

This report examines farm income variability and new farm income stabilization programs ("safety nets"), namely revenue insurance and NISA-type risk management savings accounts in Japan. This analysis is based on Farm Economy Survey data from 2,854 farms taken by the Ministry of Agriculture, Forestry and Fisheries in Japan from 1995 to 1999.

## 1. Variability of farm income

Observing the annual fluctuations in farm income based on the Farm Income Diffusion Index<sup>1)</sup> (DI), we see that the DI declines not only in 1996/97 and 1998/99, when the average farm income falls below that of the preceding year, but also in 1997/98 when the average farm income exceeds that of the preceding year (see Fig.1). This negative Farm Income DI indicates that the earnings of more than half of all farms was less than that of the previous year, illustrating a decay of business confidence in rural areas. By combining average annual farm income with the Farm Income DI, the effects of farm income fluctuation on the farm itself and surrounding rural economy can be evaluated appropriately.

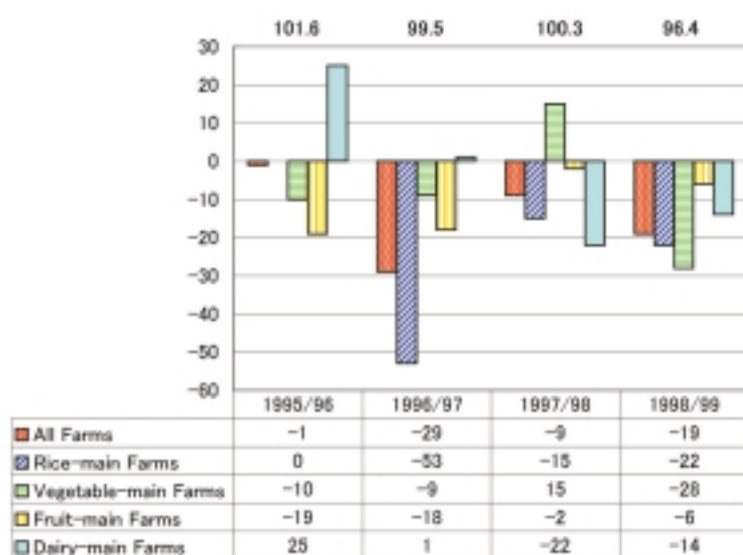


Fig.1. Farm Income DI for 1995-1999

Note: The figures in the upper margin are the percentages of the current year's average farm income compared to the previous year's.

## 2. Simulation analysis of farm income stabilization programs

### (1) Revenue insurance programs

This report examines three types of revenue insurance models: crop-based revenue, combined-crop revenue (rice/wheat/soybeans) and total farm revenue. Under these models, average damage ratios<sup>2)</sup>, which are approximate to insurance premiums, are calculated for a simulated ten-year period, as shown in Table1.

a) Calculation using the crop-based revenue insurance model shows that the damage ratios for each crop are quite different. The damage ratios for rice and dairy are low while those for wheat, soybeans and greenhouse vegetables are very high, about 12-14% at the 90% coverage level.

b) The damage ratio of combined-crop revenue insurance for rice, wheat and soybeans is much lower than the average damage ratio of any three single crop-based insurance programs. This is largely due to the offsetting effect of rice, which has a low damage ratio while making up the majority of farm income.

c) The damage ratio of total farm revenue insurance is low and remains about 3%, even at the 90% coverage level.

### (2) NISA-type savings accounts program

Using Canada's NISA-type model and including interest, calculations of farmer's deposits and government's contributions over a simulated ten-year period produced a total amount of 15.9 billion yen, much greater than the 11.89 billion yen withdrawal required to stabilize net farm income fluctuation (see Fig.2). However, the amount actually withdrawn was only 8.8 billion yen, leaving 7.1 billion yen in the accounts as a reserve. This implies that even if higher contribution rates were applied to the account balances, certain farmers would dry up leaving those farmers unable to withdraw the amount they needed, while other account balances would accumulate annually beyond farm needs.

note 1) defined as the percentage of farms with year-on-year increasing income minus the percentage of farms with year-on-year decreasing income

2) obtained by dividing claims paid by amount insured

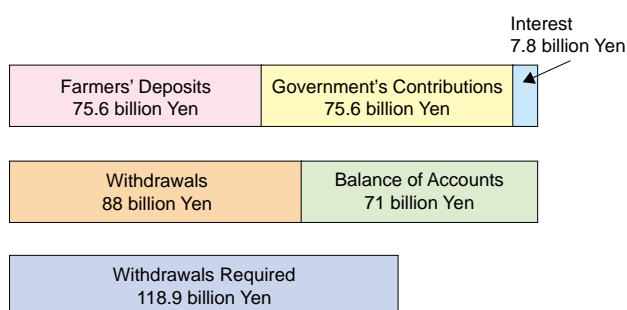


Fig.2. Deposits and Withdrawals for Savings Accounts Program

Table 1. Average Damage Ratio by Type of Insurance

Type of Insurance Program	Coverage Level		
	70%	80%	90%
<b>Single-Crop-Based Revenue Insurance</b>			
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
<b>Combined Revenue Insurance for Rice, Wheat and Soybean</b>			
Combined Type	0.74	1.44	2.87
Sum of single crop-based insurance	2.47	3.58	5.30
<b>Total-farm Revenue Insurance</b>			
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.