

《研究ノート》

## A Case for Restricting Rice Import

Takao Fujimoto

1. Asked whether to agree to lifting the ban on rice import conforming to an agreement of the Uruguay round, quite a few economists are likely to answer in the affirmative because they believe a tale told in those simple or complicated models which show the Pareto optimality of competitive equilibria. It is generally observed, as the material affluence has been enhanced in developed countries, that economists as well as politicians have started to regard every protective policy as something backward or even evil inherited from the pre-capitalist days. Interestingly enough, protective policies have often been maintained by top government bureaucrats, thus representing the 'conservative' side under chronic criticism of 'progressive' experts. We know there are always authority-inclined academics, and so top bureaucrats are not all alone.

2. The restrictions on rice import was removed because of the pressure from US, and rice was put on the same ship as vegetables and dairy products. For worse, the summer last year was terribly cool and produced a miserable rice crop. (This year, in 1994, we had an exceptionally hot and dry summer. What an ordeal Nature renders to us!) Since Japan had last year an allegedly insufficient supply of rice, the removal of

restrictions appeared natural and timely, at least to many (should I say 'some?') people. When uncertainty comes into play on a large scale, however, it may become important for Japan to keep up the level of rice production. This is for the sake of world welfare, not for the Japanese people only.

3. When uncertain fluctuations in the level of outputs are small, most traditional propositions will surely hold good, and no new findings can be expected. Fluctuations may be large, but many countries have them in different directions, then making mutual offsets brings traditional theories with certainty to the front again. When I wrote in the above 'on a large scale', it was meant fluctuations are not negligible and at the same time coherent or co-directional in many countries. A simple model explained below will remind us of an old saying, "don't put all your eggs in one basket."

4. We consider an  $n$  country model. There are only two commodities called *rice* and *tractor* respectively. The  $i$ -th country has to spend  $l_i$  units of labour force to produce one unit of rice, and  $\lambda_i$  units of labour force to produce one unit of tractor. The  $i$ -th country has its working population  $p_i$ . Uniformly all over the world, one unit of labour force (simply one worker (per year)) needs  $c$  units of rice and  $t$  units of tractor to reproduce itself properly. We assume

$$A1. l_1 > l_2 > \dots > l_n.$$

$$A1. \lambda_1 < \lambda_2 < \dots < \lambda_n.$$

The world demand for rice is  $D_r \equiv c, \Sigma p_i$ , where the summation is taken for  $i = 1$  to  $n$ , while the demand for tractors is  $D_t \equiv t, \Sigma p_i$ . We write the

world population  $\sum p_i$  as  $P$ .

To minimize the necessary labour force to meet the world demand for both rice and tractors, the obvious way is:

- (1) countries  $v$  through  $n$  specialize in the production of rice, and
- (2) countries 1 through  $u$  specialize in the production of tractors.

This implies that

$$\sum_{i=v}^n (p_i/l_i) \geq D_r \text{ and } \sum_{i=1}^u (p_i/\lambda_i) \geq D_t.$$

We assume these inequalities are satisfied with  $u < v$ . Some amount of overproduction is to be neglected. The countries from  $u+1$  to  $v-1$  can ask for foreign aids to support their respective people. The remaining countries have to trade with each other to survive.

To simplify our story, let us in addition assume that each country has the same population  $p$ . Then,  $D_r = c_r n p$ , while  $D_t = c_t n p$ , and the inequalities are now:

$$\sum_{i=v}^n (1/l_i) \geq c_r n \text{ and } \sum_{i=1}^u (1/\lambda_i) \geq c_t n$$

5. When uncertainty is allowed for so that each country's per worker production follows a some probability density function, the minimization problem above has the same solution so far as the *expectation* of total products are required to be not less than the world demands. In this case, however, there can be 'bad' years when the actual world supplies of rice and tractors are less than the demands. So, some people sometimes suffer from malnutrition or even worse from starvation. If probability distributions are independent, and their exact functional forms are known, it may be easy to calculate the variance of the world supplies. The point of this tentative note is that if those uncertain fluctuations are not independent but mutually co-directional among large

groups of countries, the variance of the resulting world supplies would be greater than in the case where independence is assumed as has been frequently done.

6 . The foregoing discussion should not be easily dismissed as unrealistic after we experienced an extremely 'unproductive' summer in the Northern Hemisphere last year. Global or semi-global climatic changes are not at all rare in a period of ten years. They seem to take place more often in the coming future perhaps due to the green house effect or due to more destructive human activities everywhere on the earth.

7 . Forget about 'efficiency anytime and anywhere.' In a simple model of sections 4 and 5, if each country produces a certain amount of rice, the variance of world supplies will be made smaller, the more realistic hypotheses we make concerning the probability density functions ruling the outputs of rice. The same is true with tractors, but varied levels of production of tractors may be more tolerable than those of foodstuff. It is not difficult to conduct simulations on personal computers and draw the graphs of world supplies. Given simplifying assumptions, one may adopt a two-parameter (mean-variance) approach to determine the optimum level of rice crop in each country based on a world(ly) welfare function.

8 . One more danger we have to face when the whole Japan is affected by an extraordinary season and has poor crops, she should be out for the world market to buy grains and vegetables. As is often argued, the 'Big Stomach' raises the prices of foodstuff, giving extra pressure to the people of other countries. This is a matter of life and death. On the other hand, the restrictions on rice import decrease the national incomes of other nations by some amount, though continuously, but we may be able to devise out a method of compensation.

9. To establish an international organization which is aimed at storing various grains can mitigate fluctuations in outputs. This will not, however, change the story told above. The international grain stock lessens the variance of supplies, and does not allow countries to specialize in particular commodities pursuing efficiency. Avoiding disasters in a satisfactory way while enjoying efficiency as the fundamental theory orders seems to require prohibitive amount of grain stock. And yet, whatever level of common grain stock under good administration is desirable and will be indispensable to distribute risks over years. Equally necessary will be the establishment of agreeable rules of how to share the costs and how to ration the stock among countries.

10. The model in sections 4 and 5 is too naive to be taken seriously. An alternative specification is that we try to maximize the utility of the representative consumer. Full employment in each country is imperative. Maximization proceeds in two steps. First, we satisfy the demand for rice. Then in the second stage, we employ the remaining workers to produce tractors. Let us explain in more detail. If the amount of rice is below a certain level, the utility is extremely low. While the amount of rice is above that level, the utility is more or less constant. Adding a unit of tractor increases the utility. As in a Heckscher-Ohlin model, we have to introduce relative prices. We may think of competitive 'equilibrium', providing a good benchmark with no glass broken. In this case, more general results concerning the existence and stability of an equilibrium can be put forward. Comparative statics may form one branch of the subject. These will be studied in the future papers.