Structural Changes in Household Income Inequality in Korea: A New Decomposition Including Labor Supply Changes

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This study estimates the relative contribution of each of the components of household income, including labor supply, to the observed changes in household income inequality between 1988 and 1999. For the period 1988 to 1993, reduced inequality in the hourly wages of heads was the dominant cause of the improvement in the household income distribution. For the period 1997 to 1999, on the other hand, changes in other incomes, along with changes in the wages of heads, was an important contributor to the widening of the income disparity. Changing hours of heads was also a nontrivial factor, accounting for 15% of the rise in income inequality during the period. The relative contribution of changing labor supply to the rise in income inequality after 1997 might be much greater, if the effects of changing employment of heads could be considered.

Keywords: Income inequality, Hours of work, Wages

JEL Classification: D31, J2, J3

I. Introduction

After nearly a decade of either declining or stable trend since the mid 1980s, the family income inequality in Korea sharply increased

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in the course of the financial crisis, and remained high even after the economy recovered from the recession. According to the estimate provided by Korea National Statistical Office based on the Household Income and Expenditure Survey, Gini ratio fell from 0.3115 in 1985 to 0.2817 in 1993, remained relatively stable between 1993 and 1997, and then rapidly rose from 0.2830 in 1997 to 0.3210 by 1999. Though Gini ratio slightly fell by the next year, it stayed as high as 3174. Similar patterns are found from other measures of income inequality, such as Atkinson's index, income shares by quintile, and percentiles ratio (Chung and Choi 2001; Yoo 1998, 2001; and Chung *et al.* 2002).[1]

As an important legacy of the financial crisis, the dramatic rise in the extent of income inequality has drawn a great deal of attention from economists.[2] In particular, a number of studies have analyzed the sources of the changes in the state of income distribution. A recent study by Chung *et al.* (2002, Chapter 3), for example, decomposed the sources of the increase in family income inequality between 1997 and 2000. They suggested that the change in the earnings of householders explains more than 100% of the observed increase in family income inequality. They also found that the rise in earnings inequality between 1997 and 2000 was largely accounted for by the growth in inequality within education or age group, rather than between-group or compositional changes.

Since earnings are determined by hours of work and hourly wages, an increase in the disparity in earnings may result from the following two sources: changes in the distributions of hourly wages and of hours worked. In spite of this simple formula for earnings inequality, the potential contribution of changes in hours and employment to earnings inequality has not been investigated. Even in the United States, for which finding the causes of the rise in income inequality during the 1980s was one of the most popular issues in the field of economics, only a few studies have examined

[1]Due to the lack of completely reliable income data that cover the entire households, there is no definite consensus regarding the trend of household income inequality in Korea, especially for the period prior to 1990. Ahn (1997), for instance, reported that the extent of income inequality rose during the 1980s, while many other studies found improvements in income distribution, at least from the mid-1980s (Kang and Hyun 2001).

[2]See Lee and Rhee (1999) for more general discussions of the origin and impacts of the Asian Currency Crisis.

the role of changing labor supply. Burtless (1990, 1993) and Moffitt (1990), for example, reported that the growth in annual earnings inequality for male workers during the 1970s and 1980s was primarily due to growing inequality in hourly wage rates. On the other hand, Haveman (1996) suggested that the increase in earnings inequality between 1973 and 1988 among working-age men was largely produced by increased variability in the amount that potential breadwinners worked.[3]

The previous studies on the U.S., mentioned above, have largely focused on male workers. However, patterns of individual labor force participation and of hours of work need to be understood in the context of joint decisions made by family members. For example, fewer working hours by a family head might be supplemented by increased hours worked by the spouse or other family members. The existing literature is nearly silent about how changes in employment and hours of family head and spouse jointly contributed to the family income inequality. Burtless (1993) considers this problem, but only incompletely. He ranks individuals into earnings quintiles according to family earnings rather than individual earnings, and calculates counterfactual mean earnings for each earnings quintile, assuming no change in the mean employment rate and hours of work in each earnings group. He assesses the contribution of the employment and hours changes by comparing the actual and counterfactual changes in Gini-ratio for the periods 1969-79. The study, after all, deals with *individual earnings* of men and women rather than *family earnings*. More recently, Lee (2000, 2001) contributed to the literature by developing a new decomposition method based on family income. This study found that changes in labor market activity of family heads accounted for half of the increased gap between families in the top and bottom income deciles.

The purpose of this paper is to estimate the relative contribution of change in each element of household income, including hours and employment of the head and spouse, to the changes in income inequality in Korea between 1988 and 1999. I use a matched micro

[3]These studies use variance of logarithm (VLN) of earnings as the measure of inequality. They decompose the VLN of earnings into (1) VLN of wage rates, (2) VLN of hours worked, and (3) a covariance term between the two. They then observed change in each factor over time to assess its relative contribution to the increase in the VLN of earnings.

sample of the Urban Household Expenditure Survey and the Economically Active Population Survey. As noted above, the extent of family income inequality fell from the mid-1980s and reached the lowest point in 1993. It remained stable from 1993 to 1997, jumped during the financial crisis, and then peaked in 1999. Accordingly, decompositions are made for the three sub-periods, 1988-93, 1993-7, and 1997-9. In particular, the decomposition analyses given below will focus on the periods 1988-93 and 1997-9 during which the measures of income inequality changed visibly. To my knowledge, the present study is the first attempt to decompose the changes in the family income inequality in Korea into the contributions of labor supply and wages.

The organization of this paper is as follows: I begin with developing a method of decomposing a change in family income in the next section. It will also introduce the data used in the analysis. Section III describes the pattern of changes in the elements of household income inequality. In section IV, I present the results of the decompositions, explaining how each of the components of household income contributed to the changes in income inequality. I also examine in the same section how the result changes where alternative measures of inequality are used. The final section summarizes the paper.

II. Method and Data

I begin with a decomposition of total household income into several components. The definition of variable representing each of the components is given in Table 1. The average monthly money income of households in a given income decile, denoted N, may be given as

$$N \equiv H_h W_h P_h + H_s W_s P_s \delta + Q \tag{1}$$

where H_h, H_s, W_h, and W_s stand for the mean monthly hours worked and the mean hourly wage rates for employed heads and spouses, respectively; P_h and P_s stand for the employment rates for heads and, if married, spouse; δ is the fraction of households in which both husband and wife are present; and finally, Q stands for the mean incomes from other sources.

TABLE 1
DEFINITION OF VARIABLES USED

Variable	Definition of Variable
N	Average monthly money income of households in a given income decile
H_h	Mean monthly hours worked by employed head of household
H_s	Mean monthly hours worked by employed spouse
W_h	Mean hourly wage rate of employed head of household
W_s	Mean hourly wage rate of employed spouse
P_h	Employment rate for heads of households
P_s	Employment rate for spouses
δ	The fraction of households in which both husband and wife are present
Q	The mean monthly income from other sources
*	The difference in the log of an income variable between two the top and the bottom income deciles; *e.g.*, $H_h^*=\ln(H_h^{TOP})-\ln(H_h^{BOTTOM})$
Φ_h	The weight of the income earned by the head of household
Φ_s	The weight of the income earned by spouse
Φ_Q	The weight of the income from other sources

As the measure of income inequality, I use the difference in the log of average household income between two income deciles, say, the top and the bottom income deciles. This measure, denoted by N^*, is the difference between the logarithm of the average income in the top decile and the logarithm of the average income in the bottom decile. That is, $N^*=\ln[N^{TOP}]-\ln[N^{BOTTOM}]$. Using an approximation, N^* can be decomposed as

$$N^* \approx \Phi_h(H_h^*+W_h^*+P_h^*)+\Phi_s(H_s^*+W_s^*+P_s^*+\delta)+\Phi_Q(Q^*) \tag{2}$$

where the asterisk denotes the difference in the logs of a variable in the top and bottom deciles of households. For example, $H_h^*=\ln[H_h^{TOP}]-\ln[H_h^{BOTTOM}]$. And Φ denotes the weight of each of the three income sources. For example, $\Phi_h[=(H_hW_hP_h)/N]$ indicates the earnings of the head as a proportion of the total household income.

It is possible to decompose the change in N^* over time, in this case, say, between 1997 and 1999, by differentiating equation (2) totally, to obtain

$$\begin{aligned}\Delta N^* \approx{}& \Phi_h \Delta H_h^*+\Phi_h \Delta W_h^*+\Phi_h \Delta P_h^*+\Delta \Phi_h(H_h^*+W_h^*+P_h^*)\\ &+\Phi_s \Delta H_s^*+\Phi_s \Delta W_s^*+\Phi_s \Delta P_s^*+\Phi_s \Delta \delta^*\\ &+\Delta \Phi_s(H_s^*+W_s^*+P_s^*+\delta^*)+\Phi_Q \Delta Q^*+\Delta \Phi_Q Q^*\end{aligned} \tag{3}$$

The first term on the right-hand side of equation (3), for example, represents the rate of change in the disparity in average hours worked by household heads in the top and bottom deciles, weighted by the relative share of household income derived from the earnings of the head. The estimate of this term will indicate the relative contribution of the change in average working hours of the head to the rise in the measure of income inequality between 1997 and 1999. Likewise, the second and third terms show the relative contributions of changes in hourly wages and in the employment rate of the head, respectively. On the other hand, the fourth term represents the effect of changing weight, that is, the relative importance of earnings of the household head as a source of income. If earnings of household heads are more unequally distributed than other sources of income, an increase in the share of earnings of the head in the total household income would produce a rise in the magnitude of inequality.

The balance of this paper is based on a matched sample of Urban Household Income and Expenditure Survey (UHS, hereafter) and Economically Active Population Surveys (EAP) for the years 1988, 1993, 1997, and 1999.[4] UHS provides information on the size of income from each source for urban households in which two or more persons reside. In spite of a number of limitations,

[4]The Economically Active Population Survey (EAP) is conducted during the week containing the 15th day of every month. The primary purpose of EAP is to collect up-to-date information on the economic status of the population and on changes in the activity pattern of the labor force. The sample to be surveyed is selected based on multistage cluster sampling method. The sample for the 2000 EAP, for instance, is drawn from approximately 22,029 ordinary enumeration districts (ED's) which are 10% of the 1995 Population and Housing Census. The ED's are reduced to Primary Sampling Units (PSU), to Secondary Sampling Units (SSU), and then to Ultimate Sampling Units, through three stages of sample selection. In 2000, for example, 29,529 households out of 1,231 PSU were selected as samples of the 1995 Population and Housing Census. The average number of households in the 2000 monthly survey was about 28,807 households. The purpose of the Urban Household Income and Expenditure Survey (UHS) is to collect information on urban households' income and expenditure for analyzing the variation in the levels of living and the disparities among the different socio-economic groups, and for obtaining weights for the construction of the consumer price index. The sample of UHS is based on the EAP sample. The average number of households in the 2000 monthly survey, for example, was about 5,216 households. See Korea National Statistical Office (2001a, 2001b) for more detailed features of the two surveys.

especially the incomplete coverage of the population, UHS is the most widely used source for measuring the extent of income inequality in Korea.[5] The information on employment and hours of work for household heads and spouses comes from EAP.[6] The sample used in this study is a selected sample of UHS. The households for which the information on income is missing and those not matched to EAP are excluded from the sample. The number of households included in the sample to be used is 33,671 for 1988 (66% of the entire UHS sample), 39,988 for 1993 (66%), 38,590 (63%) for 1997, and 33,928 for 1999 (59%).[7]

For studying the change in income inequality, it would be ideal to use the sample of all persons regardless of employment status. Since UHS does not report income for households whose heads are not employed, however, the analysis in this paper has to rely on the sample of households with employed heads. Accordingly, the decomposition method presented in equation (3) is modified as follows, excluding the term representing the contribution of change in employment of household heads.

$$\begin{aligned} \Delta N^* \approx\ & \Phi_h \Delta H_h^* + \Phi_h \Delta W_h^* + \Delta \Phi_h (H_h^* + W_h^*) \\ & + \Phi_s \Delta H_s^* + \Phi_s \Delta W_s^* + \Phi_s \Delta P_s^* + \Phi_s \Delta \delta^* \\ & + \Delta \Phi_s (H_s^* + W_s^* + P_s^* + \delta^*) + \Phi_Q \Delta Q^* + \Delta \Phi_Q Q^* \end{aligned} \tag{4}$$

As in other studies based on UHS, it should be noted that this study only deals with the income inequality of the urban households with two or more persons and an employed head.[8]

[5]By excluding single-person households and rural households, UHS represents 63.8% of the entire households. Furthermore, about 60% of the sample households are questioned their incomes. Therefore, less than 40% of the entire households are covered by the income statistics provided in UHS (Kang and Hyun 2001).

[6]It reports the hours worked for the week preceding the survey. The monthly hours of work was calculated by multiplying the weekly hours by four, assuming no changes in the hours for the entire month.

[7]The sample for each year was constructed by pooling the data for monthly surveys. Therefore, different monthly surveys for the same household, interviewed multiple times during the survey year, are counted as different observations.

[8]A drawback of the inequality measure used in this study is that it does not take into account the difference in the size of the households between income deciles. If the average size of rich and poor households changed in

III. Changes in the Components of Household Income, 1988-99

It is well documented that various measures of household income inequality fell between 1988 and 1993, remained stable from 1993 to 1997, and then rose sharply thereafter. The income gap between the top and bottom income deciles, the primary measure of household income inequality employed in this study, shows a similar pattern.[9] As presented in Figure 1, the average income of low-income households grew faster than that of high-income households between 1988 and 1993. During this period, the average income of the bottom 10% households increased by 140%, as compared to a 110% increase among the households in the top income decile. As a consequence, the difference in the log of the total household income between the top and bottom deciles, denoted N^* above, dropped by 0.13. During the following six years, on the other hand, the disparity in household income remained nearly unchanged: the average household income for the top and bottom deciles increased by, respectively 54% and 55%. After the financial crisis, in contrast to the years prior to 1993, the average income for the bottom 10th household fell sharply (-20%), while the income for households in the top decile grew at a respectable rate (10.5%). Accordingly, N^* increased by 0.32 between 1997 and 1999.[10]

Figure 2 indicates that shift in the hourly wage rates of household heads (W_h) was a highly important cause of the changes in the household income inequality between 1988 and 1993, and

a different manner, the observed change in the measure of household income inequality may distort the actual change in the disparity in economic well-being. As presented at the bottom of Appendix Table, however, the pattern of change in the household size is highly similar across different income deciles. Therefore, the potential problem arising from ignoring the equivalence scale should not be serious.

[9]Each component of the average household income for each of income deciles is reported in Appendix Table.

[10]If household income per capita is used, the pattern of changes over time in the extent of income inequality and the results of decomposition of changing income disparity do not change much, because the difference in the average household size between the poor and the rich remained stable over time. See Appendix Table.

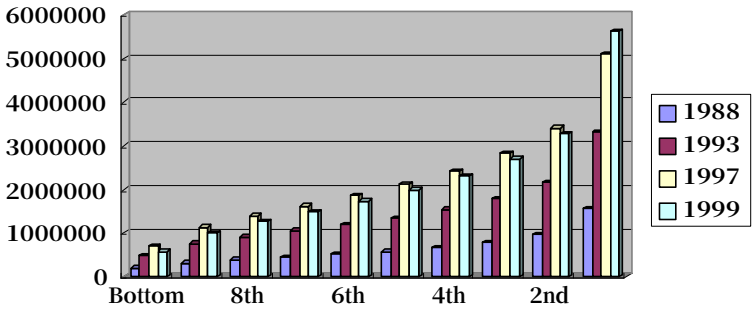

FIGURE 1
AVERAGE MOMTHLY FAMILY INCOME (WON)

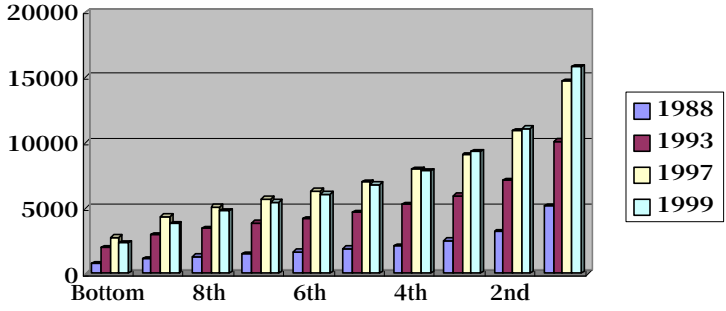

FIGURE 2
AVERAGE HOURLY WAGE FOR EMPLOYED HEADS

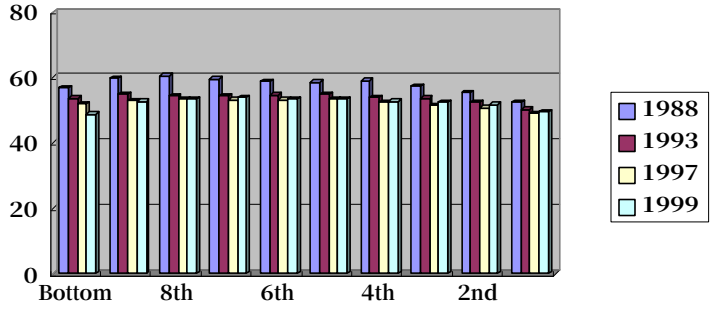

FIGURE 3
WEEKLY HOURLY WAGE FOR EMPLOYED HEADS

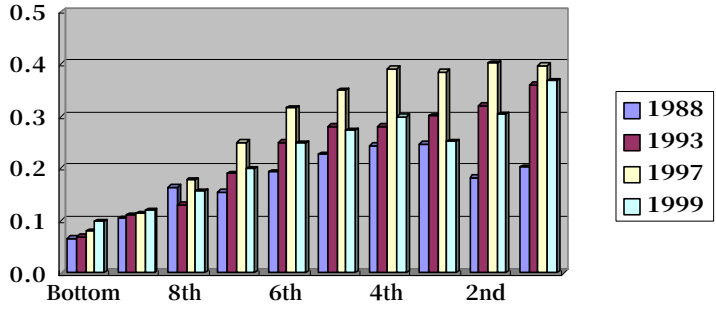

FIGURE 4

PROPORTION OF EMPLOYED SPOUSES

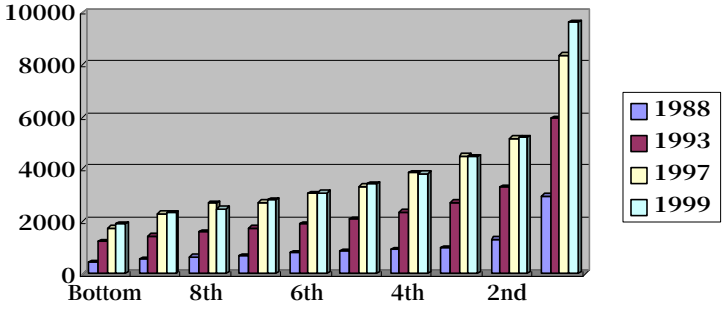

FIGURE 5

AVERAGE HOURLY WAGE FOR EMPLOYED SPORSES

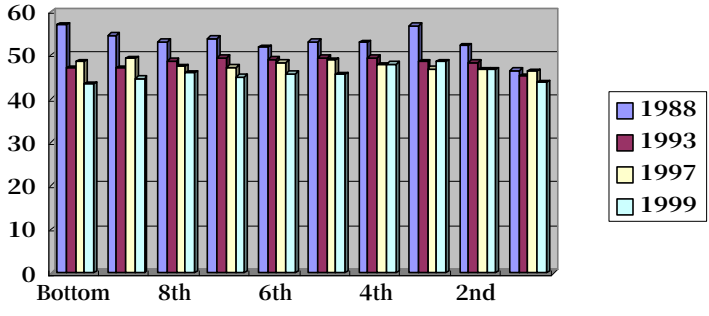

FIGURE 6

WEEKLY HOURS FOR EMPLOYED SPORSES

between 1997 and 1999. From 1988 to 1993, W_h grew by 176% for the heads of the bottom 10% households; the growth rate of W_h was only 97% for the heads of the richest 10% households. Between 1997 and 1999, on the other hand, W_h for the top 10% households increased by 7%, while W_h for the bottom income decile dropped 17%. Since the earnings of household heads account for a dominant fraction of the total household income, these uneven changes in W_h should have exerted a strong effect on the trend of income inequality.

The weekly hours of work for employed heads (H_h), as presented in Figure 3, substantially declined during the period under investigation. For the period between 1988 and 1993, the magnitude of the decline in H_h was relatively even across different income deciles, 6% and 4.5% for the bottom and top income deciles, respectively. Therefore, the change in H_h should have been a mild countervailing force of the decline in the income gap between the rich and the poor for this period. For the period from 1997 to 1999, H_h fell for the lowest 10% households (-6%), while it remained stable for the top income decile. We may predict from this pattern that uneven change in H_h was at least partly responsible for the rise in the household income inequality after 1997.

Over the period under study, the hourly wage for employed spouse (W_s) grew even more rapidly than W_h. Figure 4 shows that for the period between 1988 and 1993 the pattern of the change in W_s was similar to that of W_h; a much greater increase for the bottom income decile (180%) in comparison with the rise for the top income decile (100%). For the period 1997-9, however, W_s increased evenly across different income deciles, different from W_h of which growth was largely concentrated in high-income households. For this period, therefore, the change in W_s should not be a major source of the rise in the household income inequality.

As the female labor-force participation rate increased, the proportion of employed spouses (P_s) rose considerably, especially between 1988 and 1993. As indicated by Figure 5, the rise in P_s was generally more pronounced among high-income households. For the top income decile, P_s increased from 20% to 36% between 1988 and 1993. On the other hand, there was no gain for wives in the lowest 10% households. During the period from 1997 to 1999, P_s increased from 8% to 10% for the lowest income decile, while it

fell by 3% for the richest 10% households. These patterns indicate that the labor-force participation of spouses changed in the opposite direction of the shifts in household income inequality. Such a countervailing effect was particularly strong for the period between 1988 and 1993, in which the decline in the income gap between the rich and the poor would have been even greater had there been no change in P_s.

The average weekly hours of work of employed spouses (H_s) have diminished even more rapidly than H_h since 1988. Figure 6 shows that the decline in H_s was considerably greater for spouses in low-income households, who initially worked longer, than for those in high-income households. For the period between 1988 and 1993, in particular, H_s fell as much as 13% for the bottom 10% households, while H_s of the households in the top income decile decreased only by 3%. From 1997 to 1999, the fall in H_s was larger for the high-income households than for the poor, but only by a relatively small margin. This implies that the changes in H_s limited the extent of the improvement in household income inequality for the period 1988-93, and offset the effects of other factors leading to the widening of the income disparity for the years 1997 through 1999.

Other income (Q) is calculated as the difference between the average total household income and the average earnings of heads and spouses. Thus, it includes earnings of other household members and non-labor incomes. Between 1988 and 1993, the rate of increase in Q was much higher for the households in the top income decile (142%) than for the lowest income decile (41%). Thus, the change in Q in those years should have played the role of a countervailing factor of declining income inequality. For the period 1997-9, too, the change in Q should have had a considerable effect on household income inequality, because it rose 18% for the top decile, and fell 19% for those in the bottom 10% households. Finally, the proportion of households whose heads are married (δ) should have had little effects on the household income inequality, because it changed in a similar manner for both the rich and the poor.

IV. Decomposition of the Changes in Household Income Inequality

The patterns of the changes over time in the components of household income, reviewed in the preceding section, allow us to predict the direction of their contributions to the shift in household income inequality. For instance, it was suggested that hourly wages of heads should have been a major factor that caused the decline in household income inequality between 1988 and 1993, and the dramatic turnaround of the trend after financial crisis. Also, it was anticipated that the changes in the hours of work for heads should have contributed to the widening of the income gap between the rich and the poor for the period 1997 to 1999. In this section, I analyze in detail how changes in each of the components contributed to the shifts in the household income inequality. I begin with a baseline decomposition of the changes in the difference in the log of the total household income between the top and bottom income deciles, based on equation (4).

A. Income Gap between the Top and Bottom Income Deciles

a) 1988-93

For the period between 1988 and 1993, in which the difference in the log of income dropped by 0.13, it turns out that reduced inequality in the hourly wages of heads explains more than 100% of the decline in the measure of household income inequality. In fact, had there been no changes in other factors, the change in W_h would have produced a decline in the measure of income inequality twice as large as the actual decline in magnitude. The change in the wages of employed spouses (W_s) played a supporting role, accounting for another 15% of the decrease in the income gap. The strong equalizing effect of the changes in wages was offset to a considerable extent by the changes in other components of household income. In particular, the shifts in other incomes (Q) and the share of the earnings of spouses (Φ_s) eliminate, respectively, 78% and 58% of the overall decline in the measure of inequality. The distribution of Q became more unequal, leading to a rise in income inequality.[11] An increase in the share of spouse's

[11]The difference in the log of other income between the top and the bottom income deciles increased by 0.538 between 1988 and 1993.

TABLE 2

A DECOMPOSITION OF THE CHANGE IN HOUSEHOLD INCOME INEQUALITY, 1988-93 AND 1997-9: DIFFERENCE IN INCOME BETWEEN THE TOP AND BOTTOM DECILES

Variable	1988-93		1997-9	
	Estimate	Contribution	Estimate	Contribution
(1) ΔH^*	-0.1299	100.00	0.3239	100.00
(2) $\Phi_h \Delta H_h^*$	0.0096	-7.38	0.0481	14.86
(3) $\Phi_h \Delta W_h^*$	-0.2523	194.27	0.1742	53.76
(4) $\Delta \Phi_h (H_h^* + W_h^*)$	-0.0111	8.53	-0.0273	-8.44
(5) $\Phi_s \Delta H_s^*$	0.0094	-7.20	0.0044	1.34
(6) $\Phi_s \Delta W_s^*$	-0.0200	15.40	0.0048	1.48
(7) $\Phi_s \Delta P_s^*$	0.0337	-25.92	-0.0221	-6.83
(8) $\Phi_s \Delta \delta^*$	-0.0004	0.30	-0.0054	-1.66
(9) $\Delta \Phi_s (H_s^* + W_s^* + P_s^* + \delta^*)$	0.0673	-51.86	0.0126	3.89
(10) $\Phi_Q \Delta Q^*$	0.1018	-78.37	0.0920	28.41
(11) $\Delta \Phi_Q Q^*$	-0.0399	30.73	0.0331	10.21
(12) ε	-0.0279	21.48	0.0096	2.97
Labor Supply: (2)+(5)+(7)	0.0526	-40.49	0.0303	9.37
Wage: (3)+(6)	-0.2723	209.67	0.1790	55.25
Composition: (4)+(9)+(11)	0.0164	28.16	0.0183	5.66

earnings affected the measure of inequality in the same direction, because it was more unequally distributed than the total household income.[12] In addition, the change in the proportion of employed spouses (P_s), which resulted from the dramatic rise in the labor-force participation of spouses in higher-income households, offsets another 25%. Meanwhile, a decline in the share of other income (Φ_Q) reduced the measure of inequality, because its distribution was more unequal than that of the total income.

[12]Although the earnings of *employed* spouses are more equally distributed than the total household income, the proportion of households with employed spouses is much lower among the poor than among high-income households.

b) 1997-9

For the period between 1997 and 1999, too, the change in the wages of heads (W_h) was the major reason for the rise in income inequality, although its relative contribution (54%) was much smaller than in the previous five years. An increase in the inequality in other incomes (Q) made a considerably large contribution (28%) to the widening of the income gap. A rise in the share of other income (Φ_Q) explains another 10%. It is also notable that changing hours of heads (H_h) was a nontrivial factor, accounting for 15% of the increase in the measure of inequality. On the other hand, a decline in the share of heads' earnings (Φ_h) was a countervailing factor; the increase in the measure of inequality would have been 8% greater without it.

B. Right Tail vs. Left Tail of the Income Distribution

A widening (reduction) of the income disparity between the top and bottom income deciles could result from either a faster (slower) growth of income of the richest 10th households or deterioration (improvement) of the position of the lowest 10th households, in comparison with the households in the middle. Likewise, the relative contribution of each of the components of household income could come from either left or right tail of the income distribution. Similar decompositions, also based on equation (4), are conducted separately for the differences in the log of income between the top 10th and the average, and between the average and the bottom 10th households. The results are reported in Tables 3 and 4.

a) 1988-93

For years 1988 to 1993, the overall decline in income inequality comes equally from both tails of the income distribution [see raw (1) in Tables 3 and 4]. The effect of changing wages of heads (W_h) was also evenly allocated in both sides [see raw (3) in Tables 3 and 4]. However, the contribution of the change in other income (Q), the most important countervailing factor of the decline in the inequality, is largely concentrated in the lower half of the distribution [see raw (10) in Table 3 and 4]. The change in the weight of other income (Φ_Q) reduced the dispersion of incomes only for the right-hand side of distribution. At the opposite side, it

TABLE 3

A DECOMPOSITION OF THE CHANGE IN HOUSEHOLD INCOME INEQUALITY, 1988-93 AND 1997-9: DIFFERENCE BETWEEN THE INCOME OF THE TOP DECILE AND THE AVERAGE INCOME

Variable	1988-93		1997-9	
	Estimate	Contribution	Estimate	Contribution
(1) ΔN^*	-0.0653	100.00	0.1277	100.00
(2) $\Phi_h \Delta H_h^*$	0.0178	-27.18	0.0045	3.49
(3) $\Phi_h \Delta W_h^*$	-0.1236	189.19	0.0457	35.75
(4) $\Delta \Phi_h (H_h^* + W_h^*)$	-0.3622	55.44	0.0020	1.53
(5) $\Phi_s \Delta H_s^*$	0.0049	-7.45	-0.0023	-1.82
(6) $\Phi_s \Delta W_s^*$	-0.0226	34.60	0.0076	5.95
(7) $\Phi_s \Delta P_s^*$	0.0285	-43.59	0.0147	11.49
(8) $\Phi_s \Delta \delta^*$	-0.0008	1.19	-0.0012	-0.98
(9) $\Delta \Phi_s (H_s^* + W_s^* + P_s^* + \delta^*)$	0.0339	-51.84	-0.0120	-9.39
(10) $\Phi_g \Delta Q^*$	0.0121	-18.47	0.0595	46.57
(11) $\Delta \Phi_g Q^*$	0.0215	-32.96	0.0101	7.92
(12) ε	-0.0007	1.08	-0.0007	-0.52
Labor Supply: (2)+(5)+(7)	0.0511	-78.23	0.0168	13.16
Wage: (3)+(6)	-0.1462	223.78	0.0533	41.71
Composition: (4)+(9)+(11)	0.0192	-29.36	0.0001	0.07

actually increased the inequality. The result shows that the overall contributions of H_h and Φ_h were small, because these variables in each side changed in the opposite directions [see (2) and (11) in Tables 3 and 4].

b) 1997-9

For these years, about 60% of the increase in the income difference between the top and bottom 10th households were produced by deterioration of the position of the poorest 10th relative to the average household. This confirms the results of earlier studies reporting that the sharp rise of income inequality among urban working families was mainly due to the collapse of

TABLE 4

A DECOMPOSITION OF THE CHANGE IN HOUSEHOLD INCOME INEQUALITY, 1988-93 AND 1997-9: DIFFERENCE BETWEEN THE AVERAGE INCOME AND THE INCOME OF THE BOTTOM DECILE

Variable	1988-93		1997-9	
	Estimate	Contribution	Estimate	Contribution
(1) ΔN^*	-0.0646	100.00	0.1962	100.00
(2) $\Phi_h \Delta H_h^*$	-0.0102	15.81	0.0473	24.09
(3) $\Phi_h \Delta W_h^*$	-0.1257	194.77	0.1357	69.17
(4) $\Delta \Phi_h (H_h^* + W_h^*)$	0.0202	-31.36	-0.0006	-0.33
(5) $\Phi_s \Delta H_s^*$	0.0049	-7.63	0.0051	2.62
(6) $\Phi_s \Delta W_s^*$	-0.0033	5.07	-0.0006	-0.31
(7) $\Phi_s \Delta P_s^*$	0.0112	-17.34	-0.0279	-14.23
(8) $\Phi_s \Delta \delta^*$	0.0001	-0.21	-0.0038	-1.93
(9) $\Delta \Phi_s (H_s^* + W_s^* + P_s^* + \delta^*)$	0.0214	-33.12	0.0047	2.41
(10) $\Phi_Q \Delta Q^*$	0.0743	-115.09	0.0309	15.73
(11) $\Delta \Phi_Q Q^*$	-0.0488	75.61	-0.0024	-1.24
(12) ε	-0.0087	13.51	0.0079	4.03
Labor Supply: (2)+(5)+(7)	0.0059	-9.17	0.0245	12.47
Wage: (3)+(6)	-0.1290	199.83	0.1351	68.86
Composition: (4)+(9)+(11)	-0.0072	11.13	0.0017	0.85

low-income households (Chung *et al.* 2002). For the upper half of the income distribution, the change in other income (Q), was the major cause of rising inequality. Growing disparity in Q accounts for the largest portion (47%) of the increased income gap. The increase in the weight of other income (Φ_Q) explains another 8%. On the other hand, changing wages of heads are responsible for 36% of the increase in the inequality. For the poorer side of the income distribution, changing wages of heads account for nearly 70% of the observed increase in income inequality. The the relative decline in the hours of work among heads of low-income households was the second most important factor, explaining 24%. Finally, rise in the disparity in other incomes (Q) contributed to a considerable extent (16%) to the rise in the income inequality.

TABLE 5

A DECOMPOSITION OF THE CHANGE IN HOUSEHOLD INCOME INEQUALITY, 1988-93 AND 1997-9: DIFFERENCE IN INCOME BETWEEN THE SECOND AND NINTH INCOME DECILES

Variable	1988-93		1997-9	
	Estimate	Contribution	Estimate	Contribution
(1) ΔN^*	-0.0628	100.00	0.0869	100.00
(2) $\Phi_h \Delta H_h^*$	0.0197	-31.38	0.0196	22.51
(3) $\Phi_h \Delta W_h^*$	-0.1266	201.61	0.1156	133.07
(4) $\Delta \Phi_h (H_h^* + W_h^*)$	-0.0129	20.60	0.0164	18.89
(5) $\Phi_s \Delta H_s^*$	0.0038	-6.07	0.0065	7.43
(6) $\Phi_s \Delta W_s^*$	-0.0016	2.59	-0.0009	-9.98
(7) $\Phi_s \Delta P_s^*$	0.0293	-46.68	-0.0249	-28.65
(8) $\Phi_s \Delta \delta^*$	-0.0022	3.57	0.0024	2.74
(9) $\Delta \Phi_s (H_s^* + W_s^* + P_s^* + \delta^*)$	0.0317	-50.52	-0.0195	-22.44
(10) $\Phi_Q \Delta Q^*$	0.0083	-13.22	-0.0222	-25.56
(11) $\Delta \Phi_Q Q^*$	-0.0069	10.93	-0.0123	-14.21
(12) ε	-0.0054	8.57	0.0063	7.20
Labor Supply: (2)+(5)+(7)	0.0528	-84.13	0.0011	1.30
Wage: (3)+(6)	-0.1282	204.21	0.1148	132.07
Composition: (4)+(9)+(11)	0.0173	-19.00	-0.0154	-17.76

C. Income Gap between the 2nd and 9th Deciles

The difference in the log of income between the top and bottom 10th households, used above as the measure of household income inequality, may not deliver the full picture of changing inequality. By focusing on the gap between the richest and the poorest, in particular, it fails to capture any changes in the middle of the income distribution. In order to supplement this weakness, at least partially, a similar decomposition method is applied to the difference in income between the second and ninth income deciles. The result is reported in Table 5.

a) 1988-93

The decline in the difference in the log of income between the second and ninth deciles (-0.0628) was about half in magnitude of the reduced income gap between the top and lowest 10th households. The results of the decomposition are generally similar to those for the difference between the first and tenth deciles, reported in Table 2. The change in the wages of heads was the dominant factor of reduced income disparity. Growing relative importance of spouses' earnings was the biggest countervailing factor of the trend toward a more equal distribution of income. There are, however, some notable differences, too. The absolute size of the effect of changes in other income (Q) was relatively small in this case (-13%), compared to the result for the difference between the top and bottom deciles (-78%). In addition, the equalizing effect of increasing weight of other income (Φ_Q) was smaller (11% *vs.* 31%). This result, if combined with the result of the decomposition separately performed for each side of the income distribution (reported in Tables 3 and 4), implies that the relatively strong effect on inequality of the changes in Q is largely explained by the relative decline of Q among the lowest 10th households.

b) 1997-9

The rise in the difference in the log of income between the second and ninth deciles for this period (0.0869) was only 27% of the increased difference in income between the top and lowest 10th households. Since the increase in inequality was much more pronounced among the households on the lower side of the income distribution, this result implies that the relative decline of the lowest 10th households was the key factor of the growing income inequality during this period. Compared to the case of the difference between the top and bottom deciles, changing wages of heads (W_h) explain much larger fraction, more than 100%, of the rise in inequality. The relative contribution of changing hours of heads (H_h) was greater (23%). As oppose to the result for the difference between the top and bottom deciles, the effect of changes in other income (Q), in terms of its distribution and relative share, was negative.[13]

[13]Similar decomposition analyses were conducted, using quintile, instead of decile, as the unit of dividing households according to income. The

V. Conclusions

The dramatic rise in various measures of income in Korea after the financial crisis is drawing increasing attention from economists. Although a few studies have examined the sources of changing income disparity, the role of labor supply has not been investigated. This study has developed a new method of decomposing the changes in household income into several components, including the shifts in employment and hours worked of heads and spouses of households, and estimated the relative contribution of each of the components to the observed changes in household income inequality between 1988 and 1999. Matched samples of Urban Household Income and Expenditure Survey and Economically Active Population Survey for the years 1988, 1993, 1997, and 1999 were used in the analysis.

The difference in the log of income between the top and bottom income deciles, the primary measure of household income inequality used in this study, dropped by 0.13 between 1988 and 1993, remained stable from 1993 to 1997, and then increased by 0.32 from 1993 to 1999. For the period 1988 to 1993, reduced inequality in the hourly wages of heads was the single most important cause of the improvement in the household income distribution. In fact, had there been no changes in other factors, the change in the wages of heads would have produced a decline in the measure of inequality twice as large as the actual decline in magnitude. The strong equalizing effect of the changes in wages was offset to a considerable extent by shifts in other incomes and the share of earnings of spouses. For the period 1997 to 1999, on the other hand, changes in other income, along with changes in the wages of heads, was a considerably important contributor to the widening of the income disparity. Changing hours of heads was a nontrivial factor, accounting for 15% of the rise in income inequality.

During the years 1988 to 1993, the overall decline in the

results for decomposing the changes in the disparity in income between the top and bottom quintiles, as can be expected, are placed halfway between the results for the top and bottom deciles and for second and ninth deciles. For instance, changes in wages and hours worked of heads explain, respectively, 67% and 16% of the rise in the disparity in income between the top and bottom 20% households.

measure of income inequality comes equally from both tails of the income distribution. Diminished wage disparity among household heads was responsible for the shrinking of the spread on both sides of the income distribution. In the years 1997 to 1999, on the other hand, the sharp rise of income inequality was largely due to the collapse of low-income households. For the upper half of the income distribution, the rise in the disparity in other income was the major cause of the widening of income gap between the richest 10th households and those in the middle. For the lower side of the income distribution, the change in wages was the most important factor that produced the increase in the disparity between the poorest 10th and average households. If the difference in the log of income between households in the second and ninth deciles is used as the measure of income inequality, changes in the wages of heads still stand out as the dominant factor of the shifts in income inequality.

Since the earnings of heads account for the lion's share of the total household income and only the households with employed heads are included in the sample, it is not too surprising to observe that change in the wages of heads emerged as the most important contributor to the shifts in income inequality. Meanwhile, it is not a fully predictable result that changes in other incomes, in terms of the share in the total household income and the state of distribution, had a large effect on the rise in income inequality between 1997 and 1999. It is also notable to find that the change in the hours worked accounts for a respectable fraction of the rise in the measure of income inequality between 1997 and 1999.

In interpreting the results, the effect of changing labor supply calls for a closer attention. It is well documented that the unemployment rate soared during the economic recession following the financial crisis.[14] Job losses, rather than lowered wages, should have delivered a more devastating impact on the economic wellbeing of lower-income households. Therefore, if the effect of changing employment of heads is examined, using a sample covering the non-employed, the relative contribution of changing labor supply to the rise in income inequality after 1997 should come out much

[14]The number of the unemployed increased from 452,000 in October 1997 to 1,378,000 by March 1998. The average unemployment rate in 1998 was 6.8%, 4.2% points greater than in the previous year.

grater than suggested by the results of this study. The result of a similar analysis conducted for the United States from 1969 to 1989 is suggestive with regard to this point. The relative decline of labor supply among heads of lower-income households accounted for 45% of the rise in the difference in the log of income between the top and bottom income deciles. Of this 45%, changing employment explained 26%, and shifts in hours worked 19% (Lee 2000). A verification of this conjecture will have to wait for the release of improved data that will allow a more complete decomposition analysis.

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References

Ahn, K. "Trend in and Determinants of Income Distribution in Korea." *Journal of Economic Development* 22 (No. 2 1997): 27-56.

Burtless, G. "Earnings Inequality over the Business and Demographic Cycles." In G. Burtless, (ed.), *A Future of Lousy Jobs?* Washington DC: Brookings Institution, pp. 77-117, 1990.

_____. "The Contribution of Employment and Hours Changes to Family Income Inequality." *American Economic Review Papers and Proceedings* 83 (No. 2 1993): 131-5.

Chung J., and Choi, K. "A Decomposition of Household Income Inequality of Workers." *Korean Economic Review* 49 (No. 2001): 39-64 (in Korean).

Chung, J., Hwang, D. Lee, B., and Choi, K. *The State and Policy Issues of Income Inequality and Poverty.* Korea Labor Institute, 2002 (in Korean).

Haveman, R. *Earnings Inequality: The Influences of Changing Opportunities and Choices.* Washington DC: The AEI Press, 1996.

Kang, S., and Hyun, J. "Suggestions for Improving Statistics for Understanding Income Distribution." Paper Presented at the KDI Conference on Income Distribution, 2001 (in Korean).

Korea National Statistical Office. *The Economically Active Population Survey Annual Report.* 2001a.

_____. *Annual Report on the Household Income and Expenditure Survey.* 2001b.

Lee, C. "The Relation of the Growth in Income Inequality to the Organization of Work and the Structure of Consumption." In R. Fogel., *The Forth Great Awakening and the Future of Egalitarianism.* Chicago: University of Chicago Press, pp. 272-83, 2000.

_____. "Changes in Employment and Hours, and Family Income Inequality in the United States, 1969-1989." *International Economic Journal* 15 (No. 2 2001): 27-49.

Lee, J., and Rhee, C. "Social Impacts of the Asian Crisis: Policy Challenges and Lessons." IER Working Paper No. 2. Seoul National University, 2001.