Contemporary Global Rice Economies: Structural Changes of Rice Production/Consumption and Trade

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Summary Production technology for rice in the world has been advancing. The supply curve has shifted to the rightward and become flatter over time as well as the scale of economies have been enlarged in many countries. This has led to a great increase in yield per ha. and greater production globally. Accordingly, the rice prices have been becoming more stable and cheaper over time in real term despite of price hike around 2010. Potential of rice production increases for the future is quite large, while demand for table rice has been somewhat stagnant in major producing countries. Because the technology advancement is overwhelming in all food production, it would be hard to expect a global food shortage in the future, unless man sabotages. Developments of new products using rice for functional food may be important for the rice industries, therefore. Meanwhile, in the global rice economies, japonica rice markets are becoming phenomenal in high demand relative to indica. This may be possibly due to a globally long-lasting booming of Japanese restaurants featured by Sushi. Demand for japonica rice has been so strong that the prices of japonica rices are about double of indica rice. Because of short in supply relative to demand for japonica rice marketed globally, there are emerging japonica rice production in many rice producing countries shifting from indica rice to japonica, although the japonica rice production in each new area is still small.

Key Words global rice, production technology, indica/japonica rice, market prices

Global Production and Trade
The global rice supply and demand has been evolved. During the last half century, rice production increased from 213 million metric tons (MMT, milled basis) in 1970 to 491 MMT in 2018, a 231% increase, while the global population increased from 3.7 billion people to 7.5 billion, a 201% increase during the same period. The production growth is greater than that of population (1). The global rice consumption just follows the pace of production as seen in all grains. The top rice producing/consuming country is China followed by India. The two countries account for as much as 52% of the global total. The volume of trade relative to total production used to be quite small in rice. However, it dramatically increased over time. The international trade was 8 million tons, at 4.0% relative to production in 1970, increased to 49 MMT, at 10% of production in 2018. The trade increased nearly 6 time during the last half century. The rice trade used to be labeled as “thin markets” due to the small amount of trade relative to the total consumption and its characteristics of non-explicity to the society. However, recently the rate of trade relative to the total global consumption is rather close to that of corn at 15% in 2018. The largest rice exporter is now India. Thailand was the long lasting rice exporter until 2011. However, India, which used to be unstable rice expoter, emerged all of a suden as the largest since 2012 (2). Now, Thailand is the second followed by Vietnam and the United States. Because China is the larges rice producer/consumer and holding enormous and excessive amount of rice stocks, it would not be surprising even if China emerged to be the largest rice export any time.

Price Movements of Rice
Rice prices fluctuate much harder than other grains. This is something to do with the situation that the major rice producers, consumers and exporters have been mostly developing countries, where the infrastructures have been relatively poor and not so efficient. Accordingly, while the moving directions of the prices over time are basically the same, the magnitudes of the movements of rice are quite larger than the others’. Especially during the recent price hike during say 2007 and 2014, again the rice prices rose sky-high. It was historically the highest in May 2008 along with the crude oil prices. As the oil prices plunge afterward due to so-called “the Leman-shock,” the rice prices also plunged (3). It was so as long as the nominal prices viewed.

On the other hand, as long as the real prices which are converted by the series of the CPI (consumer price index) over time are observed, the rice price in 2008 was only a third of the one in 1974 when the food crisis was seriously considered and actual many deaths were reported in various developing and economically poor countries.

Is Food Crisis Coming?
The price hike during like 2007 and 2014 peirod appeared to be a scary food shortage and emergence of
food crisis. In fact, many media used the term “food crisis” at that time. Historically, just before that price hike period, the grain prices were the lowest in the real term, while the productions increased over time. This increase is due to the technology improvements pushing the supply curve to the right and flatter (4, 5). Technology innovation in all aspects including production for grains, transportation with better cars and roads and harbors and ships as well as airplanes, communication, etc. have been improved and helped to cut down the costs.

While the technology innovations go on, rises in prices put additional incentives on producers to increase production. In fact, compared with the situation in 2006 just before the price hike and 2014, the end of the hike period, the production increases are extravagant (Table 1). While the global population growth rate was 9.5% during the period, the growth rates for rice and wheat were 14.3% and 20.0%, respectively, while the ones for corn and soybeans are surprisingly 37.5% and 29.2%, respectively. The power of market prices toward the producers are indeed large all over the world. This is the same throughout the industries including agriculture. The global grain productions have practically been increasing even after the prices somewhat got down after the hike.

This evidence provides us with a confirmation that there is a large amount of potential to increase the production further more in the future due to both technology improvement and incentives from price hike. In the Cerrado area, Brazil, there are as much as 200 million ha. and a half of it can be developed for agriculture after considering the environmental protection. However, only around 50 million ha. appear to have been developed so far (6). Further, there is another great amount of areas to be developed in Sub-Saharan areas which are more or less the same geographical situation as the Cerrado (7). Another global price hike of grains, if ever happened again, would lead the society to pay attention to African undeveloped areas and certainly the other areas in the world as well for more food production. Considering all those things, it may be hard to imagine that a food crisis, which would cause deaths from hunger, should be coming in this society, unless man sabotages. Instead, the situations rather encourage us to develop further demand for grains including rice such as for functional food use as well as feed use, etc. should be more vitally explored.

**Emerging Japonica Rice**

Japonica rice used to be a minor crop relative to indica rice. Some changes occurred when Japan started rice imports in 1995 under the GATT agreements (currently WTO agreements). Starting at this point, the japonica

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**Table 1. The global growth rates of population and grains during 2006–2014.**

<table>
<thead>
<tr>
<th>Total growth rates 2006–2014</th>
<th>Numbers in 2014</th>
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<tbody>
<tr>
<td>Populn.</td>
<td>9.50%</td>
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<tr>
<td>Rice</td>
<td>14.30%</td>
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<tr>
<td>Wheat</td>
<td>20.00%</td>
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<tr>
<td>Corn</td>
<td>37.50%</td>
</tr>
<tr>
<td>Soybn.</td>
<td>29.20%</td>
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Note: Rice is milled-based.

![Fig. 1. Price movements for japonica and indica rice (Aug. 2002–Oct. 2018)](https://via.placeholder.com/150)
rice prices have continuously been staying above the indica rice prices, although they had been equally competing with each other before. Japanese government has been importing as much as 700,000 metric tons (milled rice basis) a year consisting of mainly japonica rice, which is commonly consumed in Japan. When the indica rice prices became historically the highest in May 2008 and plunged afterward, the japonica rice prices climbed up even further due to the Japanese rice imports expected to come (Fig. 1).

In addition, the global booming of the Japanese restaurants represented by sushi have been widely spread, and demand for japonica rice has been stronger ever before. The largest producer of japonica rice is China, whose rice exports have been quite limited, while other relatively large producers are Japan, S. Korea and Taiwan as well as California. Among those, California is the largest japonica rice exporter at about 700,000 metric tons a year. Accordingly, the California japonica rice market prices have been considered to be the global representative prices for the japonica rice. Most recently in October 2018, at which the indica rice prices were at about 550 dollars a metric tons, the japonica rice prices were at around 850 dollars, approximately 300 dollars above the indica rice.

Because the japonica rice prices stay way above those of indica rice, the indica rice producers have been switching partially to japonica rice in many areas in the world to provide the products to the Japanese restaurants. Even in tropical areas where indica rice is suitable to grow, some japonica rice varieties have been produced more and more.

When it comes to the retail prices, the japonica milled rice is being sold as expensive as 5 dollars a kilogram or more, some cheaper to a certain extent. At the supermarkets in the U.S. they sell Japanese style lunch boxes, rice balls, and sushi, etc., in addition to the raw rice. This model at supermarkets have been spread everywhere in the world, some extensively and some others beginning to learn the model. The number of Japanese restaurants have been increasing (8). Understanding those global situations of the Japanese restaurants, the global booming of Japanese food should continue to last for the next two decades. Consumption and trade of japonica rice should increase as well, and increases in the japonica rice production is expected in various areas in the world, therefore.

**Conclusions**

The evolution of rice supply/demand, trade and price movements is quite remarkable. During the last half century, rice production has been increased by 2.3 times when the global population by just 2 times. Rice trade volume has increased at much greater speed at nearly 6 times accounting for a 10% of total consumption, which compares the rate of 15% for corn. Rice may not be considered to be a thin market any more. The global rice production technology has been advanced over time and is quite flexible and sensitive to the market price movements. During the global price hike from 2007 to 2014, rice production increased by nearly 15% while the global population increased only by 9.5%. This indicates that the potential to increase rice production in the future may be quite large due to the fact that there are huge areas that can be developed for agriculture in Sub-Sahara, Cerrado area in Brazil and many other areas in the world. Some high market prices as well as technology innovation should certainly encourage development of those areas for agriculture.

Accordingly, the global food crisis may be hard to imagine and rather new demand for rice should be developed. Some functional food use and feed use, etc. for rice may be important for the entire rice economies.

**Disclosure of State of COI**

No conflicts of interest to be declared.

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**REFERENCES**


5) Baldwin K. 2011. Consolidation and Structural Change in the U.S. Rice Sector. https://usda.library.cornell.edu/catalog/utl8=%E2%9C%93&search_field=all_fields&q=Consolidation+and+Structural+Change+in+the+U.S.+Rice+Sector

