

Long-term Grain Market Projection with Considerations on the Availability of Arable and Irrigation Land : Development and Use of Resource Constraint Pilot Model

Sotaro INOUE, Atsuyuki UEBAYASHI, Koichiro AKASHI and Shunji ONIKI

Summary

As the earth's resources are limited, the expanding demand for food caused by world population growth will lead to serious food shortages. This gloomy prospect for the future of human society dates back to Thomas Robert Malthus and is still widespread in various forms. This study develops a new type of international grain market model, Resource Constraint Pilot Model, that introduces the availability of arable and irrigation land which are the most important resources for agricultural production, and explores the effects of resource constraints on the food market in the long term. In the model, resource constraints are treated as conditions for the profit maximization behavior of multi-output producers with allocatable fixed inputs.

Scenario analysis using this model shows that the international grain prices are expected to level off during the period from 2000 to 2030. Moreover, after a certain point of time during the forecasting period, the international prices are expected to decline. These findings counter the assertion that serious food shortages will occur in the future. Furthermore, it implies that Japan's food policy should be based on the assumption that pressures to increase grain imports due to slackness in the international grain market will become stronger.

The model also describes the changes of export and import country structure under various scenarios. For example, by assuming more restricted availability of arable and irrigation land, ASEAN is expected to transform from a net exporter of rice to a net importer, and the model quantitatively illustrates the effects of this emerging import demand on the other countries and regions. Our model assists the discussions on the future grain markets from multiple points of view, which combine the possible changes of resource availability and the function of the price mechanism in grain markets.