タイトル：米価の下降とその影響：宮城地方の家畜農に関するケーススタディ

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雑誌名：東北大学情報リポジトリ
7th series, Geography

巻号：56

ページ：35-48

発行年：2009-03

URL：http://hdl.handle.net/10097/45272
The Price Decline of Rice and its Effects on the Family Farm: A Case Study of the Tohoku Region

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Abstract The price of rice has declined rapidly since 1995. The response has been to restructure Japanese agriculture not by increasing the size of farms but by diversifying farming management with labor-intensive crops. The dependence on rice to secure agricultural income is still high in the Tohoku region, and thus the price decline for rice has directly decreased agricultural income in the area. The plan for restructuring farm management in the Tohoku region is the same as that on the national scale, that is, converting rice monoculture farms to diversified management. However, much of the Tohoku region grows rice as the main crop of diversification. Further decreases in the price of rice will have a negative impact on these farms.

Key words: price decline of rice, rice monoculture farm, diversified farm, Tohoku region, Japanese agriculture

1. Introduction

Since the mid 1990s, the World Trade Organization (WTO)'s globalization has affected Japanese agriculture. A series of trade liberalization policies rapidly increases agricultural imports and decreased the price of domestic agricultural products. Thus, the liberalization resulting from the WTO's globalization forcibly reduced Japan's agricultural production.

The decline of Japanese agriculture is obvious; the gross domestic product (GDP) share of agriculture decreased from 9% in 1960 to 1.6% in 2005. Similarly, both the number of farm households and the acreage of cultivated farmlands decreased. From 1985 to 2005, the number of farm households decreased 35%, while farmlands decreased 20%. At the same time, agricultural output decreased about 24% from 11,540 billion yen in 1985, the peak year, to 880 billion yen in 2005.

This declining and restructuring tendency has progressed swiftly because of the decline in the price of rice. Although rice plays a key role in Japanese agriculture, the share of rice to agricultural output decreased from 32% in 1985 to 23% in 2005. On

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Science Reports of Tohoku University, 7th Series (Geography) Vol. 56, Nos. 1/2, 2009, 35-48
the other hand, that of vegetables and livestock increased. Thus, various kinds of crops other than rice became key crops in Japanese agriculture. After the new Food Law of 1995 became effective to replace the Food Control Law of 1942, the price of rice began to drop rapidly, decreasing agricultural income and damaging the income of farm households.

Such a policy shift directs the trend of agricultural reorganization. This phenomenon becomes interesting because it has been regarded as a serious structural problem and an objective of policy research. In particular, Hokkaido, Tohoku and Hokuriku are studied as regions of interest. Those areas are also representative rice production regions in Japan. The main concern of these regions is clarifying formation or development factors of competitive large-scale rice farming management. Therefore, in this context, I believe that the following two problems must be addressed as a part of the significant subject of agricultural reorganization.

First, in the past, scholars were attracted only to the studies of scale expansion as farmers reacted to the price decline of rice. However, scale expansion at the single management level is not the only possible reaction; management diversification is another option. While many Japanese farms depend on a family labor force (Isobe, 2000), farm households tend to diversify their managements with their farm size increased (Hirabayashi, 2007). Therefore, when analyzing the diversified farm, one must simultaneously examine both the trend toward large-scale management and the direction of agricultural reorganization.

Second, in light of the examination of diversified farms as a possible direction of agricultural reorganization, the conditions for selecting appropriate crops must be examined. Currently, there are few studies about diversified farms (Yamadera, Arai, 2003). The past research clarifies that farmers have most often tried to choose profitable crops to advance diversification instead of expanding the scale of rice farming. However, in the situation of intense market competition with the increase of agricultural imports, farmers' capacity to choose alternative crops is considerably narrowed (Higashiyama, 2001). Therefore, to establish marketable crops, it is necessary for an agricultural production area to attain a certain scale of operation and profitability. In the end, I would like to show how scale expansion and management diversification affect the characteristics of Japanese agriculture.

In this paper, I clarify how the price decline of rice has changed farm managements in the Tohoku region. For this purpose, I analyze forms of farm management on a national scale. In the second section of the paper, I explore the regional characteristics of Japanese agriculture, including a look at the trends of agricultural sale, scale enlargement, and the number of days of input labor. Next, I explore the effects of rice price decline in the Tohoku region, which very much depends on rice. For this purpose, I describe the characteristics and changes in Tohoku's agricultural
regions that have occurred during the last decade.

2. The Rice Price Decline and Development of Japan’s Agricultural Regions

Figure 1 shows the price trends of main varieties of rice in recent years. The data for 1993, a year of severe cold-weather damage, has been removed from the chart; the highest prices for all rice brands occurred in 1992. After the Food Control Law was abandoned in 1995, the price of all brands began a downward trend. Even the price of Koshihikari in Niigata decreased about 30% from 25,429 yen in 1992 to 19,176 yen in 2002. This is supposed to be the most expensive rice in Japan. This tendency is seen in every rice brand and affects most severely those regions expecting high prices for rice.

Figure 2 shows the distribution of part-time farms and rice monoculture farms in Japan in 2005. This figure shows the relational nature between farms dependent on rice production and part-time farming. First, regarding rice monoculture farms, while 52.3% is the national average, a higher proportion of these farms is distributed from Tohoku to Hokuriku. Toyama (91.5%) has the greatest proportion of rice monoculture farms, followed by Niigata (87.1%). Akita (81.4%) has the greatest proportion of these farms in the Tohoku region. In contrast, Hokkaido, Tokai,
Shikoku, and Kyushu have the lowest proportion of rice monoculture farms.

In terms of part-time farms, the national average is 77.4%, indicating that part-time farms continue to play a central role in Japanese agriculture. However, in the matter of regional differences, the number of part-time farms in Tohoku and Hokuriku is relatively high, while the number in Tokai, Shikoku, and Kyushu is low. The proportion of part-time farms is the highest in Fukui (90.3%) and the lowest in Hokkaido (47.8%).

These statistics show that areas tend to have both a high proportion of rice monoculture farms and a high proportion of part-time farms, which indicates that mechanization and laborsaving practices for rice production created part-time farming. On the other hand, under the price decline of rice, many part-time farmers are still involved in rice farming. They are very likely to be engaged only in rice monoculture.

From 1995 to 2005, the national proportion of part-time farms decreased from
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84%, 81.7% (in 2000) to 77.4%, and the proportion of rice monoculture farms also decreased from 55.2%, 54.2% to 53.2%. This is attributed to the decreasing number of rice monoculture farms and the increase of elderly full-time farmers. The elderly in the countryside retire from other industries and begin to work full-time on their farms.

The number of farm households decreased to fewer than 2 million households by 2005 as the economic status of rice fell. However, according to Ando (2001), some farmers have attempted to farm full-time to diversify management while not carrying out the scale enlargement of rice farming.

Figure 3 shows the makeup of farms with regard to size and crop. This figure shows the effect of scale enlargement on agricultural sales. Prefectural dependence

Figure 3 Scale enlargement and farm income in 2005
Source: Agricultural Census

42. Nagasaki 43. Kumamoto 44. Oita 45. Miyazaki 46. Nagasaki
on rice is also shown as the attributes of each prefecture except Hokkaido are indicated, based on the proportion of farms devoted to rice monoculture. The vertical axis shows the proportion of farmers who sell more than 10 million yen in agricultural products; the horizontal axis shows the proportion of farmers who have more than 5 ha of farmlands. This shows the trend of Ninaite. Ninaite is a Japanese policy term for a designated competitive farm. These farms are supposed to earn high income as they increase the economic efficiency with scale enlargement.

Two groups are found in the figure. In Group 1, the proportion of farms with more than 5 ha of farmlands is higher than the national average. In this group, the farmers try to earn agricultural income by growing rice. In Group 2, the proportion of farms with more than 10 million yen in sales is higher than the national average. These farmers tend not to conduct scale enlargement of rice farming and secure their agricultural income from rice sales.

These groups demonstrate the following regional differences. Tohoku, Hokuriku, and Chugoku belong to Group 1. As the proportion of rice monoculture farms is high, the dominant farms tend to be formed to grow land-intensive crops. Yamagata (No. 6) and Akita (No. 5), for example, have large-scale rice farms. The Kanto, Shikoku, and Kyushu regions belong to Group 2. In some parts of these regions, as the proportion of rice monoculture farms is low, the dominant farms tend to be formed to grow crops other than rice; for example, in Miyazaki (No. 45), Kochi (No. 39), and Aichi (No. 23), labor-intensive agriculture like greenhouse gardening exists. Thus, the regional composition of present Japanese agriculture is divided into two different management types. However, this regional distinction of Japanese agriculture does not explain the positive relation between scale enlargement and agricultural sale. Rather, the introduction and expansion of labor-intensive agriculture like greenhouse gardening has diversified farm management and increased farm incomes. That is, scale enlargement of land-intensive farming does not necessarily result in high profit.

Figure 4 supports the high profitability of introducing labor-intensive crops in diversified farming. The vertical axis shows the proportion of farmers who sell more than 10 million yen in agricultural products; the horizontal axis shows the proportion of farmers who have over 900 days of labor input. The attributes of each prefecture are shaded by the proportion of farms in which more than two crop types are managed. As the figure shows, the addition of a crop type, which can increase labor input, leads to increased income. One example is the introduction of horticulture in diversified management.

The area of Group 2 is shown in Figure 3. Miyazaki (No. 45), Kumamoto (No. 43), and Kochi (No. 39) are in the upper right corner, while Iwate (No. 3), Akita (No. 4), Miyagi (No. 5), Niigata (No. 15), Toyama (No. 16), and Fukui (No. 18) are distributed in the lower left part of the figure. The former three and the latter three
belong to Tohoku and Hokuriku regions, respectively.

Unfortunately, the alternative farm development strategy to the scale expansion of rice farms faces a difficult situation. That is, the selection and concentration of competitive farms didn't form competitive farm regions, and the number of competitive farms decreased. Farmers with more than 10 million yen in sales decreased from 128,000 in 1995 to 116,000 in 2005, while the proportion of these farmers to the total number of farmers remained almost the same, rising only ca. 1% from 5.0% to 6.1%. The same logic works in terms of large-scale farms. While the number of farms with more than 5 ha increased from 35,000 households to 50,000 households, the proportion of these farms only increased 1.6% from 1.0% to 2.6%. Thus, the prospect of diversified farming is not so positive, either. This problem has occurred with labor-intensive crops such as vegetables and flowers; for example, the competition with imported agricultural products slowed the increase in price. The lack of a dependable workforce in the agricultural sector and the obstacles resulting from repeated planting are also factors.

Table 1 shows the reduction rate of farms and cultivated land from 1995 to 2005. The average national reduction in farms was 17.0%, and that of cultivated land was 19.9%. Hokkaido (27.0%), Hokuriku (20.5%), and Chugoku (18.8%) show more than
Table 1  Decreases in agricultural resources in Japan, 1995-2005

<table>
<thead>
<tr>
<th>Region</th>
<th>Farm decrease</th>
<th>Farmland decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hokkaido</td>
<td>27.0</td>
<td>5.5</td>
</tr>
<tr>
<td>Tohoku</td>
<td>16.5</td>
<td>13.2</td>
</tr>
<tr>
<td>Hokuriku</td>
<td>20.5</td>
<td>18.1</td>
</tr>
<tr>
<td>Kanto</td>
<td>16.3</td>
<td>21.4</td>
</tr>
<tr>
<td>Tokai</td>
<td>15.7</td>
<td>26.1</td>
</tr>
<tr>
<td>Kinki</td>
<td>16.4</td>
<td>23.7</td>
</tr>
<tr>
<td>Tyugoku</td>
<td>18.8</td>
<td>29.0</td>
</tr>
<tr>
<td>Shikoku</td>
<td>15.7</td>
<td>27.5</td>
</tr>
<tr>
<td>Kyushu</td>
<td>16.9</td>
<td>17.9</td>
</tr>
<tr>
<td>Average</td>
<td>17.2</td>
<td>16.3</td>
</tr>
</tbody>
</table>

Source: Agricultural Census

The national average in farm reduction. Hokuriku (18.1%), Kanto (21.4%), Tokai (26.1%), Kinki (23.7%), Chugoku (29.0%), Shikoku (27.5%), and Kyushu (17.9%) showed a higher pace of decrease in cultivated farmland than the national average.

In the Hokkaido, Tohoku, and Hokuriku regions, the pace of decrease in cultivated land was slower than the pace of decrease in farms. While farms and cultivated land decreased, the scale expansion of individual farms was not fast enough to enable the cultivation of depreciated farmland.

In other areas, however, the proportion of cultivated land decreased more than 20%. The reduction is especially remarkable in the Pacific coastal zone. This is probably because not only the reduction of farms but also the conversion to non-agricultural land use and the abandonment of cultivated farmland have affected this area. As a result, while the size of the labor force and the means of production continue to decrease in Japanese agriculture.

3. Changes in the Agricultural Areas of the Tohoku Region

3.1 Changes in the Farm Household Economy in the Tohoku Region

As discussed above, the recent rice price decline did not increase the size of many Japanese farms but it did cause a diversification of management with labor-intensive crops. In this section, I would like to consider how the rice price decline has affected the Tohoku Region. Tohoku is normally considered to have a high level of rice dependence.

First of all, in terms of Tohoku’s position within Japan, the region’s proportion of the total domestic agricultural production decreased from 18% to 16%. However, Tohoku continues to play an important role in Japan’s food supply. That is to say, in
2005, Tohoku had 26% of the nation's rice growing area and 26% of the national rice production. Tohoku also produces 70% of domestically produced apples and 80% of domestic cherries. In terms of feeding heads in livestock, Tohoku's share of beef cattle is 17%; that of hogs is 16%; that of broiler chickens is 22%. However, agricultural output in the Tohoku region decreased 34% from 254 billion yen in 1985 to 138 billion yen in 2005. Particularly, rice output decreased by half from 100 billion yen to 50 billion yen. Thus the declining position of Tohoku in the nation seems to result from the rice price decline and its negative effect on rice output.

While rice mainly characterizes regional agriculture of the Tohoku region, the Tohoku farmers have changed the nature of the farm household economy in several ways. Figure 5 shows the basic indexes of the farm household economy from 1965 to 2003. Living expenditure consistently increased to 1998. It increased from 600,000 yen in 1965, 1 million yen in 1969, 2 million yen in 1975, 3 million yen in 1977, 4 million yen in 1980, and 5 million yen in 1991 to 5.6 million yen in 1998. Since then, it has fluctuated from 5 to 6 million yen. In 2003, it was 5.06 million yen. On the other hand, agricultural gross income was below living expenditures from 1969. The gap increased every year, reaching 1.67 million yen in 2003. Unfortunately, as agricultural expenditures increased even in the 2000s, the ratio of agricultural income to family
expenditure decreased to about 20%. The total income of farm households increased from 1965 to 1995. It was 77,000 yen in 1965; more than 1 million yen in 1967; more than 2 million yen in 1973; 3 million yen in 1975; 4 million yen in 1979; 5 million yen in 1985; 6 million yen in 1990; 6.7 million yen in 1994. However, since 1995, the total income has decreased at an unprecedented pace. Reaching 5.13 million yen in 2003, it decreased to the same level as family expenditure. The decrease of farm income from 1995 is attributed to the rice price decline after the abandonment of the Food Control Law. Owing to the high dependence on rice in Tohoku's farm household economy, the direct impact of the rice price decline becomes highly significant. In addition, non-agricultural income decreased from the peak of 5.29 million yen in 1997. This was another cause of the decrease in the total income of farm households, because non-agricultural income played a significant role to sustain the total income. In 2003, non-agricultural income decreases to 4 million yen; this is the same as in 1988.

In the 1990s, non-agricultural income decreased because the dislocation of rural factories shrank the regional labor market. As a consequence, while the dependence on agriculture increased slightly, the farm household economy generally continued to deteriorate.

3.2 Regional Characteristics of Tohoku Agriculture

The classification of regions by agricultural sale leads to the analysis of regional characteristics as a way of understanding the characteristics of rice production in the Tohoku region. Figure 6 shows the classification of regions within the Tohoku region.

![Figure 6: Rice-dependence and agricultural income in Tohoku (2005)](image)

Source: Agricultural income products census
The vertical axis represents agricultural income per farm; the horizontal axis represents the share of rice to agricultural output (the value of rice-dependence in this study). These regions are historically organized according to their regional economic centers. Furthermore, based on the makeup of agricultural output, these regions are grouped into five types. The first type is a rice-dependence region, because rice consists of more than 50% of agricultural output in this region. This region type is shown with a black circle.

The second type is a region with diversified agriculture with upland cropping and livestock. In this type of region, rice consists of less than 50% of the agricultural output, while the rate of upland cropping and livestock is more than the average of the Tohoku region. This region type is shown with a white circle. The third type is a region with diversified agriculture with fruit. In this type of region, rice consists of less than 50% of the region's agricultural output, while the ratio of fruit to agricultural output is more than the average of the Tohoku region. This region type is shown in a triangle in the figure. The fourth type is a livestock region, in which livestock accounts for more than 50% of the agricultural output. This region type is shown in a rectangular. The other regions are shown in a crosshair. These are not significantly grouped like the other region types.

Usami (1985) points out that these regional characteristics emerge because of the unique historical experience of agriculture in Tohoku. That is, No. 5 to 8 were regarded as an area with upland crops and horse-raisning in the Meiji period. No. 3 and No. 19 were regarded as an area with rice farming and sericulture in the Meiji period. After WWII, this type of region produced fruit instead of silkworms. No. 2, No. 13, No. 18, No. 21, and No. 23 established a region with powerful landlords before the war. After the war, this type of region became a region with rice monoculture.

With the current rice price decline, the characteristics of the Tohoku region reflect the history of each region. The characteristics express two directions, as exemplified by Group 1 and Group 2. In Group 1, agricultural income increases as rice-dependence increases; for example, No. 17 and No. 21 have the greatest income in the group. They are a representative region of large-scale rice production, and their success indicates that rice production can allow a region to secure agricultural income even under a rice price decline.

On the other hand, in Group 2, agricultural income increases as rice-dependence decreases. No. 5 and No. 6 are the most successful examples in this group. These are large producers of vegetable such as garlic and Chinese yams. No. 3 is a large producer of apples. These regions show a successful way to secure income by establishing the production of vegetables and fruits. They diversify farm management with crops other than rice.

While the economic importance of rice decreases in the Tohoku region, the
The importance of rice remains. The share of rice to agricultural output in Tohoku is 38%, that is, 15% higher than 23%, the national average. However, as shown in Figure 6, the fact is that regions have higher agricultural income if they have crops other than rice as their main crops.

The impact of the rice price decline is considered in Figure 7, where a comparison between 1995 and 2005 shows the change in each region. All regions but No. 5 and No. 17 show a decreased agricultural income. Moreover, all regions except No. 17 show both a decreased degree of rice-dependence and decreased agricultural income. The rice price decline can directly decrease agricultural income. This tendency was more significant in regions with 50% to 60% rice dependence in 1995. These regions show the importance of rice in the Tohoku region.

Each type of region reacts differently to the decreases in rice-dependence and agricultural income. The rice-dependent regions have decreased their dependence by about 8%, while the decreasing rate of agricultural income is more than 18% in these regions. That is, regions highly affected by the rice price decrease cannot easily stop depending on the rice monoculture. Regions with diversified agriculture with upland cropping and livestock have decreased their dependence on rice by about 10%. The share of rice there is 37% of the agricultural output. These regions have softened the
impact of the rice price decline as they changed crops from rice or diversified their management. In regions with diversified agriculture with fruit and in livestock regions, although the rate of rice-dependence has decreased to 41%, the agricultural income has decreased 28%. Fruit and livestock, the main products of these regions, made the difference. Also, the competition with other domestic production regions has become more intense. In these regions, the dynamics of non-rice products can negatively affect farm management. In this way, the rice price decline has affected the agricultural regions in Tohoku in a variety of ways.

Currently, the Tohoku region faces a big problem. Not only does it have a low selection of crop varieties from which to choose, but the conditions for rice production are eroding. As a result, the region cannot change crop types. They only face the rapid decline of rice price. The problem becomes more immediate to restructure regional agriculture. The region needs to break away from rice monoculture part-time farming, while the conversion of management becomes indispensable for farm households to survive under the ongoing rice price decline.

4. Conclusion

In this study I examined the directions of farmers under an ongoing rice price decline in Japan. As a result, the following points become clear.

1) The price of rice has declined rapidly since 1995. While some agricultural regions have both a high proportion of rice monoculture farms and a high proportion of part-time farms, both part-time farms and rice monoculture farms are decreasing in proportion and number on the national scale. In this situation, the direction to restructure Japanese agriculture and farmers is not to increase the size of farms but to diversify farm management with labor-intensive crops. In the regions with dependence on rice production, the effects of enlargement of farm size were limited. A decline in the price of rice does not necessarily increase agricultural sales and farm income when regions increase farm size. In the meantime, growing crops other than rice is difficult because the number of farmers with more than 1,000,000 yen in agricultural sales has decreased.

2) The dependence on rice is still high in the Tohoku region. Rice production continues to be important to assure agricultural income. Thus, the rice price decline has directly decreased agricultural income in an obvious way. Furthermore, since 1995, the rate of farm income decrease has been more acute than ever. Agricultural management costs and living expenditures have also increased. At the same time, non-agricultural income has decreased, while this income is needed to sustain the farm income. The direction of farm management restructuring in the Tohoku region is the same as the direction on the national scale, that is, converting rice monoculture farms
to diversified management. However, many farmers in the Tohoku region already have rice as the main crop of diversification, so a further rice price decline may decrease the number of farms. While this provides the opportunity to increase farm size, the possibility is thin at the current price of rice.

Acknowledgements

My deepest appreciation goes to Prof. M. Hino, whose suggestions were of inestimable value for my study. I am indebted to Prof. T. Koganezawa, whose comments contributed enormously to my work. I wish to express my gratitude also to my friend, Mr. Yoshitaka Miyake, who edited the English.

References (* in Japanese, ** in Japanese with English abstract)


