

Principal Research Results

The Impacts of Decreasing CO₂ Emission by Changing Tax System in Japan

Background

The introduction of environment tax is considered in the government as economic countermeasures to global warming during the discussion of global warming problem. On this account it becomes an urgent subject to measure the influence of environment tax to the Japanese economy and energy demand quantitatively.

Objectives

This study provides a quantitative analysis of the impacts of environment tax on domestic energy prices, energy demands, macro economy, and industrial structure by the Long-term Economic Forecasting System in CRIEPI and evaluates the economic impacts and the effectiveness of environment tax. The baseline economy/energy scenario is the result of long-term outlook by CRIEPI that was revised in 2003.

Principal Results

Four cases are set according to the differences in imposing method of environment tax and returning method of tax revenue, and the impacts of environment tax in each case are analyzed.

- (1) In the Basic Carbon Tax Case where the reduction of income tax is assumed, the tax rate is 8,400 yen per t-C in 2010 (Table 1). Necessary carbon tax levels become higher if the rates of existing energy taxes are exempted or abolished. On the other hand, the total revenue of energy taxes and a carbon tax is smaller than that of the Basic Carbon Tax Case where the rates of existing energy taxes are not changed. It can be said that exempting or abolishing the existing energy taxes and unifying them to the carbon tax is efficient from the viewpoint of tax revenue.
- (2) As for the final energy consumption, a difference between cases is small so that reduction targets of CO₂ emission are same for all cases. On the other hand, grid electricity demand increases a little in 2010 in the cases except where existing gasoline and diesel fuel taxes are exempted compared with the Reference Case where carbon tax is not imposed because fuel substitution arises from other kinds of energy by the differences of price rise rates.
- (3) The decrease in Real GDP from the Reference Case is the smallest in the case where the carbon tax revenue is returned mainly through lowering the rate of consumption tax. They are -0.09% and -0.66% in 2010 and 2025, respectively. This is because private final consumption expenditure increases than the Reference Case. On the other hand, real GDP is the smallest in the case where the public investment in roads is decreased as shown before (Fig.1).

Future Developments

The other tax returning method, such as the manner of preventing the bad influence on employment will be analyzed and the results will be updated according to the changes in the situations.

Main Researcher: Yutaka Nagata, Ph. D,

Senior Research Scientist, Energy Management and Business Strategy Sector, Socio-economic Research Center

Reference

“The Impacts of Decreasing CO₂ Emission by Changing Tax System in Japan,” CRIEPI Report, Y03020 (March, 2004).

Table 1 The Impacts of Environment Tax

	Reference Case	Basic Carbon Tax Case	Abolishing Energy Project Special Accounts Case	Exempting Gasoline and Diesel Fuel Taxes Case	Compressed Rise in Consumption Tax Case
Existing Energy Taxes	No Change	No Change	Abolishing Energy Project Special Accounts	Exempting Gasoline and Diesel Fuel Taxes	No Change
Tax Returning Method	-	Income Tax Reduction	Income Tax Reduction	Income Tax Reduction + Decrease in Public Investment	Consumption Tax Reduction (Mostly) + Income Tax Reduction
Tax Rate (Yen/t-C)	-	8,400	9,700	10,000	8,600
Tax Revenue (Trillion Yen)	4.69	7.04	6.49	5.90	7.10
Existing Energy Taxes	4.69	4.62	3.71	3.03	4.63
Carbon Tax	0	2.41	2.79	2.87	2.47
Final Energy Consumption (PJ)	15,164	-2.5%	-2.4%	-2.2%	-2.5%
Grid Electricity Demand (TWh)	957.4	+0.0%	+0.4%	-0.3%	+0.1%
Real GDP (Trillion Yen)	525.7	-0.3%	-0.4%	-0.6%	-0.1%
Real Private Final Consumption	304.9	-0.2%	-0.4%	-0.2%	+0.2%
Real Output (Trillion Yen)	1,023.3	-0.5%	-0.6%	-0.8%	-0.2%
Material Industry	91.7	-1.3%	-1.3%	-1.5%	-1.1%
Machinery Industry	200.6	-0.6%	-0.6%	-1.0%	-0.4%
Construction	72.0	-0.6%	-0.7%	-2.3%	-0.2%
Service Industry	551.4	-0.3%	-0.4%	-0.5%	-0.0%
National Debt (Trillion Yen)	707.6	707.4	707.6	705.4	705.6
Ratio to Nominal GDP	128.0%	128.1%	128.4%	128.5%	127.6%

Note: % values except for the ratio of national debt to nominal GDP show the deviation rates from the Reference Case.

Fig.1 The Decrease in Real GDP per Reduced CO₂ Emission

