	5.7	6.0	5.8	8.2	7.3	8.8	1.7
2002	3.5	4.7	4.8	7.4	1.0	0.4	-11.7

Table A.3: Composition of Income by Sources

(unit: %)

	Regular Income	Labor Income*	Business Income*	Asset Income*	Transfers*	Non- regular
1982	98.1	92.4	2.0	2.7	2.9	1.9
1983	97.8	92.2	1.8	2.9	3.1	2.2
1984	97.6	92.6	2.2	2.7	2.5	2.4
1985	97.1	92.1	2.4	2.7	2.8	2.9
1986	96.7	91.5	2.7	3.3	2.5	3.3
1987	95.9	91.0	2.8	3.3	2.8	4.1
1988	95.7	91.6	2.9	3.0	2.5	4.3
1989	94.8	91.1	2.6	3.0	3.4	5.2
1990	94.1	91.2	2.8	2.9	3.2	5.9
1991	93.7	90.9	3.2	2.6	3.4	6.3
1992	93.7	91.0	3.1	2.7	3.2	6.3
1993	94.2	91.6	3.1	2.4	2.8	5.8
1994	93.5	91.1	3.3	2.6	3.0	6.5
1995	94.1	91.3	3.5	2.4	2.8	5.9
1996	93.7	91.1	3.6	2.6	2.7	6.3
1997	93.6	90.6	3.7	2.5	3.2	6.4
1998	93.5	91.0	3.9	2.2	2.9	6.5
1999	93.4	90.2	4.3	2.2	3.3	6.6
2000	92.8	90.7	4.3	2.0	3.0	7.2
2001	93.0	90.5	4.3	2.1	3.1	7.0
2002	94.1	90.6	4.5	2.0	3.0	5.9

Note: * as a share of regular income.

Table A.4: Composition of Households' Income by Sources: 2001

Income Source	Amount (thousand won)	Shares (%)
Total income	2,625	100.0
I. Regular income	2,442	93.0
1. Labor income	2,210	90.5
1.1. Head	1,785	80.8
1.1.1. Wage	1,531	85.8
1.1.2. Bonus	254	14.2
1.2. Spouse	234	10.6
1.2.1. Wage	215	91.9
1.2.2. Bonus	19	8.1
1.3. Other members	191	8.7
1.3.1. Wage	177	92.8
1.3.2. Bonus	14	7.2
2. Business & subsidiary work income	106	4.3
2.1. Business income	86	81.4
2.1.1. Head	6	7.5
2.1.2. Spouse	68	79.3
2.1.3. Other members	11	13.2
2.2. Subsidiary work ¹⁾	20	18.6
3. Asset income	50	2.1
3.1 interest payment	20	40.5
3.2. Dividends	1	2.0
3.3. Rents	29	57.5
3.4. Other asset income	0	0.1
4. Transfers	75	3.1
4.1. Public transfers	23	30.5
4.1.1. Pensions	13	54.7
4.1.2. Other social benefits	10	45.3
4.2. Private transfers	52	69.5
II. Non-regular income	183	7.0
1. Gift money, etc. ²⁾	26	14.1
2. Sales of non-assets ³⁾	0	0.1
3. Other non-regular income ⁴⁾	157	85.8

1) Income from subsidiary work is income of a household member without a regular job. Income of a household member with a job is classified either as a labor income or a business income according to the nature of the income source.

2) Includes gift money in weddings, funerals, etc.

3) Income from sales of goods that are not assets, such as trash papers, etc.

4) Non-regular Income other than from gifts or sales of non-assets. Includes compensations for property loss or accidents and retirement pay. Retirement pay is, in nature, a part of labor income, but it is classified as non-regular income as it is given in lump sum.

Figure 1: Macroeconomic and Gini Index Trends in Korea

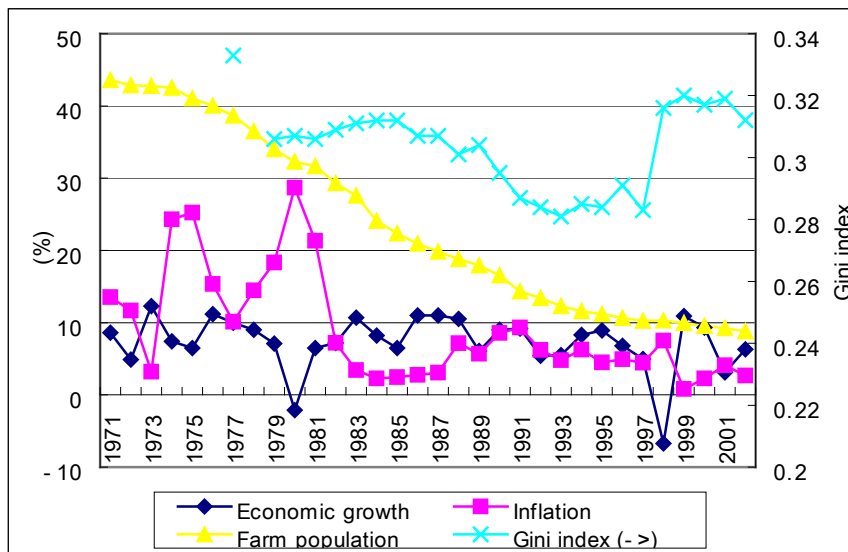


Figure 2: General Real Income Trends by Sources among Urban Worker Families

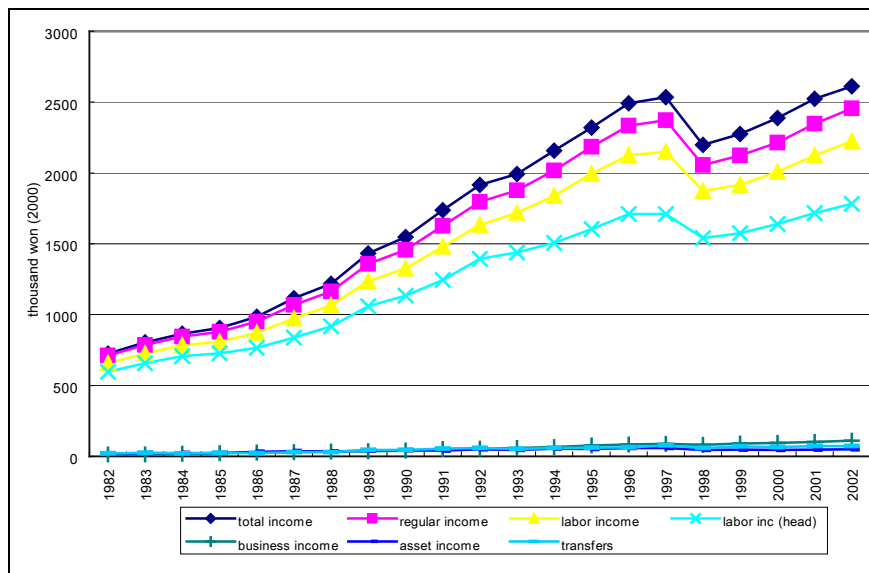


Figure 4: Trends of Major Inequality Indices: 1982~2002 (Ratios to Period Means)

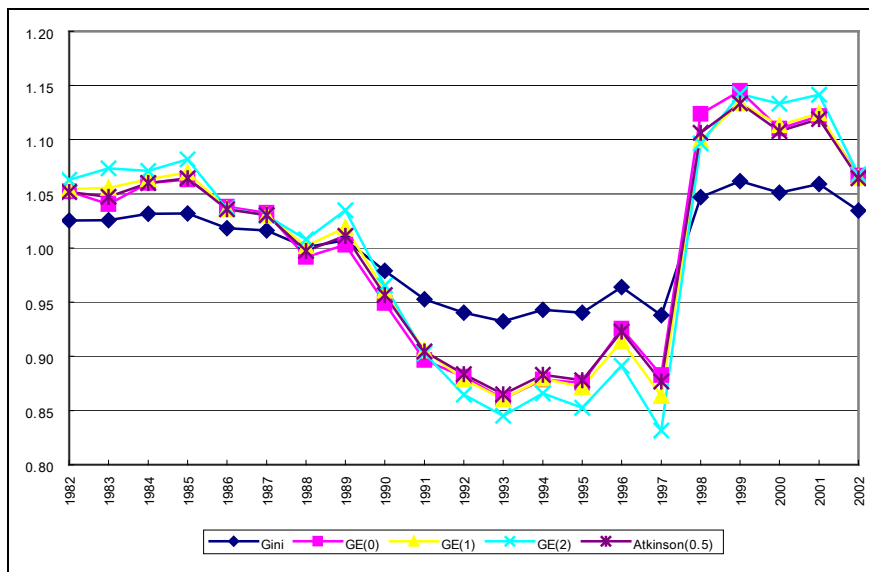


Figure 5: Trends of Total Income Deciles: 1982~2002

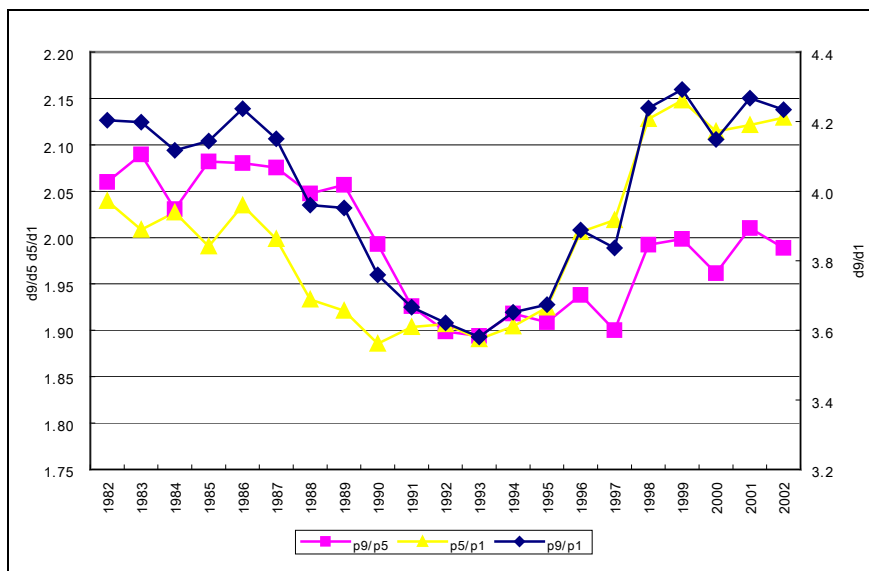


Figure 6: Gini index after Family Size Adjustment

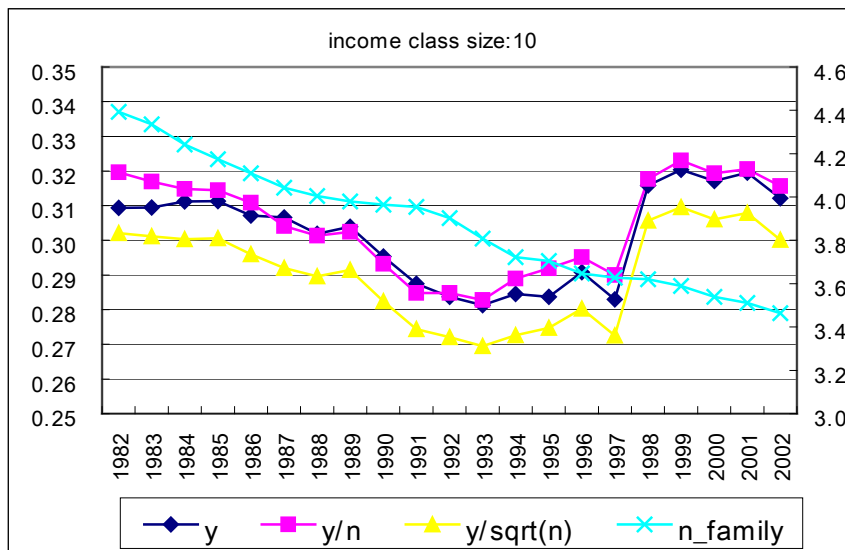


Figure 7: Sensitivity of Gini Index to Number of Income Groups

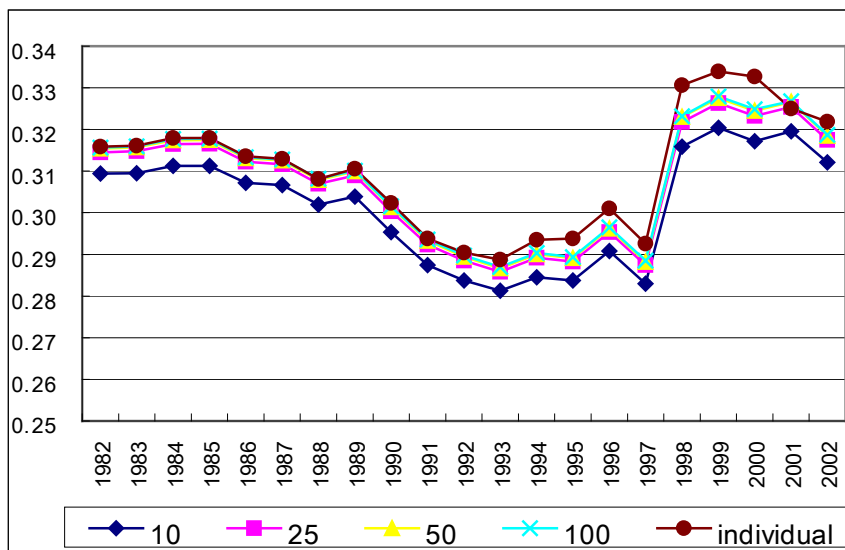
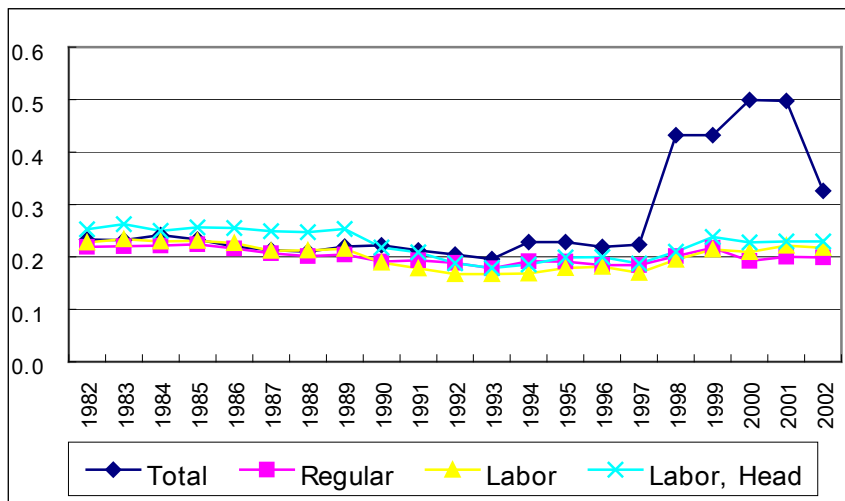


Figure 8A: Trend of GE(2) by Income Sources: Total, Regular, Labor, Head's Labor Income



note: Individual observations, incomes adjusted for household sizes.

Figure 8B: Trend of GE(2) by Income Sources: Asset, Business, Spouse & Other Members' Labor Income

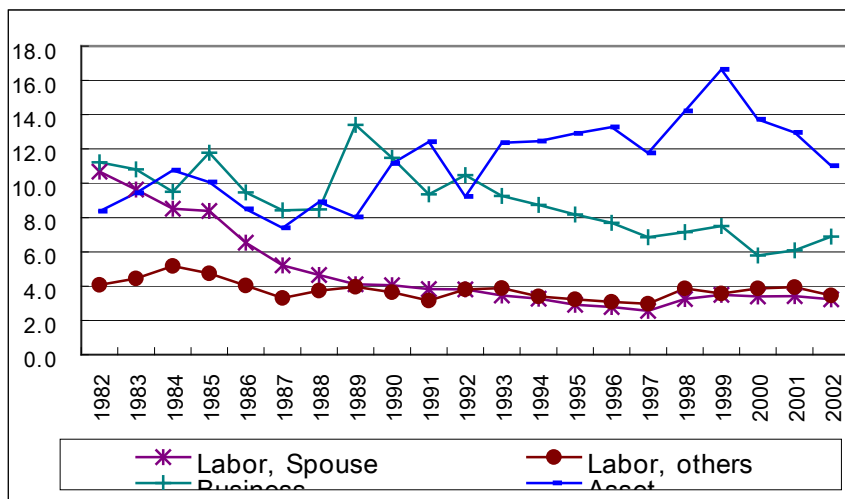


Figure 9A: Vertical Decomposition of Total Income Inequality between Regular and Non-regular Income

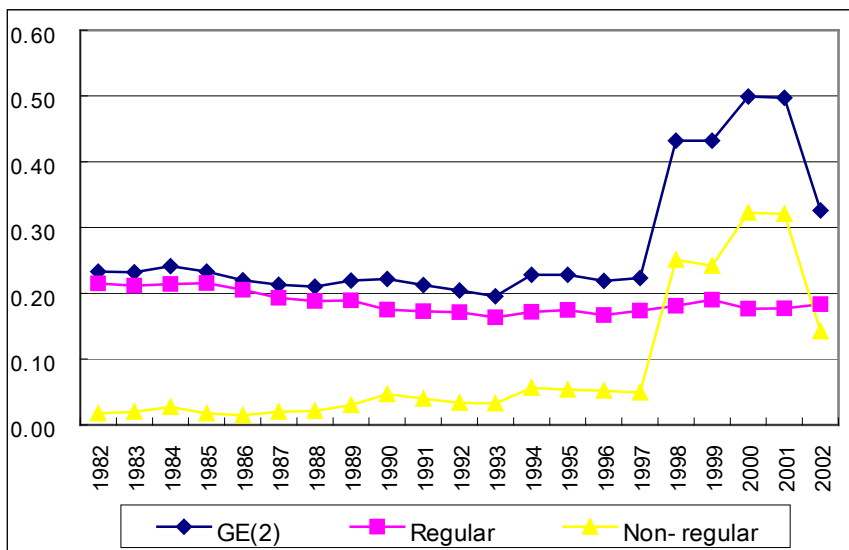


Figure 9B: Vertical Decomposition of Total Regular Income Inequality among Labor, Business, Asset, and Transfer Income Inequality

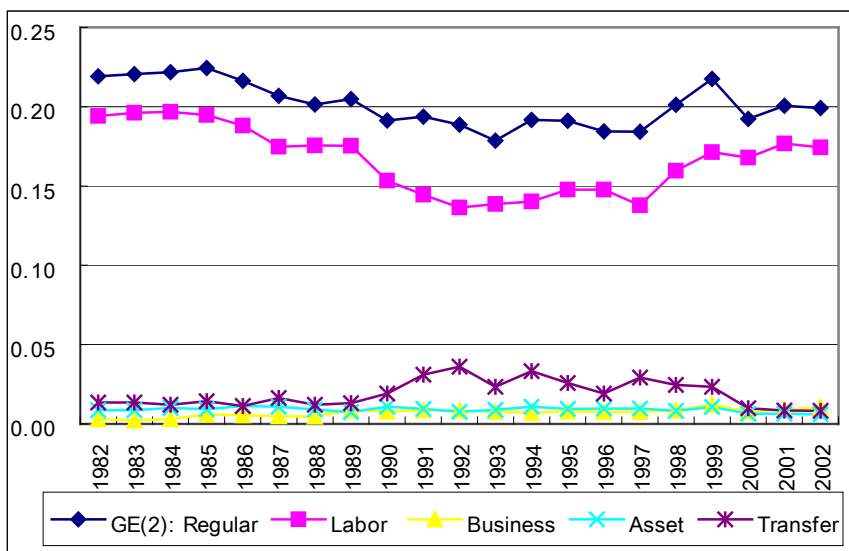


Figure 9C: Vertical Decomposition of Labor Income Inequality among Head, Spouse, and Other Members' Labor Income Inequalities

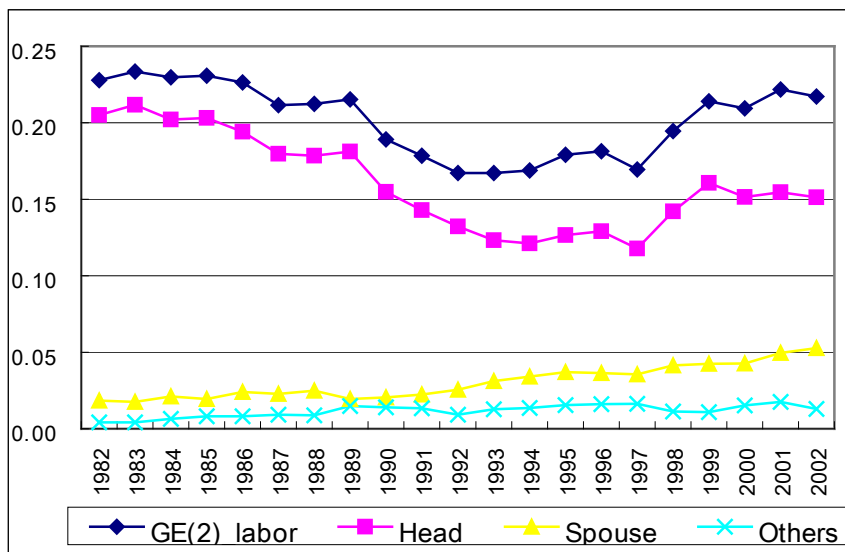


Figure 12: Horizontal Decomposition of GE(1) by Education: Head's Labor Income

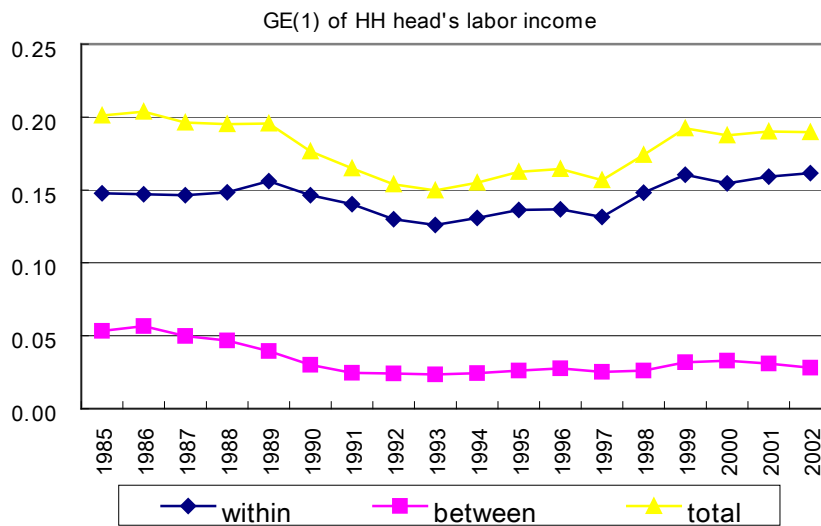


Figure 13: GE(1) of Head's Labor Income by Educational Classes

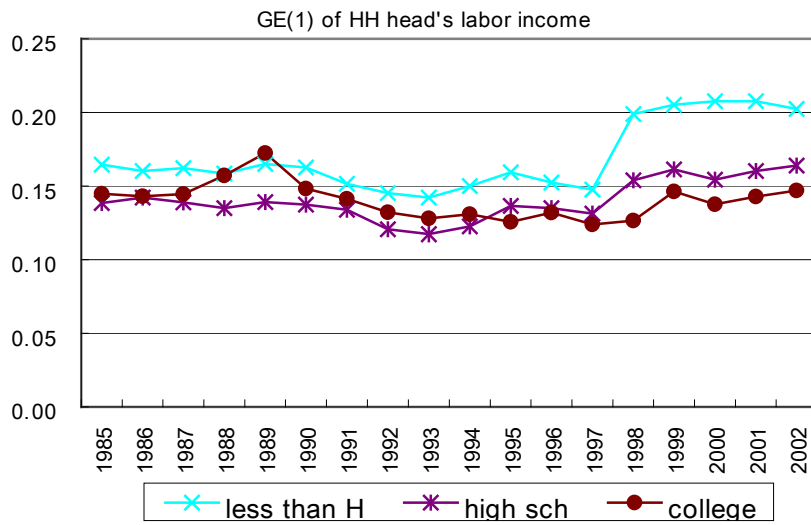


Figure 14: Decomposition of Head's Labor Income by Head's Age: GE(1)

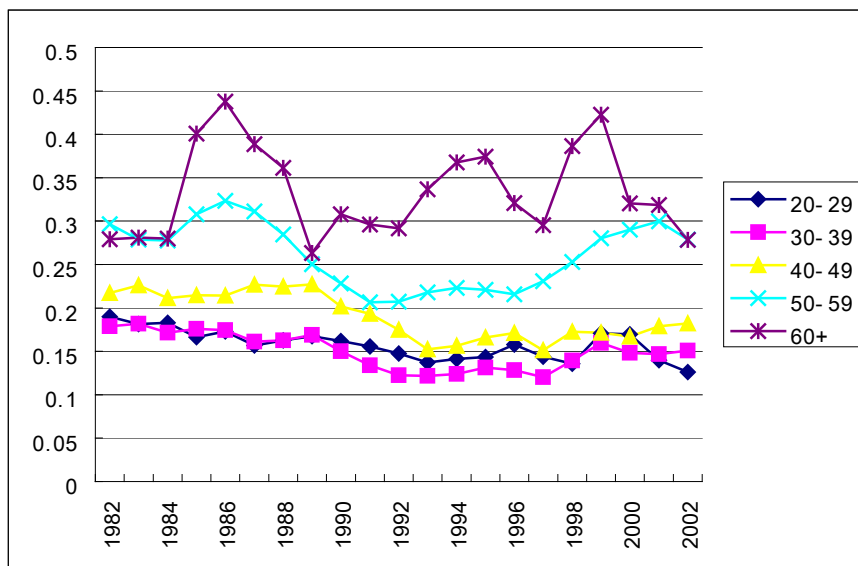


Figure 15: Decomposition of Head's Labor Income by Head's Sex: GE(1)

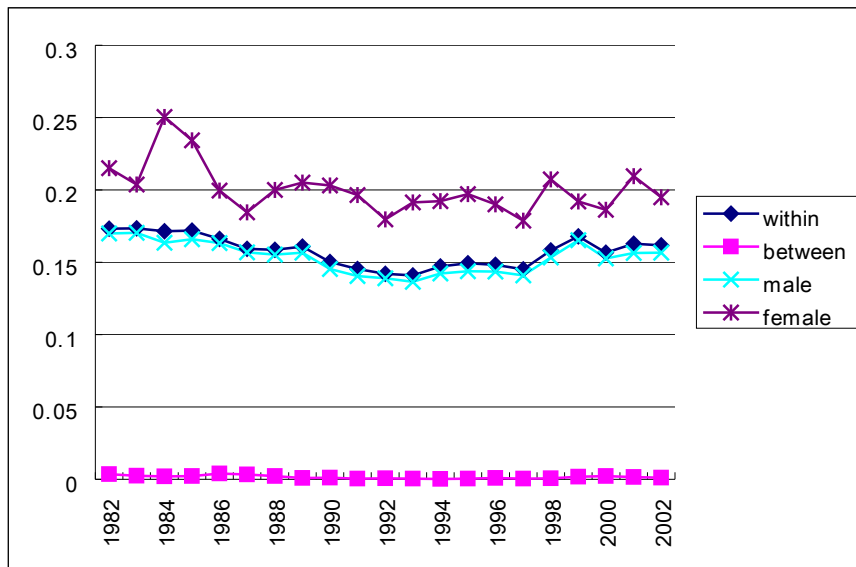
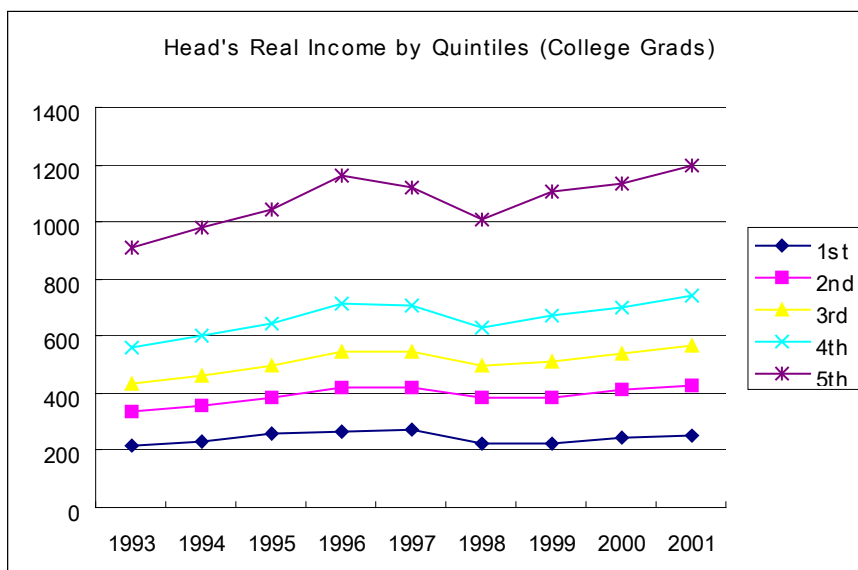
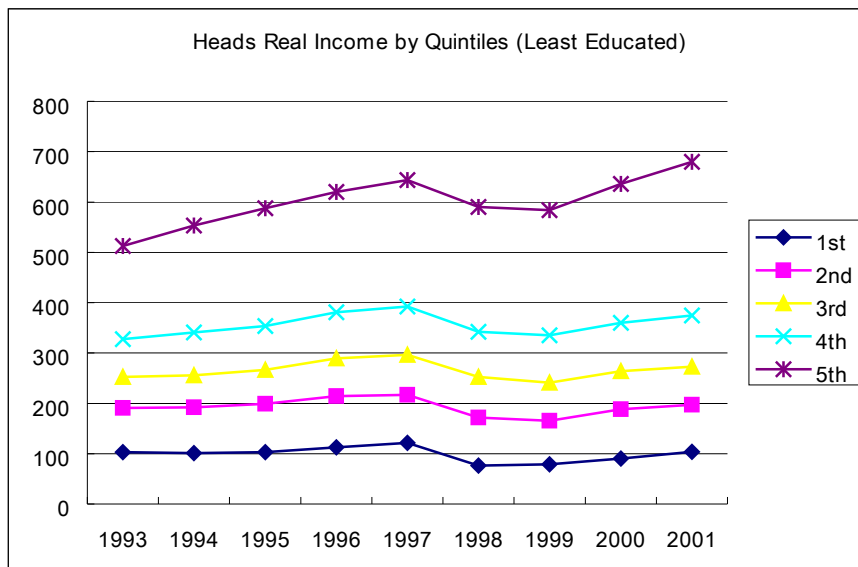
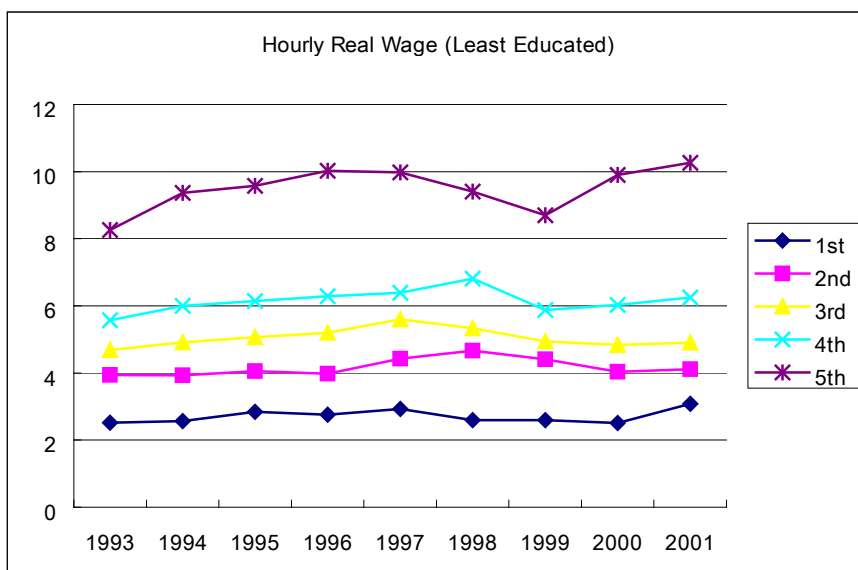
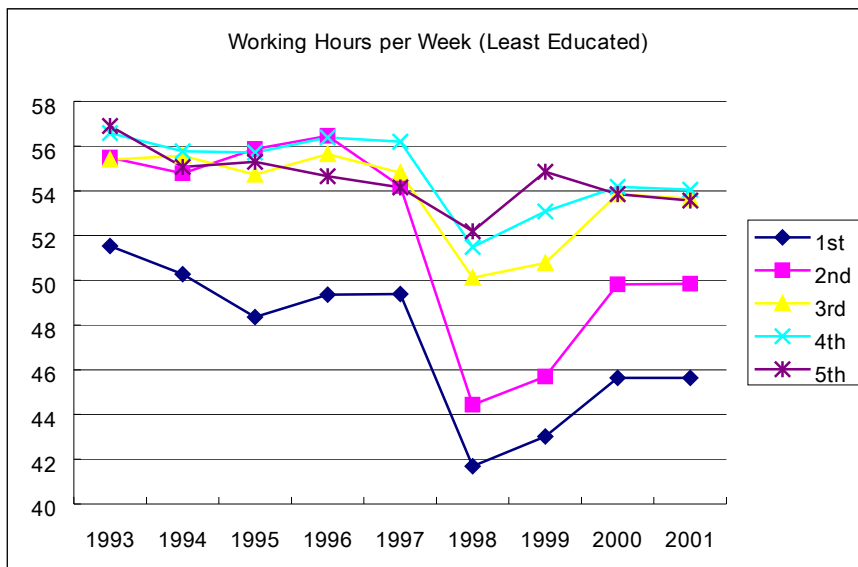


Figure 16: Head's Real Income Trend by Quartile Groups: The Least Educated and College Graduates Groups



**Figure 17: Head's Working Hours and Hourly Wage Rates by Quintile Groups:
The Least Educated Group**



**Figure 18: Head's Working Hours and Hourly Wage Rates by Quintile Groups:
College Graduates**

