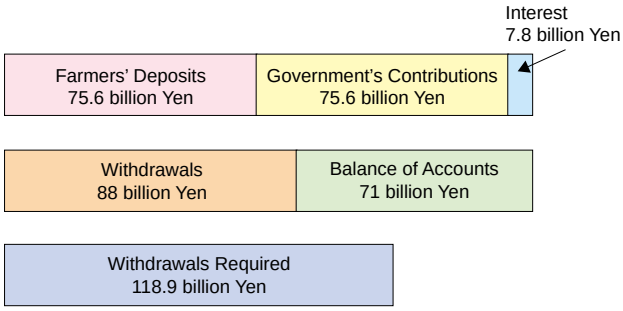


Fig.2. Deposits and Withdrawals for Savings Accounts Program

Table 1. Average Damage Ratio by Type of Insurance

Type of Insurance Program	Coverage Level		
	70%	80%	90%
Single-Crop-Based Revenue Insurance			
Rice	1.28%	2.02%	3.44%
Wheat	6.55	9.14	12.26
Soybeans	8.40	11.16	14.24
Vegetables grown outdoors	3.62	5.58	8.37
Vegetables grown in greenhouses	9.28	11.07	13.60
Apples	1.66	3.30	5.86
Oranges	3.69	5.52	7.98
Dairy	0.38	0.58	1.17
Combined Revenue Insurance for Rice, Wheat and Soybean			
Combined Type	0.74	1.44	2.87
Sum of single crop-based insurance	2.47	3.58	5.30
Total-farm Revenue Insurance			
Agricultural Revenue	0.80	1.62	3.21
Net Farm Income	5.08	7.11	9.80

Estimation of Economic Effects and Environmental Loads of the Recycling of Food Waste Using Input-output Techniques

Taiji YOSHIDA

1. Objective and method

The objective of this study is to measure the effect on economic activities and the minimizing effect on environmental loads by promoting the recycling of food, such as remains from food manufacturing and processing, and waste created during the distribution process and by the food service industry, as valuable cyclic resources for fertilizers and animal feed, as well as for biomass energy. Furthermore, the study was also intended to measure how the promotion of food recycling may affect the induced effect of labour and the self-sufficiency rate of foods, and to discuss by comparison the effect of new policy planning methods to create a recycling-oriented society.

More specifically, the above estimation involved an input-output analysis to measure the effects on both economy and employment created by the recycling of food resources, as well as measuring environmental loads. Moreover, the estimation included a) the measurement of effects by food recycling for fertilizers and animal feed and b) the measurement of effects by food recycling for biomass energy.

2. Outline of the results

(1) Basic assumptions

By referring to the 1995 input-output table, 30% of food waste discharged by the food industry (food wholesalers and retailers, food service industry, hotel and holiday accommodation industry) was recycled, 60% of which is for animal feed and 40% for organic fertilizers.

The effect on the national economy was measured using GDP (gross domestic product) and the effect created on environmental loads was measured using the amount of Co2 discharged.

(2) Results

a) GDP increased by 10.8 billion yen and the total number of employment in all the industries increased by 14,000.
b) The level of Co2 in all industries except the civil sector was reduced by 36.5 1000t-Co2.

The above results confirm to a certain extent that food recycling has a positive effect on the national economy and that it also has a minimizing effect on environmental loads in Japan.

The results by industry are indicated in the graph.

(3) The remaining problem

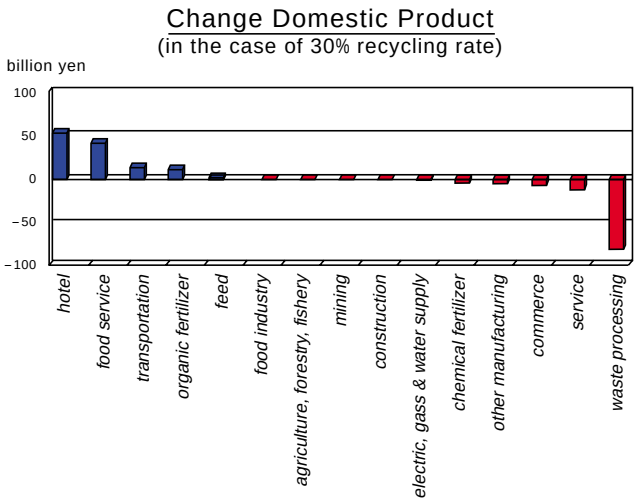
Due to insufficient data for an economic analysis, the estimation of bio-energy recycling could not be calculated.

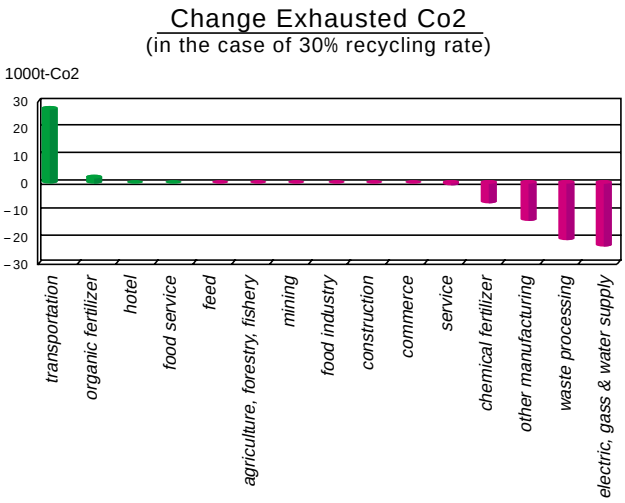
3. Related publication

Yoshida, T. (2002.7) Estimation of economic effects of the recycling of food wastes, *PRIMAFF Review* 4.

Research members

Taiji Yoshida and Tetsuro Yakushiji





Development of a Method for Econometric Estimation of Technological Innovation in Agricultural Production

Shunji ONIKI

1. Objective

This study develops econometric models to estimate technological changes in agricultural production, and conducts empirical analysis using the models. Using aggregate data for Japanese rice production, relationships between innovation based on capital investment and innovation toward quality improvement of the products are investigated. Also, the possibility of long-run growth in agricultural production under environmental constraints is examined.

2. Method

Panel data has been compiled for the rice production, and the quality index of rice covers eight areas over the 16 year period (1984-99). Using the data, a translog cost function model including a variable of product quality is estimated. Relationships between the quality index and the total factor productivity (TFP) are also tested in regression models.

3. Outline of the results

(1) The rates of increase in the quality index and the rates of increase in yield are higher where yield per hectare in the initial period is lower, implying the quality improvement accelerates as the yield increase stagnated (Table 1). Quality improvement has significantly contributed to an increase in productivity.

(2) The panel data analysis reveals a negative relationships between the yield and the quality index (Table 2).

(3) Changes in the output levels, as well as technological changes, affect demand for the intermediate inputs, such as fertilizers and chemical, while changes in the product quality do not shift the demand significantly (Table 3). These results imply that quality-based innovation is induced as effects of innovation based on capital investment diminish. In addition, the amount of the intermediate inputs per output adjusted by the quality changes in the product does not continue to increase, due to the quality improvement. Thus, sustainable growth under environmental resource constraint is possible considering the quality-based innovation.