The influence of trade value to rice agriculture in Japan

Shingen Yamamoto[1*], Yutaka Takahashi[2] and Eiichi Yamaguchi[1]

1 Doshisha University, Technology and Innovative Management Program
Karasuma-higashi-iru, Imadegawa-dori, Kamigyo-ku, Kyoto-shi 602-8580 Japan
2 Senshu University, School of Commerce
2-1-1 Higashimita, Tama-ku, Kawasaki-shi Kanagawa 214-8580 Japan
*Correspondence to: Shingen Yamamoto. E-mail: shingenome@gmail.com

Abstract

In Japan, rice cultivation is strictly regulated by the national government and Zen-noh, the farmers' association. Although there is much room for rice cultivation space, the government requires farmers to decrease their cultivation in order to keep price at the standard level. Indeed, the government pays for non-cultivation, neither for increasing production nor increasing productivity. Thus, this policy leads that farmers abandon their agriculture skills and some of them simply receive the subsidy not to cultivate and are working for other business companies. However, one can easily find food shortage in all over the world. This research builds a model to simulate rice production in market mechanism. The model shows that it sustains sound condition in rice production and price level without strong regulations. The result suggests that Japan can contribute rice production not only for domestic market but also for international society through free trades.

Introduction

We study the influence that the introduction of varieties and cultivation methods for direct seeding and the change in the policy give to rice agriculture in Japan. Its rice agriculture is restricted due to problems of aging farmers, abandoned fields, and shortage of farmers.

The effect of the governmental rice policy in Japan on producers, consumers, and government expenditures from 1986 to 2010 studied using a partial equilibrium model (Takahashi, D., 2012). Policy measures include government purchase of rice, output payment, and acreage control. The simulation result shows that acreage control has been the principal policy measure for transferring income to producers, especially since the enforcement of the WTO Agreement on Agriculture.

Since the individual income support system for agriculture was introduced in 2010, agricultural policy, including the rice crop has been changed dramatically. As rice is one of the most important crops in Japan, the Japanese government has strongly protected its domestic production by using law and institutions, specifically by imposing 341yen/kg customs duties on imported rice under the WTO Agreement. On the other hand, the duties of fruits and vegetables have become lower and lower because their competitiveness has become higher and higher.

Papachristos, Georg. (2011) studied a model that captures the unfolding dynamics of an existing technological regime and the emerging niches as they compete and respond to

landscape pressures. Formal modelling of socio-technical transitions have so far focused either on reproducing known historical case studies or on generic transition models that encompass some of the characteristics of the underlying processes.

In the present study, we have developed a model based on system dynamics, and found out reasonable scenarios of agricultural trade. This situation has stepped forward in northeast Asia.

Methods

System dynamics is a computer-aided technique, and can be used for policy analysis and design. It is applied to dynamic problems arising in complex social, managerial, economic, or ecological systems - literally any dynamic systems characterized by interdependence, mutual interaction, information feedback, and circular causality (Kelly (Letcher) R. A. et al., 2013).

We have used system dynamics software called Vensim (Ventana Systems, www. vensim. com) in the present study. When we make the model, we interview farmers and policy makers. We gather statistics compiled by the Ministry of Agriculture, Forestry and Fisheries, Japan, Rice Year Book Economic Research Service, U.S. Department of Agriculture, FAOSTAT (http://faostat.fao.org/).

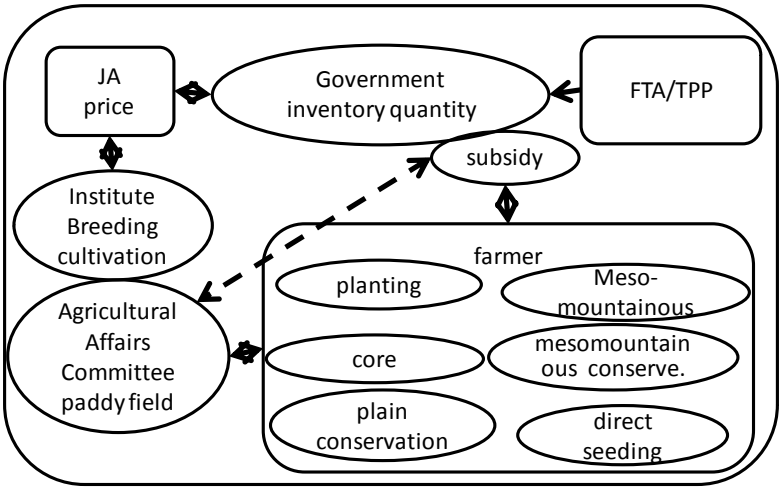

Figure 1 System Dynamics model

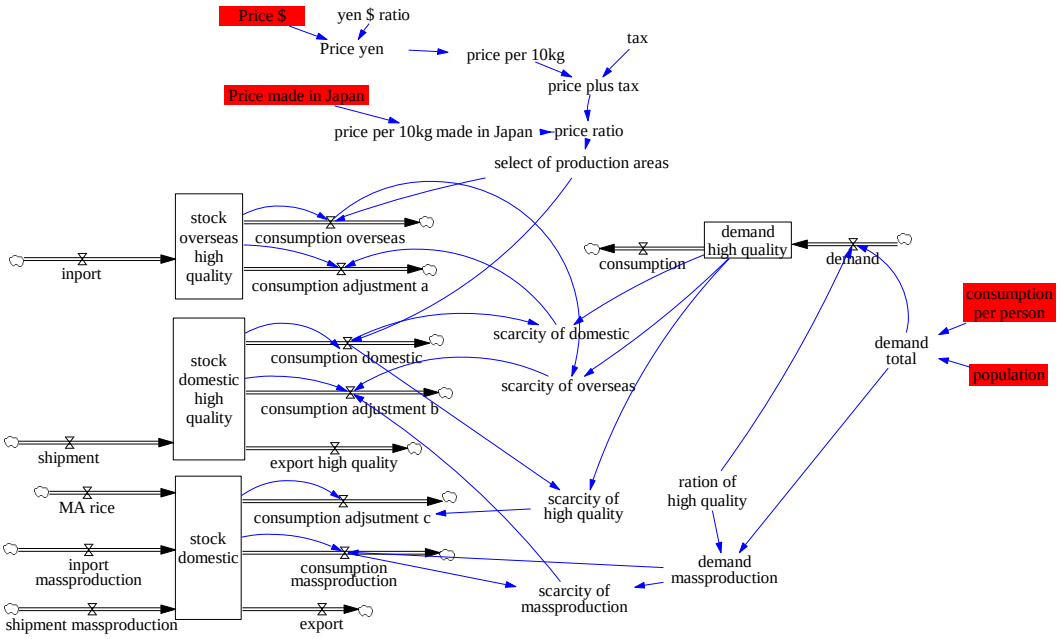

Figure 2 Inventory and price sector in the model

In the model, the result is reflected and sectors divide by rice inventory and price, rice cultivation, land use, farmers (Fig.1). Rice inventory constructs high quality and mass production (Fig.2). In Taisho period (1912-1926 CE), Rice isn't made an adequate quantity in Japan, Rice is imported goods from Taiwan and Korea. In the lean year, Prices rise higher. Japan's government is selected to state trading.

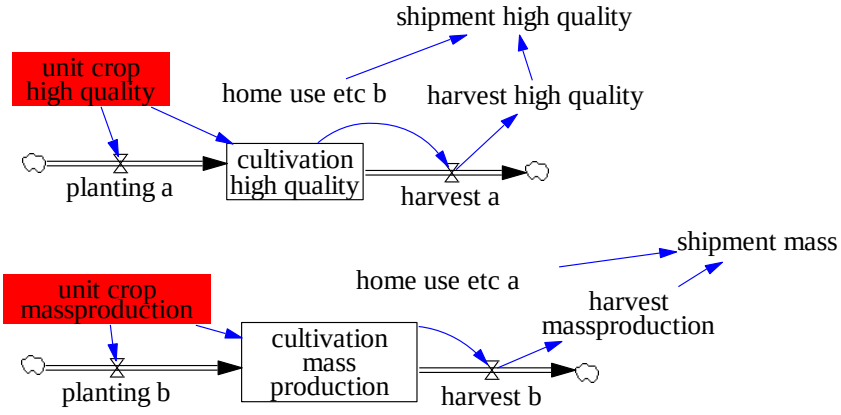

Figure 3 Rice cultivation sector in the model

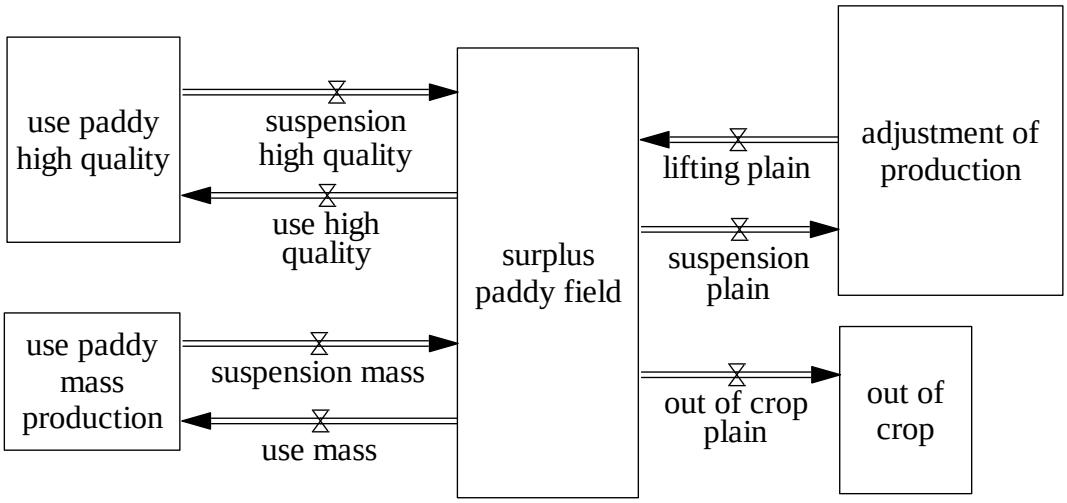

Figure 4 Land use sector in the model

Rice cultivation constructs high quality and mass production. (Fig.3). Land use expresses used and unused field (Fig.4). Farmer can't buy and sell field freely by low. Farmers are divided by cultivation method and management (Fig.5). These sectors are connected by feedback loops.

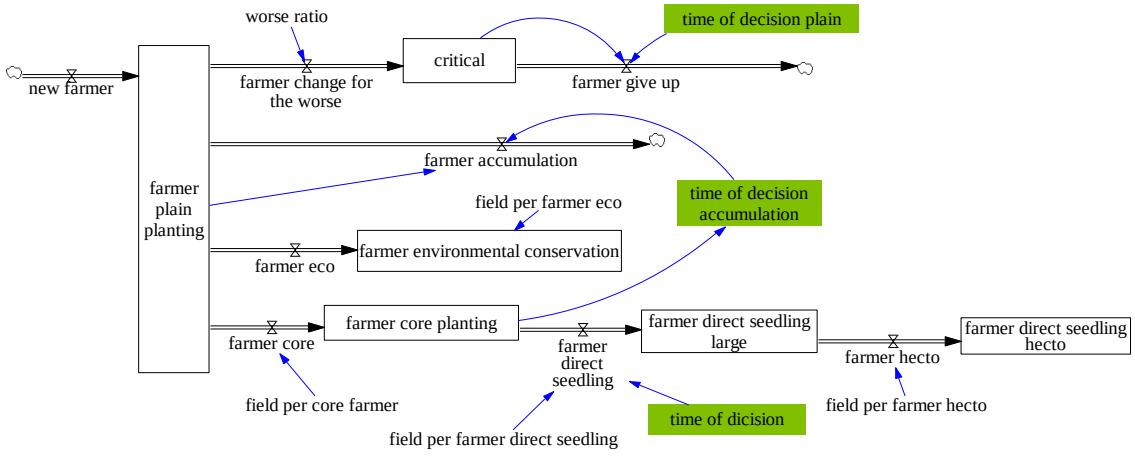

Figure 5 Farmers sector in the model

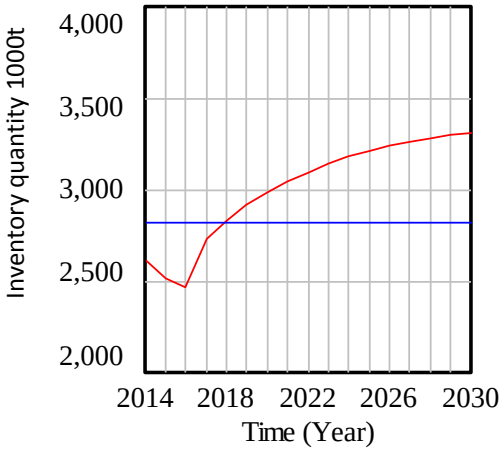

Figure 6 Inventory on import 1,000,000t export 500,000t FTA condition

Results and Discussion

Policy measures four stocks, inventory quantity, the number of the farmers and rice production. Three key variables are unit production, worse ratio of management and rice price. Government promote agriculture reform, legal controls don't change.

The alleviation of production control, the subsidy for farmers who introduce new technology and the subsidy for farmers who is planning to retire. When we carry out the alleviation of production control and start two new subsidies in the model, we know the distribution ratio of farmer changes and production increases by technology innovation.

As a result, farmers who introduce new technology will take over the charge of conventional farmers, cultivate wider areas of rice field, export to abroad and then inventory is stable (Fig.6). Free trade agreements represented by TPP (Trans-Pacific Partnership) will eliminate or reduce tariffs comprehensively on agricultural, forestry, and fishery products. The alleviation of production control and the reapportioning of subsidy, called the individual income support system for agriculture, promote to participate in Free trade agreements and stable stocks brings competitiveness by export and peace by aid for the underdeveloped countries. The model matches the condition 1995-2013 in inventory (Fig. 7), farmers number and paddy field (Fig. 8).

Finally, farmers can cultivate wider and increase the production. In the environment restricting competition and resource allocation, government allocates subsidy to the middle farmers and promote to manage effective. This is a new innovation management method in the environment restricting competition and resource.

Conclusion

Our model includes rice inventory and price, rice cultivation, land use, farmers sectors. We try scenarios in FTA condition, the amplitude of vibration in inventory quantity from 2014 to 2030 falls in the range from 1995 to 2013. The model matches the past condition in 1995-2013. FTA is said to be lack of inventory quantity. FTA is more stable inventory quantity in technology innovation introduced cultivation methods for direct seeding.

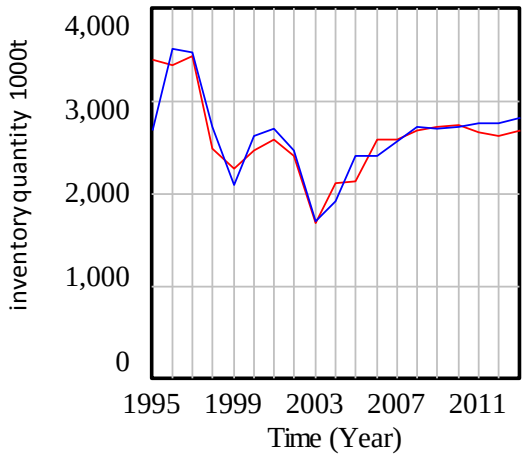

Figure 7 Baseline analysis Inventory quantities 1995-2013
Red simulation, Blue measured value

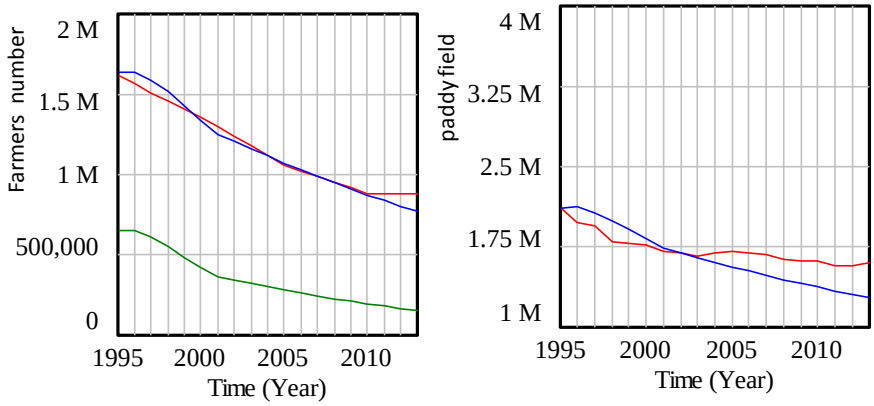

Figure 8 Baseline analysis Farmers number and paddy field 1995-2013
Red simulation, Blue measured value, Green mountainous region

Reference List

Takahashi, Daisuke, (2012) The distributional effect of the rice policy in Japan, 1986-2010. Food Policy 37:679-689.

Papachristos, Georg (2011) A system dynamics model of socio-technical regime transitions. Environmental Innovation and Social Transition 1:202-233.

Kelly (Letcher) R. A., Jakeman A. J., Barreteau O., Borsuk M. E., Elsawah S., Hamilton S. H., Henriksen H. J., Kuikka S., Maier H. R. Rizzoli A. E., van Delden H., Voinov A. (2013) Selecting among common modelling approaches for integrated environmental assessment and management. Environmental Modelling & Software 47:159-181.

Acknowledgement

This work was supported by MEXT-Supported Program for the Strategic Research Foundation at Private Universities, 2009-2013."