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

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Abstract

We empirically examine the impact of 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 Gini coefficient of 0.3368 in 1996 and 0.4008 in 2000. Especially, poor group has been increased from 4.7% in 1996 to 6.6% in 2000.

The redistributive effect of income tax is relatively low, as it has too low average tax rate, irrespective of high progressivity. 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 allows 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 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 incentive 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.

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 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 examine any 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 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 financial crisis has not been rigorously analyzed.

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 most popular notion to evaluate tax policy in the perspective of equity, with the concept of progressive characteristic of tax system. Horizontal equity is another notion to fully explain the equity. Its classical definition is the equal treatments of equals. However, rank preserving principle has been popularly applied for empirical measurement[2]. Berliant and Strauss (1985) showed two examples for the independence between 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 rank preserving principle.

Aronson, Johnson, and Lambert (1994) (hereafter AJL) developed the decomposition of 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 rank preserving principle. Thus the application of AJL model into Korean tax policy might give us detailed examination about the cause of inequality over the periods of financial crisis.

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

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

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

Our data for analysis is micro data of Family Income and Expenditure Survey for 1996 and 2000, which was surveyed by Korean National Statistical Office. This data has plenty of information related to income and expenditure with more than 20,000 households.

The structure of our paper is as follows. Section 2 describes the change in Korean economy during 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 from the end of 1997 had a devastating impact on Korean economy. There has been much debate for the cause of financial crisis, however, it needs more study to have the comprehensive analysis. As the main focus on this study is to empirically examine the change in income distribution during the financial crisis, we just describe the change in economy during these periods. Our data for study shows the situation of before-financial crisis with 1996 and that of the after-crisis with 2000. Table 1 explains the change in economic situation with GDP growth rate, inflation with GDP deflator, unemployment rate, and the interest rate of corporate bond. During the financial crisis, economic indicator in 1998 shows devastating figures with negative rate of economic growth (-6.7%), high unemployment rate of 7%, and high interest rate of 15.1%. Korean economy has been stabilized with various economic indicators of 1999, and it completely got out of the financial crisis in 2000. The change in economic situation had important consequences in the level of income distribution. When unemployment rate was increased, unskilled labor has more probability for losing their jobs. It implies that low income group was increased at that time. On the contrary, as interest rate was increased, high income group with more capital income might have more income. It led to the consequence that the level of income distribution became worse.

Our research motivation for empirical work is how much the level of income distribution became worse with our dataset, 1996 and 2000. We assume that financial crisis was completely recovered in 2000. Economic indicators during 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, it might be better measurement for the level of income distribution after the consequence of the financial crisis.

Table 1: The change in economic indicators during 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;

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

Where 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 thresthold is defined as comparing 40% and 30% of the current median income. We measure the number of househods 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 amoung 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 redistributive effect of income tax;

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

$$RE = G_x - G_{x-T}$$

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

$$RE = V - H - R \qquad (1)$$

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

$$V = (g/(1-g))\, K_T, \qquad H = \Sigma\, \alpha_x\, G_{F(x)}$$

Where g, K_T are the average tax rate and Kakwani index for vertical equity. Also α_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 total distributive effect of income tax. It implies that vertical equity is reduced due to horizontal inequity, which consequently leads to total redistributive effect of income tax, RE.

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

4.1. Income distribution

Table 2 shows that general figure about the change in income group, by grouping the total income group into three different income groups. We follow OECD 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 serious over time, 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 summarize the level of total 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 total 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 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 the different figures, which are 0.5184 in 1996 and 0.4634 in 2000. As the capital income occupies around 5% of total income, the contribution of capital in the change of inequality for total income is negligible. As labor income occupies around 60% of total income, the pattern of the change in labor income inequality reflects that of total 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 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 same levels. 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.

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	Total 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

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

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 expressed by RE, 0.018041. The degree of progressivity and average tax rate lead to one component of redistributive effect, which is vertical equity. 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 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 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 Kakwani index, and higher average tax rate with 0.069124. The contribution of each component with respect to 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 much less level of horizontal inequity than that of 1996.

We examined the role of each equity with respect to total redistributive effect of income tax system. The estimates are based on relative contribution of each equity with the standardization of 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 have variation 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 has 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 income tax system in 2000 became much stronger, which was mainly due to the improvement of horizontal equity.

We overview the change in income tax system over two periods to explain the different pattern in redistributive effect. Table 7 shows the change in income tax system for our research periods. In 1996, allowance, expense deduction, and exemption are generous to pursue some policy objective for centain 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 income tax system. The income tax system in 2000 has a similar pattern as 1996, however, the horizontal equity was much 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 so much serious.

We have the international comparison of our result with Wagstaff, et. al. (1999). Table 8 shows the summary of international comparison for those estimates. As most OECD countries in Wagstaff, et. al. (1999) are based on the data during the last of 1980's and the beginning of 1990's, our comparison

focuses on estimates for 1996 and 2000. The level of income distribution before income tax in Korea is generally moderate. However, the Gini coefficient after income tax indicates relatively serious situation. It is because the redistributive effect of income tax is too little, where France and Switzerland have similar level. Korea has one interesting characteristic in the income tax system, which is too low level of average income tax rate and high level of progressivity. Even though income tax system has relatively high progressive characteristic, absolute income tax burden is too low. Consequently, Korea's income tax system has little redistributive effect, compared with OECD countries. The contribution of each equity with respect to total redistributive effect has interesting contrast in Korea. The role of vertical equity is relatively high in Korea, however, the horizontal inequity with unequal tax treatment for equal income groups is too high. It implies that Korea's income tax system has too many deductions and exemptions compared with other OECD countries.

As the level of tax evasion is relatively much higher than OECD countries, the horizontal inequity with classical notion in Korea will be reduced with the consideration of tax evasion in self-employed income. Schneider and Enste (2000) showed that the size of underground economy with respect to GDP is 38-50% for Korea, 8-10% for Japan and USA, 13-23% for UK, France, Germany. Thus we need to have careful interpretation with the serious figures of horizontal inequity in Korea's income tax system.

Table 5: Estimation result for 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

Table 6: Comparison of 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

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 Yarly return for housing finance 30% Private pension deduction 40%	Labor income tax credit less than 0.6M Saving account tax credit Yarly 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 is equivalent to $ in 2000.

Table 8: The international comparison for redistributive effect

	Data	Before Gin:	After Gin:	RE	Average tax rate	Kakwani index	V(%)	H(%)	R(%)
Denmark (1987)	A	0.3023	0.2703	0.0320	0.2966	0.0938	123.8	1.9	21.9
Finland (1990)	A	0.2685	0.2253	0.0432	0.2188	0.1644	106.7	1.0	5.7
France (1989)	A	0.3219	0.3065	0.154	0.0620	0.2717	116.6	1.9	14.8
Germany (1988)	A/E	0.2591	0.2312	0.279	0.1108	0.2433	108.5	1.3	7.3
Ireland (1987)	A	0.3870	0.3418	0.0452	0.1540	0.2685	108.2	1.0	7.3
Italy (1991)	E	0.3248	0.3009	0.0239	0.1354	0.1554	102.0	0.4	1.6
Netherlands (1992)	A	0.2846	0.2517	0.0329	0.1487	0.1977	104.9	0.7	4.2
Spain (1990)	A	0.4083	0.3694	0.0389	0.1397	0.2545	106.1	0.4	5.7
Sweden (1990)	A	0.3004	0.2608	0.0396	0.3270	0.0891	109.3	1.5	7.8
Switzerland (1992)	A	0.2716	0.2541	0.0174	0.1210	0.1528	120.7	1.7	19.0
UK (1993)	A	0.4121	0.3768	0.0352	0.1421	0.2278	107.1	0.9	6.3
US (1987)	E	0.4049	0.3673	0.0376	0.1370	0.2371	102.6	0.4	1.9
Korea (1996)	E	0.3368	0.3188	0.0180	0.0660	0.4016	157.4	49.5	7.9
Korea (2000)	E	0.4008	0.3790	0.0218	0.0691	0.4264	128.7	25.2	3.5

5. Conclusions

We empirically examine the impact of 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 the income inequality became serious after the financial crisis, with Gini coefficient of 0.3368 in 1996 and 0.4008 in 2000. Especially, poor group has been 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. 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 allows 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 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 incentive 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 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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