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The Financial Crisis and Income Distribution in Korea: The Role of Income Tax Policy*

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We empirically examine the impact of the financial crisis at the end of 1997 on income inequality in Korea. We also find the role of income tax policy on reducing the level of income inequality. The income inequality became serious after the financial crisis, with the Gini coefficient of 0.3368 in 1996 and 0.4008 in 2000. Especially, poor group was increased from 4.7% in 1996 to 6.6% in 2000.

The redistributive effect of income tax was relatively low, as it has too low average tax rate, irrespective of high progressivity. The most serious problem was too high level of horizontal inequity with unequal tax treatment of equal income groups. Horizontal inequity with classical notion was the most serious in 1996, as it allowed too much deductions and exemptions at that time. The degree of income inequality was much worse in 2000, but the horizontal equity was improved.

Our policy suggestion is that Korea's income tax system can have a greater redistributive effect while increasing the level of horizontal equity, which leads to the equal tax treatment of an equal income group. It implies that various kinds of tax incentives including allowance, deduction, and exemption should be abolished. Horizontal equity with classical notion can be actively used as one tool to enhance the redistributive effect of Korea's income tax system.

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1. INTRODUCTION

The financial crisis at the end of 1997, as a result of the foreign currency shortage and weak financial infrastructure, has dramatically changed Korea's economic structure. There has been much discussion for the cause of the Korean financial crisis.[1] One of the hot topics about its economic impact is income distribution. It has been well recognized that the level of income distribution was worse after the financial crisis. However, there has been a few empirical evidence to show changes in the level of income distribution during the financial crisis. For example, Cheong (2001) empirically showed that the income share of the middle class was increased substantially relative to the poor.

Income tax policy is one of most effective policy tools to reduce the level of income inequality. It might be an important policy question on whether or not tax policy played an important role to reduce the income inequality during the financial crisis. However, the redistributive effect of income tax policy during the financial crisis has not been rigorously analyzed, even though there have been several studies with descriptive analysis.

The Gini coefficient has been popularly used to measure the level of income inequality, and has been applied to pre-tax income and post-tax income to examine the redistributive effect of tax policy. However, the redistributive effect of tax policy by using the Gini coefficient can be decomposed into various kinds of equity components. There are several equity notions to explain the equity properties in tax policy. Vertical equity is the most popular notion to evaluate tax policy in the perspective of equity, with the degree of progressivity in tax system. Horizontal equity is another notion to fully explain the equity. Its classical definition is the equal treatment of equals. However, the rank preserving principle has been popularly applied for empirical measurement.[2] Berliant and Strauss (1985)

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[1] Hahm and Mishkin (2000) explain the cause of the financial crisis with an asymmetric information framework.

[2] See Plotnick (1981), for example.

showed two examples for the independence between the rank preserving principle and the classical notion of horizontal equity. One is the case which satisfies the principle of rank preserving, but not the equal treatment of equals. The other is the case which satisfies the equal treatment of equals, but not the rank preserving principle.

Aronson, Johnson, and Lambert (1994) (hereafter AJL) developed the decomposition of the redistributive effect of income tax into vertical and horizontal equity with two components. One is the measurement with classical notion of horizontal equity, and the other with the rank preserving principle. This model has been empirically applied to many countries to examine the redistributive effect of income tax, for example, by Wagstaff *et al*. (1999). Thus the application of the AJL model into Korean tax policy might give us a detailed examination about the cause of inequality during the financial crisis.

The purpose of this paper is to compare the levels of income distribution before and after the financial crisis at the end of 1997. It also shows the role of income tax policy to reduce the level of income inequality during this period.

Our data for analysis is micro data from the Family Income and Expenditure Survey for 1996 and 2000, which was conducted by the Korean National Statistical Office. These data have plenty of information related to income and expenditure from more than 20,000 households.

The structure of our paper is as follows. Section 2 describes the change in Korean economy during the financial crisis. Section 3 presents our methodology for analysis. Section 4 shows empirical results for income distribution and the redistributive effect of income tax policy, and Section 5 concludes.

2. FINANCIAL CRISIS IN KOREA

The financial crisis at the end of 1997 had a devastating impact on the

Korean economy. There has been much debate for the cause of the financial crisis, however, it needs more study in order to have a comprehensive analysis. As the main focus on this study is to empirically examine the change in income distribution during the financial crisis, we will just describe the change in the economy during these periods. Our data for study shows the pre-financial crisis situation in 1996 and that of the post-financial crisis in 2000. Table 1 explains the change in the economic situation with the GDP growth rate, inflation with the GDP deflator, unemployment rate, and the interest rate of corporate bond. During the financial crisis, the economic indicator in 1998 showed devastating figures with a negative rate of economic growth (–6.7%), a high unemployment rate of 7%, and a high interest rate of 15.1%. The Korean economy was stabilized with various economic indicators during 1999, and it completely got out of the financial crisis in 2000. The change in the economic situation had important consequences in the level of income distribution. When the unemployment rate was increased, unskilled workers had a greater probability of losing their jobs. This fact implies that a low income group grew during this time. On the contrary, as the interest rate was increased, a high income group with more capital income might have had more income. As a consequence, the level of income distribution became worse.

Our research motivation for this empirical work is to show by how much the level of income distribution became worse using our dataset, 1996 and 2000. We assume that the financial crisis was completely recovered in 2000. Economic indicators during the financial crisis showed much fluctuation over short time periods. For example, the overnight interbank call rate jumped from 14.54% in November of 1997 to 25.49% in December of that year. As the economy became stable in 2000, we can measure the change in income inequality after the consequence of the financial crisis.

Table 1 The Change in Economic Indicators during the Financial Crisis

(unit: %)

Year	GDP Growth Rate	GDP Deflator	Unemployment Rate	Interest Rate for Corporate Bond
1996	6.8	3.9	2.0	11.87
1997	5.0	3.2	2.6	13.39
1998	-6.7	5.0	7.0	15.10
1999	10.9	-2.0	6.3	8.86
2000	9.3	-1.1	4.1	9.35

3. MODEL

We need to define income for analysis, as there are several measures for income. We use economic income before tax. We use the equivalent income to standardize numerical income by the number of children and household size as follows:

$$\text{Equvalent Income} = \text{Income} / (A + \beta B)^{\gamma} .$$

A, B are the number of adult and children, and β, γ are parameters for standardization separately. We use 0.5 for both parameters, as AJL (1994) did. The use of the same number for two parameters will give us one advantage for the comparison of our empirical results with theirs. Our model for measurement is based on, mainly, the Gini coefficient between two time periods, which are before and after the financial crisis in 1997.

We also measure the level of poverty between two time periods by using the relative approach. Poverty threshold is defined as comparing 40% and 30% of the current median income. We measure the number of households under this poverty threshold, which is head of count (H). We also use income gap which is the average difference of the incomes of poor group

compared to poverty threshold (I). The level of income inequality among poor group will be estimated by using the Gini coefficient (GP).

We examine the redistributive effect of income tax with the estimation of the Gini coefficients with pre-tax and post-tax income. The role of income tax policy can be decomposed into three different equity notions following AJL.[3] As we follow AJL methodology, the difference (RE) between before-tax Gini coefficient and after-tax Gini is the measurement of the redistributive effect of income tax:

$$\mathrm{RE} = G_X - G_{X-T}\,.$$

RE can be decomposed into three components as AJL's theorem:

$$\mathrm{RE} = V - H - R\,. \tag{1}$$

V, H, R are vertical equity, classical notion of horizontal equity, and a rank preserving principle separately. It can be measured as follows:

$$V = (g/(1-g))K_T\,, \qquad H = \sum a_X \; G_{F(X)}\,.$$

g, K_T are the average tax rate and Kakwani index for vertical equity. Also a_X is the product of the population share and post-tax income share of households with income x, and $G_{F(X)}$ is the Gini coefficient for post-tax income for households with pre-tax income x. We may indirectly get R from the relation, (1). As AJL discussed, V, H, R is all non-negative. Thus we standardize RE with 100%, to compare the contribution of each equity with respect to the total distributive effect of income tax. It implies that vertical equity is reduced due to horizontal inequity, which consequently leads to the total redistributive effect of income tax, RE.

Our data for analysis is micro-level data, which has information about

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[3] Kakwani (1984) also decomposed the redistributive effect with vertical equity and horizontal equity with the rank preserving principle only.

demographic and economic variables for each household. Even though this dataset has information about an income tax for each household, we prefer simulating to responded income tax due to its unreliability. We apply the income tax law for each year, based on demographic and economic characteristics of each household.

4. EMPIRICAL RESULTS

4.1. Income Distribution

Table 2 shows the general figure of the change in income group, by arranging the gross income group into three different income groups. We follow OECD's approach to define these income groups. The low income group and the high income group are defined as the income group under 50% and above 150% of median income level separately. Thus the middle income group is the households which have the income level between 50% and 150% of the median income amounts. The low income group occupies 14.36% of total households in 1996, however, it is increased to 18.61% in 2000. The high income group occupies 20.1% in 1996, and 24.29% in 2000. Thus we find that the level of income inequality became more serious after the financial crisis.

We closely examine the change in income inequality by income decile, with the different types of income. Table 3 shows these figures in detail. The Gini coefficient summarizes the level of gross income inequality with 0.3368 in 1996 and 0.4008 in 2000. This result reflects the change of income groups as explained above. We examine gross income by the different types of income, which are labor income, business income, and capital income. It will lead to find the difference in inequality by a different income source. The inequality of labor income shows the Gini coefficient of 0.3324 in 1996 and 0.4043 in 2000. It also indicates the 0.3878 in 1996 and 0.4286 in 2000. However, the inequality for capital income shows

Table 2 Income Distribution by Income Class

(unit: %)

Income Class	1996	2000
Low income group	14.36	18.61
Middle income group	65.54	57.10
High income group	20.10	24.29

Table 3 Income Distribution by Decile

(unit: %)

Decile	Gross Income		Labor Income		Business Income		Capital Income	
	1996	2000	1996	2000	1996	2000	1996	2000
1	1.96	1.39	2.15	1.09	1.16	0.62	4.49	5.59
2	4.67	3.72	5.28	3.98	3.71	2.44	3.18	6.08
3	6.30	5.30	6.91	5.84	5.52	4.01	3.65	5.22
4	7.48	6.59	8.12	7.35	6.78	5.35	3.91	4.61
5	8.74	7.85	8.93	8.57	9.06	6.64	4.62	5.93
6	9.70	9.19	10.45	10.13	8.93	7.83	5.50	6.54
7	11.17	10.65	11.90	11.03	1056	10.59	6.27	7.22
8	12.52	12.55	12.52	13.78	13.25	10.89	8.24	9.10
9	14.84	15.39	15.44	16.76	13.61	13.34	14.91	13.14
10	22.62	27.38	18.30	21.47	27.40	38.27	45.23	36.57
Gini	0.3368	0.4008	0.3324	0.4043	0.3878	0.4286	0.5184	0.4634

different figures, which are 0.5184 in 1996 and 0.4634 in 2000. As the capital income occupies around 5% of gross income, the contribution of capital in the change of inequality for gross income is negligible. As labor

Table 4 The Change in Poverty Over Time

Poverty Definition	1996	2000
40% of median income		
- H	0.0470	0.0657
- I	0.3313	0.3385
- GP	0.1854	0.2048
30% of median income		
- H	0.0232	0.0358
- I	0.3174	0.3168
- GP	0.1794	0.1973

income occupies around 60% of gross income, the pattern of the change in labor income inequality reflects that of gross income.

As the low income group might have relatively more shock compared with other income groups due to the financial crisis, we examine the figures of the income group under the poverty line. Table 4 shows the change in poverty level with two different kinds of poverty definition. The poverty group shows 4.7% in 1996 and 6.57% in 2000 with the definition of 40% median income group. Income gap of poor households with poverty threshold indicates 33.13% in 1996 and 33.85% in 2000, which are almost at the same level. However, the Gini coefficients among poor households are 0.1854 in 1996 and 0.2048 in 2000. We find that poor group was increased due to the financial crisis. Moreover, the level of inequality among poor households was also increased.

4.2. Income Tax Policy

Table 5 shows the estimation for the redistributive effect of Korea's income tax system, which are decomposed into three factors. For 1996, the Gini coefficients before and after tax are 0.33682 and 0.31877 separately. It means that income tax reduces the level of income inequality, which is

Table 5 Estimation Result for the Redistributive Effect

	1996	2000
Gini before tax	0.33682	0.40077
Gini after tax	0.31877	0.37899
RE	0.018041	0.021782
Kakwani index	0.40158	0.42643
Average tax rate	0.066025	0.069124
V	0.028389	0.028033
H	0.008924	0.005491
R	0.001424	0.000760
V(%)	157.35	128.70
H(%)	49.46	25.20
R(%)	7.89	3.49

expressed by RE, 0.018041. The degree of progressivity and average tax rate lead to one component of the redistributive effect, which is vertical equity. The Kakwani index and the avearage income tax rate are 0.4015 and 0.066 separately. We standarize the redistributive effect of income tax with 100% of RE, to examine the relative contribution of vertical equity and two components of horizontal equity. The contribution of vertical equity for the total redistributive effect of income tax system is 157.35%. However, horizontal inequity with unequal treatment of equal income groups sacrifices the redistributive effect of income tax by 49.46%. Another horizontal inequity with rank reversal after income tax sacrifices 7.89%. Consequently, two components of horizontal inequity reduced the total redistributive effect of income tax by 57.35%.

For the year of 2000, the Gini coefficients before and after income tax are relatively higher than 1996 due to the financial crisis. The redistributive effect of income tax becomes relatively higher, as it has more progressivity

with 0.42643 of the Kakwani index, and a higher average tax rate with 0.069124. The contribution of each component with respect to the total redistributive effect indicates 128.7% for vertical equity, 25.2% for horizontal inequity with unequal tax treatment of equal income groups, and 3.49% for horizontal inequity with rank reversal after income tax. The contribution of each equity has lower level of horizontal inequity than that of 1996.

We examined the role of each equity with respect to the total redistributive effect of the income tax system. The estimates are based on relative contributions of each equity with the standardization of the total redistributive effect with 100% for each year. Thus, it is hard to compare the change over time. We need to standardize all estimates for comparison, which make RE in 1996 as 100%, and compare other estimates. Table 6 shows the results for this calculation. The redistributive effect of income tax has varied over time. The level of vertical equity with the progressivity and the average tax rate has the similar degree for two periods. However, horizontal inequity had the higher value in 1996 for two components. The income tax system in 1996 has the least redistributive effect, mainly due to the high level of horizontal inequity. The redistributive effect of the income tax system in 2000 became much stronger, which was mainly due to the improvement of horizontal equity.

Table 6 Comparison of the Redistributive Effect over Time

(*RE* in 1996 = 100)

	1996	2000
RE	100.00	120.74
V	157.35	155.39
H	49.46	25.21
R	7.89	3.49

We overview the change in the income tax system over two periods to explain the different pattern in the redistributive effect. Table 7 shows the

Table 7 The Change in Korea's Income Tax System

	1996	2000
Basic allowance	Family: 1M per person Age related allowance	Same as 1996
Expense deduction	Medical insurance Unemployment insurance Medical expense, unemployment expense Education expense Housing saving expense Labor income deduction Below 4M: all Above 4M: 30%	Medical insurance Unemployment insurance Medical expense, unemployment expense Education expense Housing saving expense Labor income deduction Below 5M: all 5M – 15M: 40% Above 15M: 10%
Exemption	Labor income tax credit less than 0.5M Saving account tax credit Yearly return for housing finance 30% Private pension deduction 40%	Labor income tax credit less than 0.6M Saving account tax credit Yearly return for housing finance 30% Private pension deduction 40%
Rate structure	Below 10M: 10% 10M – 40M: 20% 40M – 80M: 30% Above 80M: 40%	Same as 1996

Note: 1M means 1 million won, which was approximately equivalent to $830.

change in income tax system for our research periods. In 1996, allowance, expense deduction, and exemption are generous to pursue some policy objective for certain groups. For example, the basic allowance began to include age related allowance, and expense deduction includes unemployment insurance and housing saving expense. Also exemption was extended to various kinds of housing finance. More deduction and

exemption would lead to the higher level of horizontal inequity, and eventually it sacrifices the redistributive effect of the income tax system. The income tax system in 2000 has a similar pattern as in 1996, however, the horizontal equity was greatly improved. As Korea's income tax system does not have indexation for inflation, it might give an improved level of horizontal equity.

One interesting point in Korea's income tax system is the high level of tax credit for labor income, due to high tax evasion in self-employed income. As our study did not consider tax evasion in self-employed income and only examined the difference in tax burdens between labor and self-employed income, the horizontal inequity in Korea became much more serious.

5. CONCLUSIONS

We have empirically examined the impact of the financial crisis at the end of 1997 on income inequality, and the role of income tax policy on reducing the level of income inequality. We find that income inequality became serious after the financial crisis, with the Gini coefficient of 0.3368 in 1996 and 0.4008 in 2000. Especially, poor group was increased from 4.7% in 1996 to 6.6% in 2000.

We find that Korea's income tax has some interesting characteristics. The redistributive effect of income tax is relatively low, as it has too low average tax rate, irrespective of high progressivity. The most serious problem is too high level of horizontal inequity with unequal tax treatment of equal income groups.

Horizontal inequity with classical notion was the most serious in 1996 as it allowed too many deductions and exemptions at that time. The degree of income inequality was much worse in 2000, but the horizontal equity had improved. Our policy suggestion is that Korea's income tax system can have more redistributive effect with increasing the level of horizontal equity, which leads to the equal tax treatment of equal income group. It implies

that various kinds of tax incentives including allowance, deduction, and exemption should be abolished. Generally, policy analysts and academic professionals in Korea have been more concerned with vertical equity, mainly with the level of progressivity, to consider the redistributive effect of income tax. We suggest that horizontal equity with classical notion can be actively used as one tool to increase the redistributive effect of Korea's income tax system.

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