THE NECESSITY AND EFFECTS OF ECOLOGICAL BASIC INCOME IN KOREA

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1. INTRODUCTION

The object of this paper is to explain the necessity and effects of ecological basic income in Korea. Ecological basic income is defined as the policy of distributing revenues raised by ecological tax to all individuals unconditionally. The main goal of ecological basic income is not to guarantee people's subsistence, but to reduce people's resistance against ecological tax.

Reducing the number of nuclear plants in Korea is the most pressing reason to pursue ecological tax. After the Fukushima disaster, more Koreans are aware of the risks associated with nuclear plants. However, it may not be easy to discontinue the use of nuclear power altogether because Korea's electricity consumption per unit of GDP is the highest in the world. Imposing ecological tax on energy is a viable way of reducing the consumption of electricity. As ecological tax reduces people's real income, there is a need for compensation for the loss. This paper will argue that ecological basic income is necessary to overcome the political resistance against ecological tax.

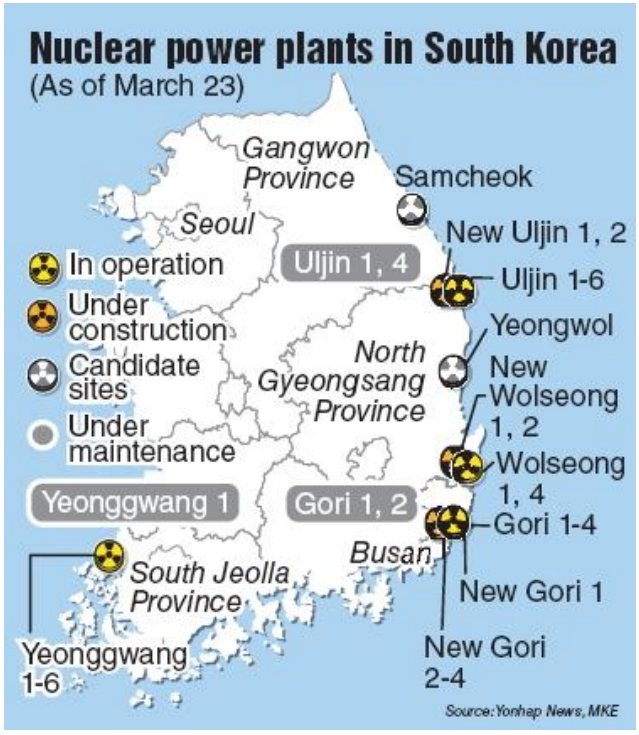
In section 2, the current situation in Korea concerning nuclear plants and ecological tax is described. In section 3, the necessity of ecological basic income is explained. Although most countries adopt income tax reduction when introducing ecological tax, this strategy

is not applicable in Korea. In section 3, the distributional effects of ecological basic income is examined using statistical data.

2. THE CURRENT SITUATION IN KOREA

NUCLEAR PLANTS

Figure 1. Nuclear plants in Korea



Data: The Korea Herald, 2012.3.23.

In Korea there are 23 nuclear plants in operation, and seven more under construction. Nuclear plants accounted for 34.2% of electricity generation in 2010. Most of the nuclear

plants are located in the Southeast, proximal to the second largest city (Busan) in Korea. Owing to the high population density in Korea, a nuclear accident such as the one in Fukushima would cause far greater damage.

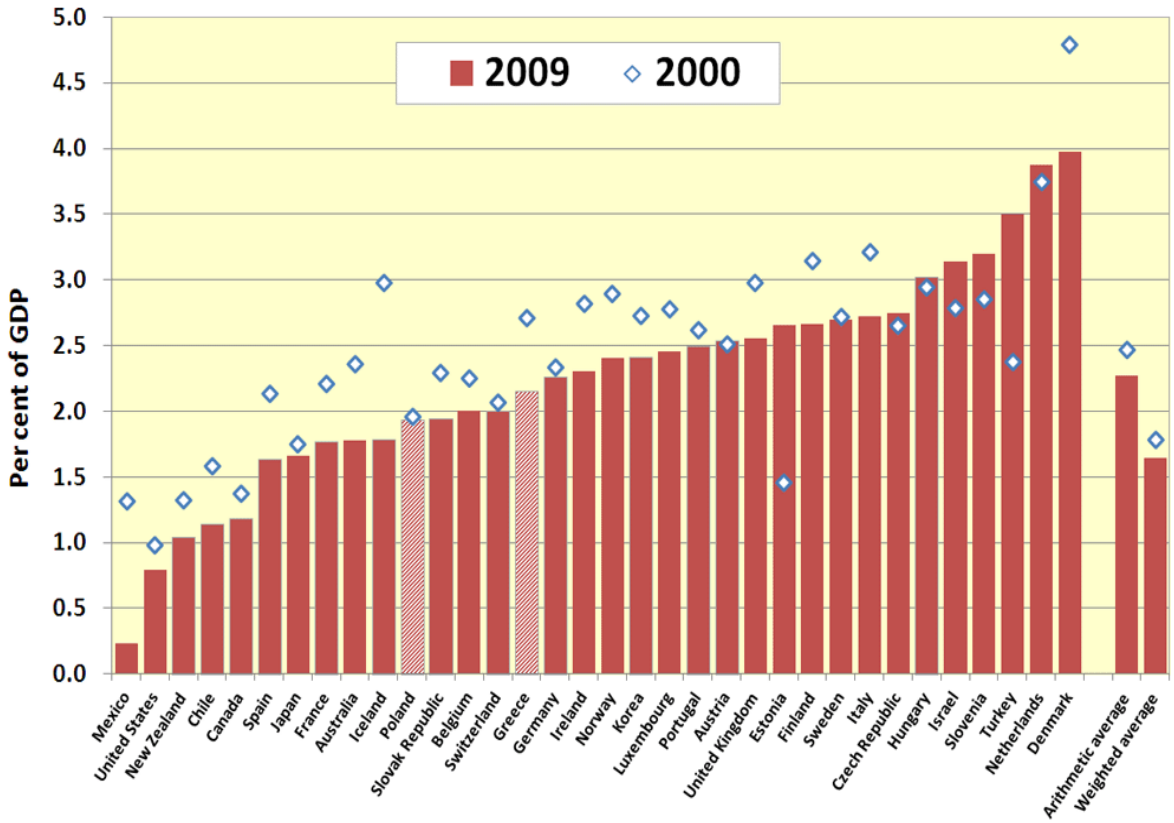
Let us calculate the probability of nuclear accident based on extremely simple assumptions. There are 450 nuclear plants in the world. 60 years has passed since the nuclear power generation started. In the meantime, there have been 6 big(level 5 or above) accidents, including Three Mile(1979), Chernobyl(1986), and Fukushima(2011). Let us assume that until now, 100 reactors retired after operating for 30 years, and that 450 reactors have been operating for 15 years. Let us further assume that the probability of accident is the same for all reactors. As 6 accidents happened in 9,750 reactor-years(= 100 reactors*30 years + 450 reactors*15 years), the probability of accident is 0.000615 per reactor-year. If there are 30 nuclear reactors in Korea, the probability of accident is 0.0185 per year, which means that on average one big accident will occur in 55 years.

The current president Lee Myung-bak plans to build an additional 13 nuclear plants to increase the share of nuclear power generation to 59% by 2030. If the plan carries through, South Korea will have the highest density of nuclear power plants by 2020. In 2024, South Korea's per-kilometer nuclear power plant system capacity is expected rise to 365 kilowatts, some 3.5 times that of "nuclear superpower" France (103 kW) and twice that of Japan (177 kW). (Hangyore, 2011. 3. 28)

ECOLOGICAL TAX

As depicted in Figure 2, Korea's ecological tax is about 2.5% of GDP, close to average tax rate in OECD countries. But Korea's ecological tax system has the following problems(Youngtak Cho, 2011).

Figure 2. Ecological tax in OECD countries



Data: European Environmental Agency, OECD

First, Korea's ecological tax is made up of various taxes such as transportation tax, individual consumption tax, and local transportation tax. This violates the principle of simplicity and makes the tax system very complex.

Second, the tax base is limited mainly to transportation. This means that the same energy can have different prices depending on how it is used, for instance energy used for transportation is more costly.

Third, there are so many exemptions and exceptions in place that increase the administrative fees and make the tax system inefficienct.

Lastly, more than 80% of the revenues raised by ecological tax are spent on road construction, which ironically increases environmental pollution and energy consumption.

3. THE NECESSITY OF ECOLOGICAL BASIC INCOME

It is not easy to stop nuclear plants because of the electricity shortage. The only way to decrease our reliance on nuclear power is by reducing the energy demand as well as increasing the share of the renewable energy. Ecological tax, by increasing the price of electricity, does both.

Most countries cut income tax or social security payments when they impose ecological tax. This is related to the so-called double-dividend hypothesis. The double-dividend hypothesis suggests that ecological tax can provide two kinds of benefits. The first is an improvement in the environment, and the second is an improvement in economic efficiency from the use of environmental tax revenues to reduce other taxes such as income taxes that distort labor supply and saving decisions.

This hypothesis was generally accepted in partial equilibrium approach, but in general equilibrium approach many economists discredit its validity (Charles Kolstad, 2000). They argue that the hypothesis ignores the interaction between environmental taxes and pre-existing taxes. Since environmental taxes cause prices of products to rise, they tend to discourage labor supply, thereby exacerbating the inefficiency associated with tax distortions in labor markets. As the double-dividend hypothesis is rejected, one can consider ecological basic income as the more effective policy that can increase economic efficiency.

The biggest obstacle to increasing ecological tax is political resistance. As the general price level rises due to ecological tax, people's real income diminishes and they protest

against ecological tax. In this respect, we can argue that increasing ecologic tax distribution takes precedence over efficiency. Whether the double-dividend hypothesis is valid or not, we can consider tax reduction as a policy to help reduce political resistance.

In the case of Korea, ecological basic income rather than tax reduction is the appropriate policy to reduce people's resistance for the following reasons.

First, under the current income tax structure, about 40% of laborers are exempt from paying income tax. Therefore, tax deduction only benefits 60% of high income laborers. But ecological basic income benefits all people.

Second, although Korea's rate of unemployment is very low (3.4% in May 2012), its employment rate is also very low (about 60% in May 2012). Among 41 million people aged 15 or above, 16 million people do not work and have no income. Since income tax reduction gives benefit only to those who have income, it aggravates income distribution.

Third, in 2009 Korea's total tax revenue was 25.5% of GDP, which is among the lowest in OECD countries. (OECD, Tax revenue statistics) In order to become a welfare state, Koreans should pay more tax and receive more welfare. Income tax reduction moves in the opposite direction.

Forth, while the amount of income tax reduction is difficult to calculate and is determined only at the end of the fiscal year, the amount of ecological basic income is clearly visible to everyone.

This paper suggests the following policy of ecological tax and ecological basic income. Increase the ecological tax to 5% of GDP, and then distribute the tax revenue increment as basic income. Moreover, with the pre-existing ecological tax revenues, make mass transportation services (bus and subway) free, rather than spending them on road construction. As free mass transportation can be regarded as basic income in-kind, our ecological basic income consists of two parts: money basic income and free mass

transportation. More public mass transportation services should be provided in small cities that have insufficient mass transportation services.

4. THE DISTRIBUTIONAL EFFECTS OF ECOLOGICAL BASIC INCOME

GENERAL CHARACTERISTICS OF KOREAN HOUSEHOLDS

In this section, we will estimate the distributional effects of ecological basic income using *2011 Household Income and Expenditure Survey* conducted by Statistics Korea. The population of the survey consisted of 16 million households and 45.8 million people. Some households such as those engaged in farming and fishing were excluded from the survey. Average monthly household income was 3.36 million won (3,210 US dollars) and median household income was 3.03 million won (2,658 US dollars). As the minimum subsistence income was 1.17 million won (1,026 US dollars) in 2011(Department of Welfare) for a three-member family, this paper defines absolute poverty as a household whose income per member is less than 390,000 won (342 US dollars). According to this definition, 2,890,000 people were in absolute poverty. This is similar to the number of poor described in other studies. (Seungho Bak, 2010) Looking at the household distribution of income tax, 44% of households did not pay any income tax. This implies that it is politically impossible to increase ecological tax through income tax reduction.

ASSUMPTIONS SCENARIOS FOR ESTIMATION

We first assume that ecological tax is increased by 27.4 trillion won. (24 billion US dollars). If we distribute the whole revenue as basic income, monthly individual payment will be 50,000 won. (43 US dollars) We further assume that consumer tax burden is 80% of the total tax revenue, so that households should pay about 22.0 trillion won as ecological tax. Finally we assume that ecological tax is proportional to consumption. Seongrin Na and Gwang Choi(1995) estimated that ecological tax can be progressively

imposed in Korea. If their estimation is correct, it is even more logical to make ecological tax proportional to consumption.

We have estimated distributional effects under three scenarios. The base case is the current status, where neither ecological tax nor ecological basic income exists. Under scenario 1, 80% of the total ecological tax revenue is distributed to households as income tax and social security payments reduction. Under scenario 2 the amount of ecological basic income is 40,000 won. (80% of the total ecological tax revenue) Under scenario 3, the amount of money basic income is the same as in 2 and free mass transportation is provided additionally.

SCENARIO 1

Under this scenario, we assume that tax cut (reduction in income tax and social security payments) is proportional to tax. As total amount of income tax and social security payments is 47.4 trillion won, reduction rate becomes 46.3%. Households as a whole pay 22 trillion won as ecological tax and receive back the same amount as tax cut. Individual household pays ecological tax proportional to its consumption and receives back 46.3% of sum of its income tax and social security payments as tax cut. This aggravates distribution of income since 44% of households do not pay income tax and 14% of them do not contribute social security payments.

Table 1 shows the distribution of net household burden under scenario 1. Here, net household burden equals household ecological tax payment minus reduction in income tax and social security payments, so that minus value indicates net benefit receiver. In Table 1, households are sorted by the amount of net household burden in ascending order. The number under the percent sign shows the percentile value of net household burden in the distribution.

Table 1. Distribution of net household burden under scenario 1 (unit: won)

0%	1%	2%	3%	4%	5%
-3775264.86	-435958.08	-301977.70	-254723.66	-215937.62	-191330.50
6%	7%	8%	9%	10%	11%
-170205.41	-153456.15	-140570.38	-125579.63	-113769.87	-102238.85
12%	13%	14%	15%	16%	17%
-93061.24	-83561.03	-75962.19	-70184.34	-64201.32	-59628.38
18%	19%	20%	21%	22%	23%
-54328.84	-49798.08	-45604.06	-41740.00	-36846.30	-32825.65
24%	25%	26%	27%	28%	29%
-29542.19	-25720.84	-22880.06	-19195.76	-16262.77	-14075.48
30%	31%	32%	33%	34%	35%
-11119.12	-8947.06	-6660.30	-4534.53	-2301.82	-187.24
36%	37%	38%	39%	40%	41%
2293.55	4105.02	5925.44	7509.15	9230.84	11000.35
42%	43%	44%	45%	46%	47%
12516.52	13874.31	15004.58	15923.72	17195.55	18389.82
48%	49%	50%	51%	52%	53%
19646.68	20554.71	21762.46	22768.99	24116.88	25455.55
54%	55%	56%	57%	58%	59%
26696.90	27688.49	28613.44	29902.22	30961.40	32067.71
60%	61%	62%	63%	64%	65%
33046.06	34476.85	35868.77	37377.06	38737.86	39888.78
66%	67%	68%	69%	70%	71%
41100.14	42340.98	43911.82	45281.49	46716.09	48102.00
72%	73%	74%	75%	76%	77%
49863.85	51491.96	53146.35	54807.06	56414.22	57999.05
78%	79%	80%	81%	82%	83%
59898.88	61877.09	64080.61	66210.09	68463.86	70951.59
84%	85%	86%	87%	88%	89%
73791.85	76825.15	79965.36	82902.92	86560.64	90073.21
90%	91%	92%	93%	94%	95%
93982.41	97946.23	101856.43	106701.31	112259.02	120115.33
96%	97%	98%	99%	100%	
128457.08	139355.60	156336.96	192527.54	780076.64	

From Table 1, we observe that 35% of households become net benefit receiver, and the other 65% of households become net tax payer. Under this scenario, the number of people in absolute poverty increases from 2,890,000 to 3,160,000 and the Gini coefficient of equalized income (household income divided by the root of the number of household

members) increases from 0.3363 to 0.3449. It seems impossible to increase ecological tax under this scenario, since majority of households will vote against the policy.

SCENARIO 2

Under this scenario, households as a whole pay 22 trillion won as ecological tax and receive back the same amount as ecological basic income. Individual household pays ecological tax proportional to its consumption and receives back 40,000 won per family member.

Table 2 shows the distribution of net household burden under scenario 2. As before, households are sorted by the amount of net burden in ascending order, and the number under the percent sign shows the percentile value of net burden in the distribution.

Table 2. Distribution of net household burden under scenario 2 (unit: won)

0%	1%	2%	3%	4%	5%	6%
-203732.10	-105082.00	-91873.00	-83802.64	-77289.01	-72242.50	-67600.38
7%	8%	9%	10%	11%	12%	13%
-63760.50	-60737.29	-58140.11	-55458.56	-53596.25	-51068.62	-49357.08
14%	15%	16%	17%	18%	19%	20%
-47667.11	-45791.57	-43878.21	-42381.92	-40441.80	-39394.70	-37972.04
21%	22%	23%	24%	25%	26%	27%
-36542.55	-35259.55	-33938.00	-32602.44	-31448.24	-30314.55	-29255.86
28%	29%	30%	31%	32%	33%	34%
-27847.00	-26854.27	-25837.75	-24787.75	-23739.27	-22707.30	-21710.81
35%	36%	37%	38%	39%	40%	41%
-20757.11	-19817.86	-18970.14	-17995.93	-16943.75	-16042.15	-15029.82
42%	43%	44%	45%	46%	47%	48%
-14260.54	-13215.45	-12347.95	-11473.68	-10504.65	-9433.87	-8533.54
49%	50%	51%	52%	53%	54%	55%
-7600.82	-6717.99	-5665.71	-4780.27	-3748.44	-2895.89	-1943.47
56%	57%	58%	59%	60%	61%	62%
-1103.10	-292.35	656.20	1706.19	2577.55	3617.90	4711.80
63%	64%	65%	66%	67%	68%	69%
5955.42	7467.96	8516.29	9845.16	11112.37	12381.42	13888.95
70%	71%	72%	73%	74%	75%	76%

15243.24	16531.71	17937.56	19786.32	21032.53	22442.62	24052.53
77%	78%	79%	80%	81%	82%	83%
25821.15	27484.26	29547.82	31458.30	33681.97	35884.18	38978.08
84%	85%	86%	87%	88%	89%	90%
42122.48	45012.86	47352.73	51355.38	55093.96	58739.93	62970.39
91%	92%	93%	94%	95%	96%	97%
66908.46	73777.87	80643.00	86241.30	93735.78	105870.71	120214.45
98%	99%	100%				
142256.14	178374.21	802791.71				

From Table 2, we observe that 57% of households become net benefit receivers, and the other 43% of households become net tax payers. Under this scenario, the number of people in absolute poverty decreases from 2,890,000 to 2,530,000 and the Gini coefficient of equalized household income decreases from 0.3363 to 0.3315. It seems possible to increase ecological tax under this scenario, since majority of households will vote for the policy.

SCENARIO 3

Under this scenario, households collectively pay 22 trillion won as ecological tax and receive back the same amount as ecological basic income. Additionally, free mass transportation is provided to everyone. In the base case, total expenditure on mass transportation is 6.7 trillion won, while total transportation expenditure is 49.4 trillion won. Under scenario 3, individual household pays ecological tax proportional to its consumption, receives back 40,000 won per family member, and receives back its mass transportation expenditure. As explained before, the tax revenue needed to provide free mass transportation comes from the existing ecological tax revenue.

Table 3 shows the distribution of net household burden under scenario 3.

Table 3. Distribution of net household burden under scenario 3 (unit: won)

0%	1%	2%	3%	4%	5%	6%
-340388.52	-192936.10	-168706.53	-155788.57	-147823.78	-138031.88	-131274.39
7%	8%	9%	10%	11%	12%	13%
-125246.97	-119658.58	-115214.93	-111219.61	-107569.99	-104581.73	-100751.98
14%	15%	16%	17%	18%	19%	20%
-96867.19	-93772.54	-91460.91	-88666.07	-86110.14	-83551.53	-80885.38
21%	22%	23%	24%	25%	26%	27%
-78079.62	-75453.47	-73635.35	-71488.63	-69949.47	-68179.89	-66481.10
28%	29%	30%	31%	32%	33%	34%
-64404.20	-62679.91	-61301.08	-59612.00	-57994.96	-56057.77	-54530.10
35%	36%	37%	38%	39%	40%	41%
-53046.92	-51748.95	-49982.47	-48429.25	-47122.27	-45900.15	-44747.79
42%	43%	44%	45%	46%	47%	48%
-43804.40	-42319.42	-41121.01	-40235.96	-38934.04	-37956.35	-36509.86
49%	50%	51%	52%	53%	54%	55%
-35160.24	-33759.27	-32323.34	-30908.92	-29644.96	-28608.71	-27685.59
56%	57%	58%	59%	60%	61%	62%
-26669.31	-25595.29	-24316.67	-23021.06	-22224.54	-20959.89	-19609.50
63%	64%	65%	66%	67%	68%	69%
-18311.69	-16828.48	-15644.04	-14535.19	-12982.65	-11787.95	-10181.38
70%	71%	72%	73%	74%	75%	76%
-8810.23	-7367.01	-5827.62	-4383.50	-2802.80	-1479.21	-104.06
77%	78%	79%	80%	81%	82%	83%
1807.66	3846.88	5794.72	7721.79	9867.27	12363.91	14780.61
84%	85%	86%	87%	88%	89%	90%
17237.35	20378.86	23000.45	25873.81	29840.80	33690.97	37806.86
91%	92%	93%	94%	95%	96%	97%
42502.47	46496.50	52648.32	59968.19	67156.66	76334.05	90783.16
98%	99%	100%				
114921.44	153164.12	802791.71				

From Table 3, we observe that 76% of households become net benefit receivers, and the other 14% of households become net tax payers. Under this scenario, the number of people in absolute poverty decreases from 2,890,000 to 2,367,000 and the Gini coefficient of equalized income decreases from 0.3363 to 0.3289. It seems highly possible to increase ecological tax under this scenario, since more than two thirds of households will vote for the policy.

5. CONCLUSION

It is necessary to increase ecological tax in order to decrease reliance on nuclear power. As 40% of the households are exempt from paying income tax, it is not possible to overcome political resistance against ecological tax by income tax reduction. In order to persuade the increase in ecological tax, it is necessary to combine ecological tax with ecological basic income.

This paper estimated distributional effects of ecological basic income in Korea using statistical data under various scenarios. When we redistribute 80% of ecological tax revenue through reduction in income tax and social security payments, only 35% of households become net benefit receiver. When we redistribute the same amount of ecological tax revenue through ecological basic income, 57% of households become net benefit receivers. If we further provide free mass transportation in addition to money basic income, 76% of households become net benefit receivers.

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