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The Rice Market in South Korea

Sunchul Choi, John Dyck, and Nathan Childs

Abstract

Rice has been Korea's most important agricultural crop and staple grain for centuries. Rice consumption per person has fallen in recent decades. Korean policies have isolated Korea's rice market from the global rice markets, and Korean prices are above those of potential rice imports. Korean rice farmers have become more productive, using fewer chemical inputs and consolidating machine use, while maintaining high yields. Government support for rice farmers has shifted toward income support, but some subsidies are still directly linked to rice output. Despite movement toward greater efficiency and liberalized markets in domestic rice farming, Korea has maintained very high barriers to imports. Korea's rice import system was a special case set up in the 1995 Uruguay Round Agreement (URA) of the World Trade Organization (WTO). WTO permission for the special treatment expired at the end of 2014, and Korea chose to switch to a tariff-rate quota (TRQ) with a tariff of 513 percent for over-quota imports. U.S. rice, in particular japonica-type rice from California, has long been imported by Korea—over 1 million tons since 1995. The report reviews this important market for U.S. rice with regard to the new TRQ and internal Korean supply and demand.

Keywords: Korea, South Korea, rice, tariff-rate quota, agricultural policy

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The Rice Market in South Korea

Introduction

Rice is the staple food of Korea (the Republic of Korea, or South Korea) and the chief crop of its farms. Since both consumers and farmers depend on it, rice has been important to policymakers in Korea for many centuries. Korea, which used to be nicknamed the Hermit Kingdom, was isolated from world trade for long periods of time by geography and politics. By the 21st century, much had changed. The significance of rice in the diet has been steadily diminishing, and Korea has become a leading participant in world trade in goods and services and multinational investment. Korean farmers have maintained high yields with less use of costly inputs.

In 2015, Korea changed its treatment of rice imports and established a tariff-rate quota (TRQ). However, by instituting an over-quota tariff so high that it effectively precludes significant imports and announcing its intention to tightly manage the disposition of government-imported rice in the TRQ, Korea maintained its isolation from world rice markets. The high protection of rice contrasts with the success of many other Korean products that compete in the world economy. This report reviews key aspects of Korea's rice market history and current situation.

Korea is an important market for U.S. rice—the United States has shipped over 1.1 million tons of rice to Korea since the end of the Uruguay Round (UR) in 1995. In late 2014, Korea announced that it would exit the special arrangement under the UR Agreement that allowed it to put an absolute quantitative limit on rice imports, and as of January 1, 2015, Korea shifted to a TRQ. Unlike the import regime in place under the special arrangement, the new TRQ regime proposed by Korea does not ensure country-specific portions of the quota, although complete government control of the quota is preserved.

Consumption

Rice has been a leading grain in Korea for over a thousand years (Crawford and Lee, 2003), and currently is the staple grain and largest starch source in Korea. Rice provided 64 percent of the starch-based calories and 28 percent of total calories in 2011 (FAOSTAT, 2015). Consumption has varied greatly over many centuries. In times of poverty and foreign rule (for example, during the Japanese empire, 1910-45), Koreans have relied on other domestically produced traditional grains and seeds in addition to rice: wheat, barley, millet, sorghum, and buckwheat. In times of prosperity, white rice has been the dominant grain.

As part of its self-sufficiency drive in the 1970s, the Korean Government tried to decrease rice consumption, so that the gap between consumption and production would be narrowed. Consumers were encouraged not to eat rice, and were required to use rice mixed with barley for some meals. During the 1980s, restrictions on the use of rice were gradually lifted. The use of rice in making processed foods was banned or limited until 1991.

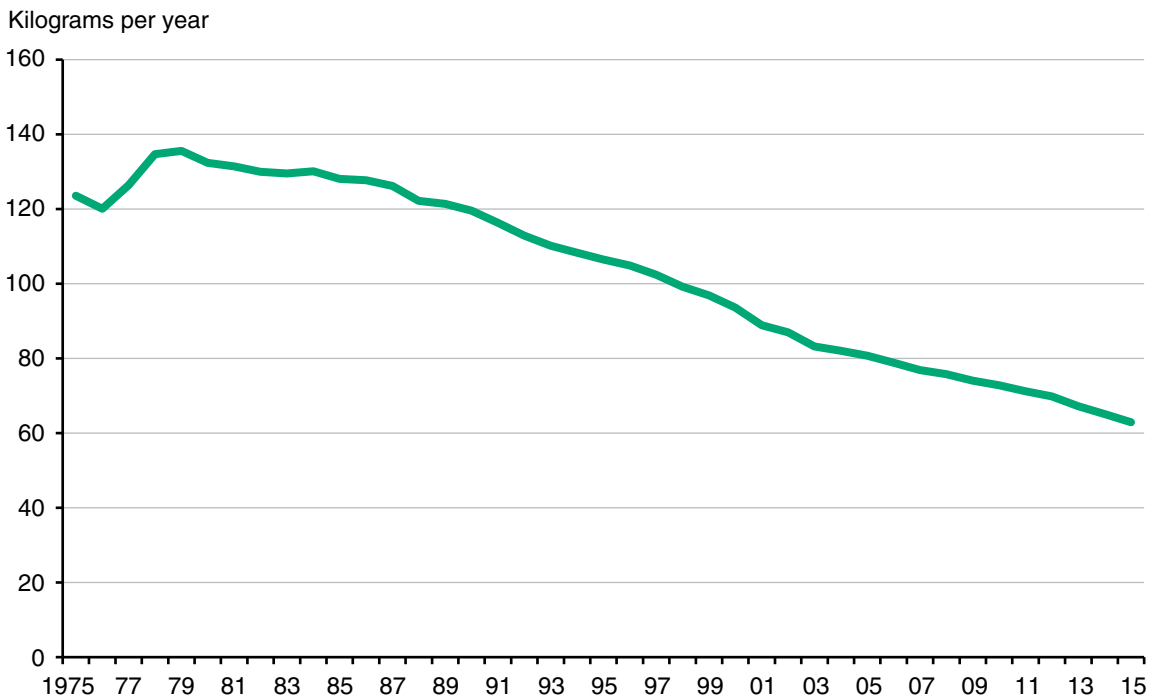
In recent years, instead of worrying about self-sufficiency, the Government has confronted unwanted surpluses of rice as table rice consumption has decreased faster than production.

Rice consumption per person for direct food use peaked in 1970 at 136.4 kg per year. Since the mid-1980s, rice consumption per person has declined in almost every year, reaching 62.9 kg per year in 2015 (fig. 1).¹ The decline in consumption per person of table rice has also been evident in some other Asian countries whose diet has been centered on rice (e.g., Japan, Taiwan, China, and Thailand). Some of the factors that may contribute to declining consumption include:

- The shift from living on a farm to living in a town or city, where it is more convenient to buy a variety of foods, and where stores and restaurants advertise other foods. In 2015, farm households consumed 102.1 kg of rice per person, while nonfarm households consumed 60 kg per person (Statistics Korea, 2016). Urbanization has become so dominant in Korea (80 percent of the population is now in urban areas (World DataBank, 2014)) that this will not be a major factor going forward.
- The shift from eating at home to having lunch at or near the workplace. This does not necessarily mean a shift away from rice, but disrupts the old pattern of family-based cooking centered on rice. The shift to workplace eating affected men and, more recently, even married women. This shift is ongoing, as women move into the workplace. Expenditures on rice declined from 38.6 percent of food expenditures in 1970 to 4.6 percent in 2006. Over the same period, expenditures on eating away from home rose from 2.1 percent of food expenditures to 45.6 percent (Han et al., 2008).
- The convenience and low prices of foods based on imported wheat, such as instant noodles, breads, and rolls. Such foods became common in the post-World War II period. Wheat food consumption per person has been virtually static since 1980—but not falling, like rice (KREI, Food Balance Sheet, 2013).

¹Food consumption of rice per person is measured differently by Statistics Korea (KOSTAT), which calculates 65.1 kg, and the Korea Rural Economic Institute (KREI), which calculates 75.3 kg for 2014 (see Appendix table 1). The Ministry of Agriculture, Food and Rural Affairs calculated 79.4 for 2012 (Appendix table 2), close to the KREI number for that year. The differences are caused by different ways of assigning rice used in processed foods. All the series show declining consumption per person.

Figure 1
Korea: Food use of rice per person



Note: Table use of rice.

Source: USDA, Economic Research Service, using Statistics Korea, KOSTAT data.

- High consumer prices for rice, which have likely tended to depress consumption.
- The dietary shift away from starch-based foods. Starch-based calories as a proportion of total calories have steadily declined since 1972 (KREI, Food Balance Sheet, various issues).

Although consumption has declined, rice consumption probably benefited from the even greater decline in consumption of some other grains, especially barley, for which it is a substitute.

Uses of rice have evolved over time. The principal use has always been for table rice: white rice, cooked or steamed, served in a bowl. Sometimes the rice is mixed with other grains or ingredients like seasonings, vegetables, etc. Another longstanding use has been for making alcoholic beverages. These include makkoli, a fermented rice wine with alcoholic content under 8 percent. Makkoli was traditionally produced in farm households using simple methods. It is now widely available as a bottled product. Soju is a distilled beverage that has often been made from old rice, but is also made from imported tapioca, other grains, sweet potatoes, or potatoes. Its alcohol content varies from under 20 percent to over 40 percent. The Government has promoted rice use in processed foods since the mid-1990s. Besides makkoli and soju, rice has been used in bakery applications.

Unlike other Asian countries, rice has not been regularly used for feed in Korea, except for the rice bran removed during milling. However, in 2016, the Government has made its first sale of subsidized rice from stocks for feed use (Choi and Myers, 2016).

The Government estimates a substantial amount of rice as a loss or other use (i.e., not for table rice, processing, or feed). In recent years, the amount of rice categorized as loss (Appendix table 1) or other and loss (Appendix table 3) has significantly grown. It averaged over 625,000 tons per year in the period 1995-2012 (i.e., the years since the signing of the WTO's URA), as opposed to an

average of over 235,000 tons in the decade before 1995. Loss has grown as a share of the market: As a proportion of total supply, the loss category averaged 10.3 percent in the 1995-2012 period, compared to 3.3 percent in the years 1985-94. At one-tenth of supply, this level of loss is an important factor in Korea's rice balance, and the annual average cost, evaluated in terms of average rice import values, would be over \$300 million (GTIS, World Trade Atlas, 2015). Other anomalies in Korea's rice supply and demand data are inconsistent stock data in the 1970s and 1980s (see Appendix). The reasons for the unaccounted-for rice are not known.

Types of Rice

Koreans consume primarily japonica rice, a rice type grown mostly in northeastern Asia. According to the International Rice Research Institute (IRRI), "Japonica grains are short, roundish, spikelets are awnless to long-awned, grains do not shatter easily, and have 0-20 percent amylose content." This is in contrast to the other major category of rice, indica rice: "Indica grains are long to short, slender, somewhat flat, and the spikelets are awnless. Indica grains shatter more easily and have 23-31 percent amylose content" (IRRI, Rice Knowledge Bank, 2016). Amylose is a component of starch. Amylose content strongly influences the cooking and eating characteristics of rice. Rice with a high amylose content (25-30 percent) tends to cook firm and dry, whereas rice with an intermediate amylose content (20-25 percent) tends to be softer and stickier and rice with a low amylose content (<20 percent) is generally quite soft and sticky (IRRI, Rice Knowledge Bank, 2016).²

Korean producers and consumers distinguish many varieties of japonica rice, often named by the place in Korea where the variety is produced. The varietal distinctions lead to price differences in the market.

As in most countries of East Asia, Koreans also use glutinous rice, which IRRI defines as "Special varieties of rice (*Oryza sativa* L. *glutinosa*) the kernels of which have a white and opaque appearance. The starch of glutinous rice consists almost entirely of amylopectin. It has a tendency to stick together after cooking" (IRRI, Rice Knowledge Bank, 2016). Thus, glutinous rice has almost no amylose content in the grain. Glutinous rice has many uses, but a major use in Korea is in baking rice pastries.

Finally, Koreans also use some indica rice, especially in restaurants that feature Chinese, Southeast Asian, or South Asian foods. However, in contrast to japonica rice and glutinous rice, there is no Korean production of indica rice.

²Japonica and indica rice can be cross-bred. Rice production in Korea rose sharply in the 1970s after the introduction of tongil rice, crossbred from indica and japonica rices. Tongil yields were higher than japonica yields. Consumers did not like the taste and cooking characteristics of tongil rice, and the Government was forced to pay high prices to farmers to induce them to plant tongil in most of Korea's rice area. A cold snap in June 1980 devastated the tongil rice crop, leading to large imports. By 1991, the Government had ended its purchases of tongil rice. With no other market for the unwanted rice, planting of tongil ceased (Kim and Sumner, 2006).

Production

Rice has been grown in Korea for 3-4,000 years (Crawford and Lee, 2003). Rice can be grown both as a heavily irrigated crop, in paddy fields, and as a so-called upland crop, which is not irrigated and in which the field is not bounded by bunds (low walls) to form a paddy. Over time, upland rice farming has declined in Korea and throughout Asia. In paddy rice production, the paddy is flooded before rice is transplanted into the field. The field can then be drained and reflooded during the growing season, for several reasons:

- To provide moisture for the growing plants
- To control pests and weeds
- To regulate temperature, especially in periods when abnormally cold weather can affect the development of the kernels.

Before harvest, the paddy is drained so that conditions are dry while the grain ripens.

Flooding and draining the paddies requires that a water source be available and that the land slopes enough so that water flows in and out when gates are opened to access the water source or to drain the field, while maintaining a relatively even depth across the field. Periodic work to maintain the bunds around the paddy; to keep the paddy level; and to provide access to the water source has always been required. Over time, water control has become a larger-scale undertaking. Reservoirs have become larger, serving more area and using longer networks of channels to send water to the paddies and to drain them. In addition to gravity, pumps have been used to lift water into and out of irrigated fields. Old systems of farmer cooperation to maintain water supplies to a large number of heterogeneous paddies have given way to large systems using machinery and regularly shaped, homogeneous paddies, organized by specialized government agencies. Labor has been replaced by machines that require fuel. Paddy fields have been consolidated, so that they are uniform (usually rectangular) and much larger in extent. This reduces labor in maintaining bunds, keeping the fields graded, and getting water into and out of the paddy. It also facilitates the use of larger machinery.

Over the decade between 2002 and 2013, the proportion of paddies deemed “fully irrigated” rose from 77 to almost 81 percent, and the proportion of fully irrigated paddies with irrigation managed by the Korea Rural Community Corporation rose from 60 percent to 68 percent (MAFRA, Yearbook, various issues).

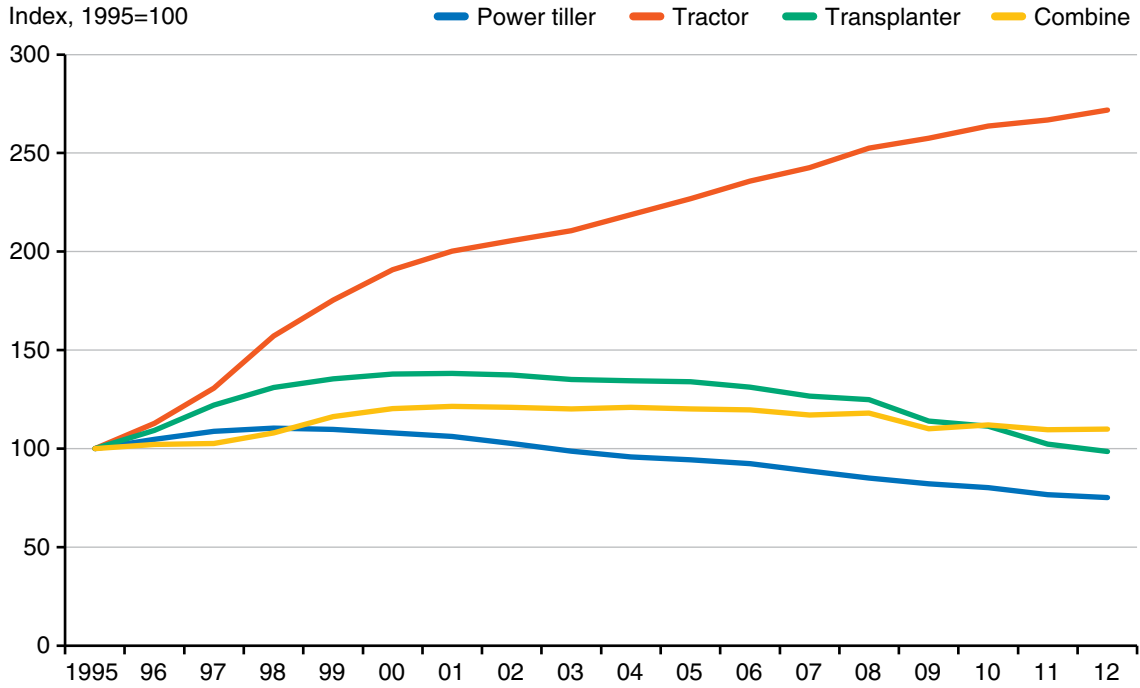
Machinery and chemical applications replaced much human labor and most animal power use in Korea’s rice farms by the 1970s. At first, small farms invested in power tillers to replace cattle. The number of tillers rose until 1998, and has decreased since then, to about two-thirds the number reached in 1998 (MAFRA, Yearbook, various issues). Similar reductions have occurred in the number of rice transplanters and binders. At the same time, the number of larger machines, like tractors, has increased (fig. 2). This also coincides with the rise of custom, or contract, farming (MAFRA, Yearbook, various issues). Increasingly, the individual farm household is doing less of the work involved in rice farming, and contractors who work for several farms are doing more of it. The average labor time in rice cultivation fell from 130.5 hours per 10 ares (10 ares = .25 acre) in 1980 to 16.3 hours in 2009 (KREI, 2010).

Rice yields (rough or unmilled basis) rose by 87 percent from 1960 to 1977, to 6.9 tons/ha (fig. 3; FAS/USDA, PS&D), bolstered by new seeds that had greater yield potential and by the increasing

Figure 2

Korea: Agricultural machinery

Index, 1995=100

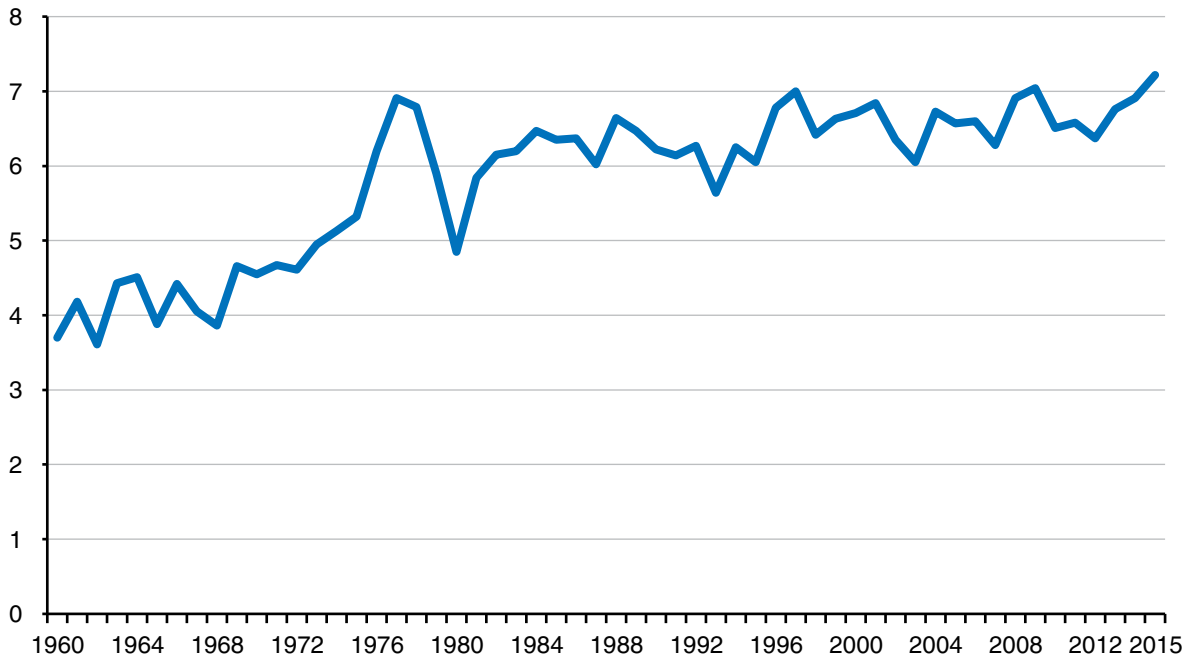


Source: USDA, Economic Research Service, using data from Ministry of Agriculture, Food and Rural Affairs, Statistical Yearbook, various issues.

Figure 3

Rice yield, Republic of Korea

Mt/ha, rough basis



Source: USDA, Foreign Agricultural Service, PS&D database.

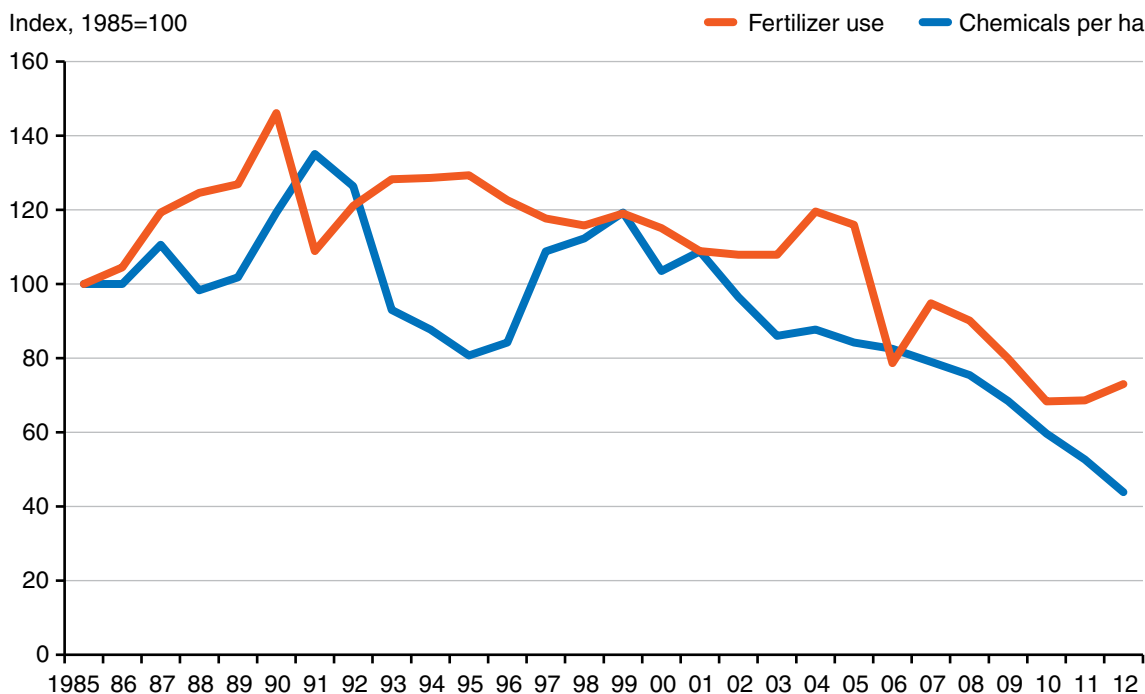
use of fertilizer and other agricultural chemicals. Yields then dropped after 1979, as high-yield varieties were replaced by traditional varieties that were better-suited to the Korean climate and Korean tastes. After a period of gradual growth from 1981 to 1996, yields in 1996-2014 fluctuated between 6 and 7 tons/ha, with little tendency to grow. However, the three most recent years (2013-15) have shown strong yield growth (FAS/USDA, PS&D).

The use of inorganic fertilizers and pesticides has decreased markedly (fig. 4). Inorganic fertilizer use in Korea peaked in 1990, and is now less than half the peak level. Insecticide use peaked in 1991, fungicide use in 1993, and herbicide use in 2001. Total pesticide application by weight in 2012 was 62 percent of the peak in 2001 (MAFRA, Yearbook, various issues). The decrease in chemical fertilizer and pesticide use is related both to the decrease in the area used for rice farming and to the intensity of chemical applications. Consumption of pesticides per hectare in 2012 was less than one-third the level in 1991, when use per hectare (for all crops) peaked (MAFRA, Yearbook, various issues). The reasons for the decreasing amount of chemical application, per hectare, may include the advice of extension agents that fertilizer and other chemical use had risen to such high levels that the marginal effectiveness of the additives was zero or negative, and the overuse of chemicals was a needless cost to farmers. Farmers may have observed this phenomenon themselves, as well. The Korean Government also discouraged chemical use because of water pollution problems in ground water, streams, and coastal marine areas, and because chemical fertilizer application has exacerbated soil acidification (KREI, Agriculture in Korea, 2010). Consumers have expressed worries about chemical contamination of food. Finally, chemicals have increased in cost.

Aggregate rice production almost doubled from 1960 to 1977 (fig. 5), chiefly because of rising yields; rice area changed little in this period (fig. 6). Production plunged in 1980, as a result of an

Figure 4

Agricultural chemical and fertilizer use in Korean agriculture



Source: USDA, Economic Research Service, using data from Ministry of Agriculture, Food and Rural Affairs, Statistical Yearbook, various issues.

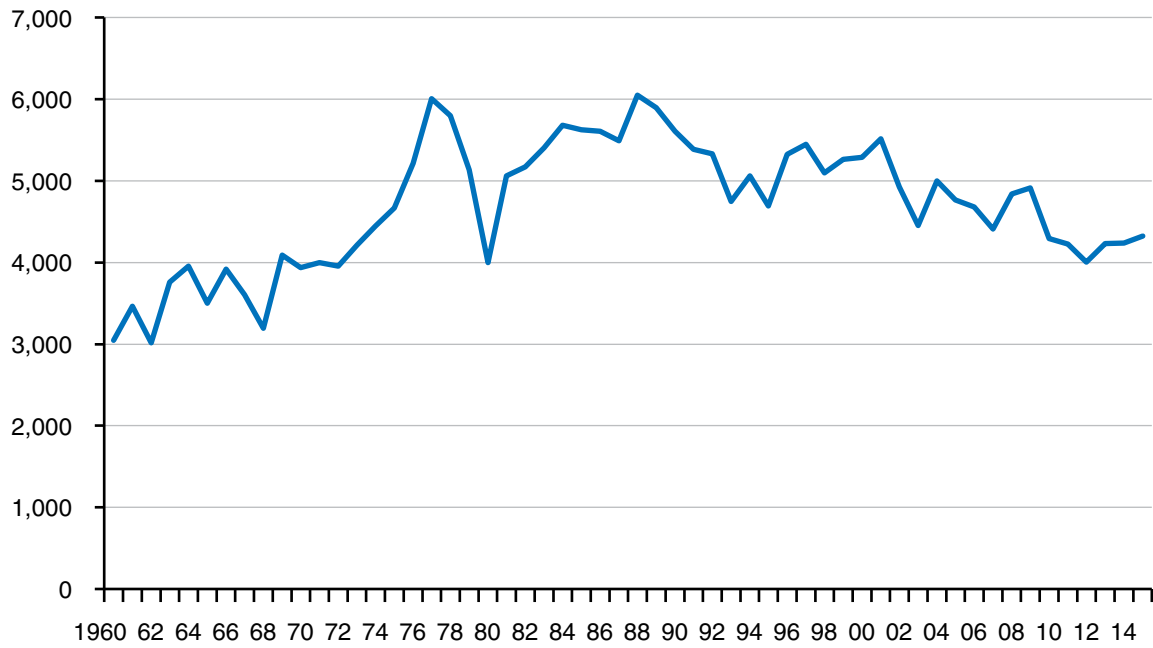
episode of cold weather, but then rose again, reaching an all-time peak of 6.053 million tons in 1988 (milled basis; FAS/USDA, PS&D). Increased yields resulting from breeding research on traditional varieties were responsible for the production rebound (fig. 3). Since 1990, production has declined along with decreasing rice area, with yields remaining fairly steady.

Korea's rice area peaked in 1987, at 1.26 million ha (fig. 6). It has declined since then by over one third, to 799,000 ha (2015; FAS/USDA, PS&D). Lack of demand for rice contributed to the decline. Some of the area taken out of rice production has not been used for other crops or purposes, but is vacant. Korea's cultivated land area has also gradually declined over time. The rice area accounts for about 50 percent of total cultivated land. Since 2006, rice area has dropped slightly faster than total area, and was 47.5 percent of the total in 2015 (MAFRA, yearbook, various issues and Korean Statistical Information System (KOSIS) database).

Figure 5

Rice production, Republic of Korea

1,000 mt, milled basis

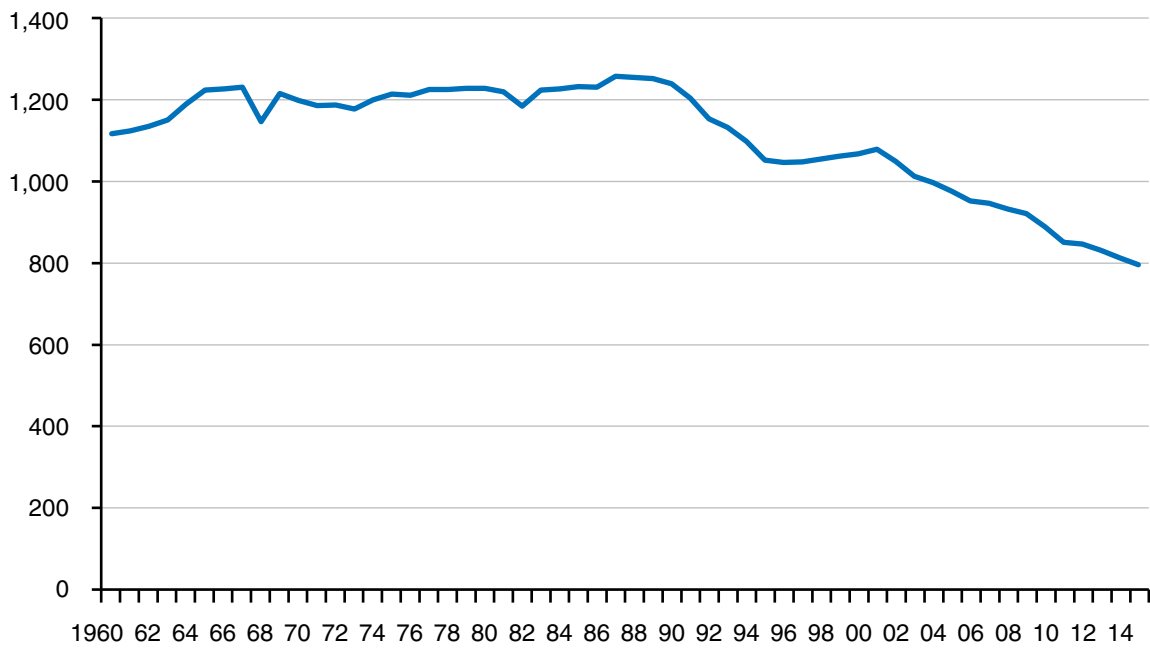


Source: USDA, Economic Research Service, using USDA, Foreign Agricultural Service Production, Supply and Distribution database.

Figure 6

Rice area harvested, Republic of Korea

1,000 ha



Source: USDA, Economic Research Service, using USDA, Foreign Agricultural Service Production, Supply and Distribution database.

Production Policy

Korea has about 1.1 million farm households. The average cultivated area is 1.5 ha/household, or 3.7 acres (in 2013; MAFRA, Yearbook). Most farms cultivate rice. The small land size of each farm limits the amount that can be earned from rice. Other major farm activities include producing vegetables, fruits, and livestock products (MAFRA, Yearbook). Nevertheless, generating an income similar to urban incomes from agricultural activities alone on 1.5 ha is difficult. Much of the farmland is relatively distant from large employment centers. While nonfarm income now is the largest part of farm household income, farm activities still contributed 39 percent of household income in 2013. One way to boost farm household income is to raise revenues from rice production by keeping market prices high.

From 1948-2005, the Korean Government influenced domestic rice prices by purchasing much of the country's output. In the 1970s and afterward, as part of the effort to attain national self-sufficiency in rice, the Government paid more for the rice that it purchased than it received when it sold the rice to consumers. This subsidy to rice farming was helped by the ban placed on imports in most years, which allowed Korean prices to remain at levels above world trade prices. The support continued through the 1980s and 1990s, but was constrained in 1995 by the URA that established the WTO. Under URA rules, each country was supposed to reduce its agricultural subsidies from their average level in the base period of 1986-88. However, South Korea, alone among the signatories to the URA, unilaterally declared that its base period would be 1988-90, a period in which its support was higher than in 1986-88. Furthermore, it used actual support for 1993 (2,182.5 billion won) as its amount for the first implementation year, 1995. Support through the rice purchases was in the so-called “amber box,” and thus subject to reduction by 13 percent over the period 1995-2004 (WTO, UR schedules).³ Because Korea had raised its support for rice substantially by 1993, the reduction it finally committed to (to 1,490 billion won in 2004) was equivalent to almost 32 percent (the difference between 1993 support and the average for 1988-90, in addition to a 13-percent cut from the 1988-90 level; WTO, 1995)—i.e., cutting from 2,182.5 billion won to 1,490 billion won, rather than from 1,695.74 billion won to 1,490 billion won. Thus, the Korean Government was obliged to reduce its spending on rice purchases at a time when it was under farmer pressure to increase it.

The Korean executive branch generally tried to reduce the rice price for its purchases in order to reduce spending on its domestic programs. However, the Korean legislature sometimes blocked the price reductions (Choi and Phillips, 2005). This meant that the quantity purchased needed to be reduced in order to remain below the spending limit imposed under the URA. The subsidies per ton were high. In 1990-94, the prices received by farmers when the Government purchased their rice were about 180 percent of their costs of production. These prices were also equivalent to 120 percent of harvest season market prices (KREI, Agriculture in Korea, 2010).

Direct Payment Programs

Other kinds of support for rice farmers were introduced in the aftermath of the URA. The Korean Government continued to try to boost the income of farm households, and designed policies that would do so without being “coupled”—tied to current production output. In most cases, these

³The Republic of Korea declared itself a developing economy, and thus was committed to a 13-percent, rather than a 20-percent, reduction, spread over a longer period. Developed economies implemented their commitments by 2000, rather than 2004.

policies were directed to the core of the farm population, rice farmers. Other motivations were to increase the scale of rice farming by reducing the number of farmers while keeping rice land in production; and in mitigating environmental damage caused by rice farming. Often these post-UR policies were called “direct payment” programs. Instead of paying farmers through higher prices for their harvest, the programs sent money directly to households, independently of the quantity of rice sold during a season (Lim, 2008).

One of these programs, the Direct Payment for Environment-Friendly Farming, continues. Begun in 1999, the program pays farmers of all crops, not just rice, to use environmentally friendly techniques. In 2015, the Environment-Friendly Farming program paid rice paddy farmers 600,000 won/ha (\$215/acre) for organic production, 400,000 won/ha for pesticide-free production, and 217,000 won/ha for low-pesticide production.⁴ Total spending on the program in 2015 was 32.8 billion won (\$29 million) (KREI, Agriculture in Korea, 2015).

In March 2005, the Rice Income Compensation Act introduced a new system of subsidies for rice farmers, the Direct Payment Program for Rice Income Compensation (Yim, 2006). The Direct Payment Program has two elements. One, the area payment, is paid according to the size of the land on which a farm produced rice in a 1998-2001 base period. This payment, given regardless of current production, is classified by the Korean Government as a decoupled payment, and not as part of the WTO’s “amber box.” The other payment is a deficiency payment to cover most of the difference between the average rice price offered to farmers at harvest time and a target price (table 1). The calculation of the payments for 2014 is explained in detail in the box: Direct Payment Program for Rice Income Compensation: How It Is Calculated. The deficiency payment is regarded as encouraging production, and classified in the “amber box.”

In 2015, the deficiency payment calculation per kilogram was 198.6 won/kg. The 2015 area payment, 998,892 won/ha, was increased by 11 percent over 2014 levels. Total deficiency payments were 718.7 billion won (\$635 million) and area payments were 843.1 billion won (\$745 million).

The deficiency payment is the same per kilogram for all rice farms. For an individual rice grower, there is no relationship to the quality of rice produced. Only the amount harvested matters. Thus, this policy encourages higher yields, without regard to quality (Choi and Myers, 2015b).

One result of the policy changes away from the “amber box” in 2005 was to radically reduce Korea’s Aggregate Measurement of Support (AMS) under Korea’s UR commitment to reduce and limit domestic support coupled to production decisions. In 2001-2004, coupled payments to rice farmers under the Government purchase program were 80-92 percent of Korea’s upper limit on the AMS (1,490 billion won), leaving little space for any other “amber box” support (WTO, 2007). In 2005 through 2011 (the last year for which Korea has notified data), spending on rice in the “amber box” only once was counted in the AMS, in 2006, and then at a lower level, 52 percent of the upper limit. In the other years, Korea’s total AMS was calculated to be very small (WTO, 2011 and 2014).

By the mid-2000s, it was evident that the Republic of Korea needed to address the issue of over-supply, rather than self-sufficiency. Since then, the Government has implemented programs to induce some farmers not to plant rice, or, sometimes, any commercial crop (Choi and Phillips, 2005; Choi and Smith, 2010a; Choi and Smith, 2010b; Choi and Smith, 2012).

⁴Since 2006, the exchange rate has varied between 955 won per U.S. dollar and 1,277 won per dollar. In this report, conversion from won to dollars uses the average rate for the year in which a transaction was made.

Table 1

Korea: Direct Payment Program for Rice Income Compensation

Calendar year	Area payment (A)			Deficiency payment (B)			Total (Billion won) (A) + (B)
	Area (1,000 ha) ¹	Payment (Won/ha)	Total (Billion won)	Production (1,000 mt) ²	Payment (Won/kg)	Total (Billion won)	
2005	1,007	600,000	603.8	4,587	196.4	900.6	1,504.8
2006	1,024	700,000	716.8	4,641	94.2	437.1	1,153.9
2007	1,018	700,000	712.0	4,548	61.3	279.3	991.9
2008	1,014	700,000	711.8	4,490	none	0	709.8
2009	894	703,684	632.8	3,948	150.4	598.2	1,227.3
2010	885	700,704	622.3	3,850	194.9	750.4	1,372.7
2011	883	700,169	617.4	na	none	0	617.4
2012	866	702,071	610.1	na	none	0	610.1
2013	855	800,926	686.6	na	none	0	684.8
2014	835	901,304	756.0	3,632	52.8	191.8	947.8
2015	844	998,892	843.1	3,624	198.6	718.7	1,561.8

na = not applicable.

¹Those eligible for payment include farmers, farming union corporations, agricultural corporations, or anyone producing rice on a minimum of 0.1 ha of farmland between Jan 1, 1998, and Dec 31, 2000.

²Based on the Olympic average rice yield of 4,880 kg per hectare for 1999-2003 and actual cultivated area registered under the program. The applicable rice yield has been revised up to 5,040 kg per hectare since 2012.

Source: FAS/Seoul estimate based on MAFRA data.

Direct Payment Program for Rice Income Compensation: How It Is Calculated¹

The total payment to farmers under the Direct Payment Program is the deficiency payment, less the area payment on a per-kg basis, plus the area payment. The deficiency payment formula, per kilogram of paddy rice:

$$[(\text{target price in won/kg} - \text{average harvest price in won/kg}) \times .85] -$$

$$(\text{area payment per ha/average national yield per ha})$$

For 2015, the various components were

- area payment per ha: 998,892 won (\$797), equivalent to \$322 per acre
- area on which the area payment was made: 843,752 ha
- target price: 2,350 won/kg, or \$2.08/kg, equivalent to \$94/hundredweight (100 pounds, or cwt)
- average harvest price: 1,883 won/kg, or \$1.66/kg, equivalent to \$75.50/cwt
- national yield per ha: 5,040 kg, the Olympic average of countrywide yields in 1999-2003 (i.e., with the largest and the smallest yields excluded)

- area payment per ha: $(998,892 \text{ won/ha}) / (5,040 \text{ kg/ha}) = 199 \text{ won/kg}$.

The calculation for the 2015 deficiency payment was thus:

$\{[(2,350-1,883)*.85] - (998,892/5,040)\} = 199 \text{ won/kg}$ times the number of kilograms harvested by the farm.

¹This explanation is taken from Choi and Myers, 2016.

As the former rice purchasing program, designed primarily to prop up prices, was ended in 2005, the Government began the Public Food Grain Stockholding Program (PFSP), designed to provide food security stocks and to assist in stabilizing farm prices (table 2), which continued purchases for food security purposes made in earlier years.⁵ Under the PFSP, the Korean Government procures domestic paddy rice during the harvest season (October-December) at the average market price and later sells it during the non-harvest periods at the prevailing domestic market price. Through 2011, the last year for which Korea has notified details of its domestic support to the WTO, Korea placed “Financial expenditure for storage and handling of staple grains including rice” in the Green Box under the category “public stockholding for food security purposes” (WTO, 2014). For October-February 2015-2016, the Korean Government purchased 360,000 mt (milled basis) of paddy rice, or 8 percent of the 2015 rice crop, under PFSP. Subsequently, the Government also purchased 240,000 mt of 2015-crop rice to support prices (Choi and Myers, 2016). Ending stocks of rice rose to nearly 34 percent of the consumption level in 2015—a high share (Choi et al., 2016).

Table 2

Korea: Government rice purchases under Public Food Grain Stockholding Program

Marketing year	Production (1,000 mt)	Purchase (1,000 mt)	Percent of production
2005/06	4,768	719	15.1
2006/07	4,680	504	10.8
2007/08	4,408	417	9.5
2008/09	4,843	400	8.3
2009/10	4,916	370	7.5
2010/11	4,295	340	7.9
2011/12	4,224	261	6.2
2012/13	4,006	363	9.1
2013/14	4,230	367	8.7
2014/15	4,241	610 ¹	14.4
2015/16	4,327	717 ²	16.5

Notes: Marketing year begins November 1. Thus, marketing year 2015/16 began Nov. 1, 2015. ¹Includes 240,000 mt to stabilize the rice market in addition to 370,000 mt under the PFSP. Government purchase of 30,000 mt for the ASEAN plus Three Rice Reserve is not included. ²Includes 357,000 mt to stabilize the rice market in addition to 360,000 mt under the PFSP. Government purchase of 30,000 mt for the ASEAN plus Three Rice Reserve is not included.

Source: Ministry of Agriculture, Food and Rural Affairs (MAFRA).

⁵Under the Resource Management Law for Emergency and Food Grains Control Law (WTO, 2007).

Rice income support programs are summarized in table 3.

Table 3
Korea: Summary of support for rice

Name of program	Support per hectare	Support per kilogram	Budget, 2014	Year begun
	Won		Billion won	
Rice income compensation				2005
<i>Area payment</i>	998,892		843.1	
<i>Deficiency payment</i>		198.6	718.7	
Public food grain stockholding			780 ¹	2005
Environment-friendly farming	217-600,000		32.8 ²	1999
Soil conditioner support			110.1 ^{2, 3}	1960s

¹This represents the MAFRA budget to purchase 370,000 mt under the PFSP and 30,000 mt for the ASEAN Plus Three Emergency Rice Reserve. Additional Government purchases of 240,000 mt used a 500 billion won NACF loan program, with the Government pledging to make up potential NACF losses in the next fiscal year. ²Includes payments for rice and other crops. ³2010 budget.

In addition to the Government purchases of rice for public stocks, each year the National Agricultural Cooperative Federation (NACF) purchases a significant share of the rice crop after harvest for resale later in the year when prices are likely to be higher. The NACF lends money at zero interest to Rice Processing Complexes (RPCs), which make the purchases for the NACF. As a share of production, the NACF purchases have been rising (table 4). For the 2014 harvest, 53.3 percent of the crop was purchased by either the NACF or a Government program. The NACF is owned and run by farmers and their representatives, but has a close relationship to the Government. The NACF can issue loans through its banking arm.

Table 4
Korea: NACF rice purchases ^{1, 2}

Marketing year	Production (1,000 mt)	Purchase (1,000 mt)	Percent of production
2005/06	4,768	1,071	22
2006/07	4,680	1,306	28
2007/08	4,408	1,227	28
2008/09	4,843	1,617	33
2009/10	4,916	1,950	40
2010/11	4,295	1,380	32
2011/12	4,224	1,327	31
2012/13	4,006	1,331	33
2013/14	4,230	1,465	35
2014/15	4,241	1,649	39
2015/16	4,327	1,770	41

Notes: Marketing year begins Nov. 1. Thus, marketing year 2015/16 began Nov. 1, 2015.

¹Excludes purchases by RPCs not part of the NACF; the purchases were about 400,000 mt in 2015. ²Purchases are of paddy rice, but amounts in the table are on a milled basis.

Source: USDA, Foreign Agricultural Service, 2015 Annual Grain and Feed Report, using data from the Ministry of Agriculture, Food and Rural Affairs (MAFRA).

Korean rice farming has also benefited from large expenditures on the entire farming sector. Major waves of spending were triggered by the end of Korea's quotas based on the Balance of Payments clause in the General Agreement on Tariffs and Trade (GATT) beginning in 1989; by the URA (1995); and by the Korea-United States Free Trade Agreement (implemented in 2012). Other spending had as its impetus the need to deal with the increasing amount of animal waste produced by raising cattle, swine, and poultry and by the desire to reduce the chemical applications to Korean land. Efforts to restructure farming into larger, sustainable units have spent funds to encourage farmers to retire and to sell or rent land; to provide subsidies to contract (custom) farming operations; and to pay for the reconstruction of land and water infrastructure for farming.

The Agricultural and Rural Structural Improvement Measures were in effect from 1992 to 2001, with a promised budget of 42 trillion won (\$42.3 billion) for improving agricultural competitiveness and rural living conditions (KREI, 2010). The Special Rural Development Tax was instituted in 1994 and continued through 2014. It raised 1.5 trillion (\$1.39 billion) annually for use in

- improving production infrastructure
- modernizing production and distribution facilities
- fostering new farmers
- expanding specialized farms
- improving rural living conditions
- expanding welfare infrastructure (KREI, 2010).

Together, these two initiatives envisioned spending about \$60 billion in special efforts to improve agriculture and rural life over a 22-year period. However, actual spending was less, about \$22 billion (KREI, 2010). Given the leading position of rice in households and land, both in agriculture and in rural society, much of the spending benefited rice farm households. An additional program offered 1.2 trillion won (\$1.1 billion) to help farmers hurt by free trade agreements over the period 2004-2010 (KREI, 2010).

The growing concern over the environmental effects of intensive animal agriculture and intensive chemical applications to crop and horticulture farming also led to special initiatives that benefitted rice farms. A major program is the recycling of animal wastes into compost and liquid manures, which are then applied to farmland, including rice paddies. In 2010, the budget for this program was 121.9 billion won (\$105 million). Other programs provide financial assistance to groups of farmers—the environment-friendly agricultural zone promotion project and the project to establish environment-friendly agricultural complexes (KREI, 2010).

The Government's Rural Development Administration (RDA) performs research and extension work for Korean farmers. It develops, distributes, and sells almost all rice seed (KREI, 2010). The RDA budget for 2010 was about \$950 million (KREI, 2010).

After harvest, the Government has encouraged the establishment of rice processing complexes (RPCs), which dry, mill, package, and market rice. In 2014, there were 226 RPCs, 149 belonging to member cooperatives of the NACF and 77 belonging to private owners (MAFRA, Statistical Handbook, 2015).

The RPCs typically attempt to differentiate their rice by using a brand and highlighting the area where the rice was produced and the special characteristics that might appeal to consumers. Member farms are paid for the rice supplied to the RPC, and share in any returns that the cooperatively owned RPC gains after paying all its costs. Almost all rice from the RPCs is shipped directly to retailers (KREI, 2010). The large number of brands leads to strong price competition at the retail level.

Prices

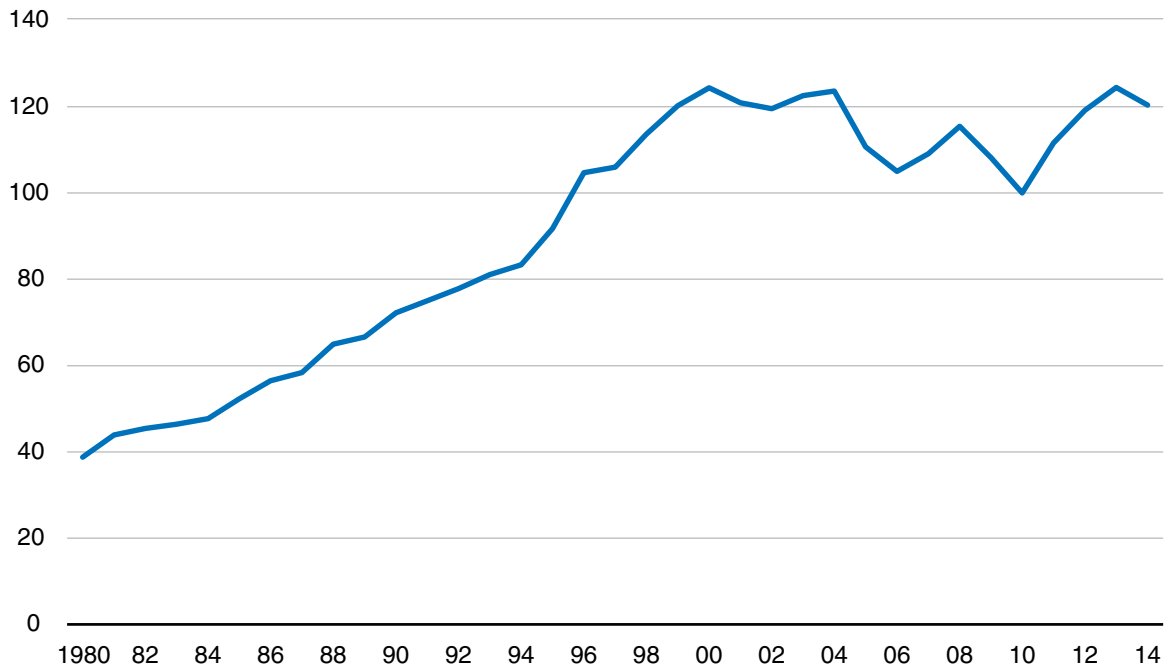
Korea's producer prices for rice were raised until 2000, supported by barriers to imports and the purchase interventions made by the Government and the NACF. Since 2000, producer prices have not showed the same consistent rise, although they did rise in 2010-13, before falling in 2014 (fig. 7). Nominal wholesale prices for rice also leveled off after 2000, and then rose again, 2010-13 (fig. 8).

The gap between internal Korean wholesale prices and some external rice prices has been under 100 percent (varying between 24 and 82 percent, comparing annual averages) since at least 1996 (earlier data are not available). The gap was lowest in 2009, when global rice prices peaked and the average price for milled, short-grain japonica rice in California reached 1,450 won/kg, 463 won less than Korea's wholesale price for high-quality rice (fig. 8). If transportation costs and marketing costs were added to the California ex-mill price, the price gap with the California rice would be even narrower. Medium- and short-grain rice production from California and New South Wales, Australia, has suffered from episodes of drought in the last decade, while demand has remained strong. Korean rice, given Korea's abundant land and water resources, could become more competitive with close substitutes in the future, such as California medium- and short-grain rice.

Figure 7

Korea: Producer rice price

Index, 2010 = 100

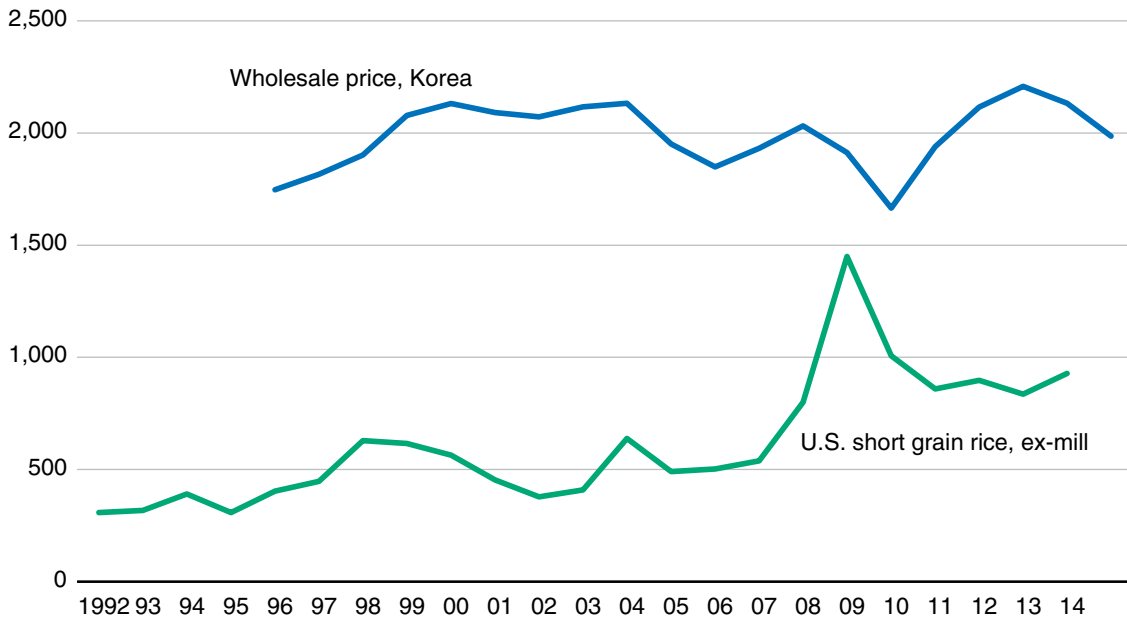


USDA, Economic Research Service using data from Statistics Korea, KOSIS database.

Figure 8

Korea's wholesale rice price and California's short-grain rice price

Won per kg



Note: Rice is on a milled basis.

Source: USDA, Economic Research Service, using Korean data from USDA, Foreign Agricultural Service, Korea Grain and Feed Annual reports, various issues and California data from USDA, Economic Research Service, 2015 Rice Yearbook.

Korea's Rice Trade

Korea's rice trade history is sporadic. In the last century, Korea exported rice during the early decades; imported rice as food aid in the middle decades; in 1978 briefly achieved self-sufficiency in rice (its policy goal); in 1981 was one of the world's largest commercial rice importers; returned to self-sufficiency until 1996; allowed limited interaction through WTO minimum market access quotas until 2015; and in 2015 adopted a TRQ system that can isolate domestic from world rice prices.

In 1910, Japan annexed Korea. Under Japanese rule, South Korea became a source for rice sent to Japan and to North Korea, which was developed by the Japanese for mining and industry. After liberation from Japan in 1945, South Korea ceased to export much rice, and imported U.S. rice donated as food aid. Sporadic exports for the most part ended after 1966 for the remainder of the century, with a few minor exceptions (FAS/USDA, PS&D).

As the Korean population grew and consumers switched from barley and millet to rice, demand in Korea outpaced production in the late 1960s and 1970s. The Government's rice self-sufficiency campaign succeeded in ending rice imports in one year, 1978. However, concerned about possible food shortages after the serious reduction in production in 1980, the Korean Government turned to imports on an unprecedented scale.

The Korean Government imported well over 3 million tons in its effort to avoid a shortage after the bad 1980 harvest (3.3 million mt 1980-83, according to FAS/USDA, PS&D; 3.6 million mt according to Customs Office, Yearbooks, 1980 and 1981). The sudden surge of imports roiled the world rice market, and caused rice prices to spike. The Korean Government purchased mostly medium- and short-grain rice. Long-grain rice prices in the world market also rose as long-grain rice was purchased for use as a replacement for medium-grain rice that was diverted to Korea. Of the rice purchased by Korea in 1980-83, 2.096 million tons, or about 58 percent of the total imports, was imported from the United States (Box: Rice Imports After Korea's 1980 Harvest Problem) (Customs Office, Yearbooks, 1980 and 1981).

After the 1980 setback, the Government turned its attention to conventional varieties of rice. After yields of conventional rice varieties proved resilient and were raised through breeding and improved agricultural practices, the Korean Government resumed its insistence on rice self-sufficiency after 1983, and ceased importing large amounts of rice. Korea actually exported some rice to repay loans made in the 1980-83 crisis by Japan and Indonesia.

Rice Imports After Korea's 1980 Harvest Problem

The rice crop was affected by a period of cold weather in June 1980. Kim and Sumner (2006) note that the leading rice variety, tongil, was also under pressure from rice blast disease from 1978 on. The 1980 crop was widely affected by rice panicle blanking—rice kernels were empty—as a result of the cold weather early in the season. According to Korean Government data, the harvest in fall 1980 was 2.016 million tons less than in 1979, a decline of 36 percent (Kim and Sumner, 2006). Yields of all varieties of rice fell, but the tongil yield fell the most, to a level just below that of conventional rice varieties. Confidence in national rice supplies

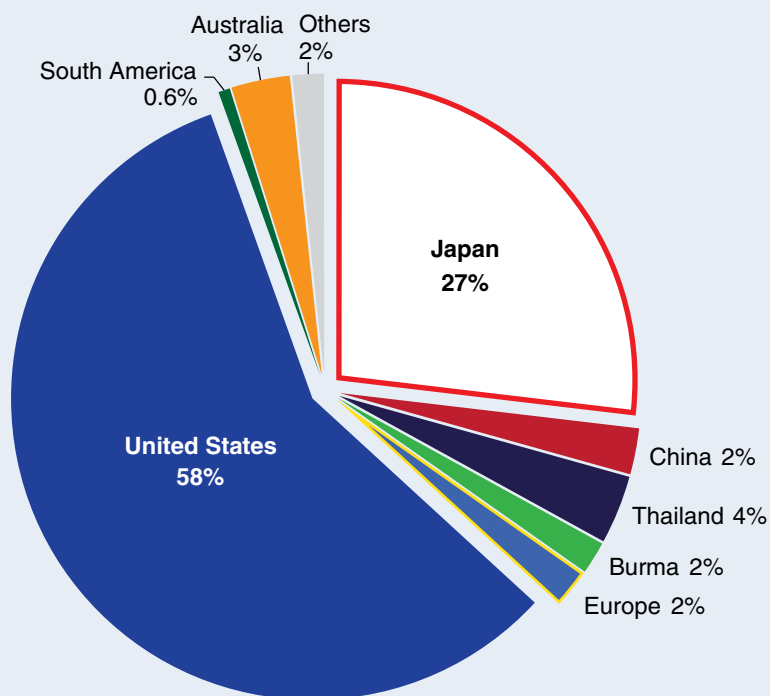
was doubly shaken, first by the magnitude of the production decline in 1980, and second by the poor performance of the Green Revolution tongil rice, which had been seen as the primary variety to increase Korean rice yields going forward. Thus, there was uncertainty about production in future years.

Korea's government took swift action to import rice (only the government could import rice). In late 1980, world rice production in Northern Hemisphere rice-producing regions had already been harvested, with no chance for foreign producers to plant more to satisfy increased Korean demand. Korea had imported 220,000 tons of rice in 1979 (calendar year, milled basis) (Customs Office, 1979). According to USDA's Production, Supply and Distribution database, Korean imports in the rice year (November-October) of 1978/79 were 4.3 percent of total world imports. The 2-million-ton shortfall in Korea's 1980 harvest represented about 17 percent of world rice imports in the previous year. To import so much more rice in a short timespan was a shock to world rice trade. Two benchmark prices for exports (the Thai export price and the price for California medium-grain rice) rose by about 40 percent, 1981 compared to 1979.

The large imports of 1980-83 shed light on the relationship of Korean rice consumption to world market supplies. For almost the entire 20th century, Korea's rice trade was controlled by the Japanese Empire and then the Korean Government. Under the former regime, exports were required, and, under the latter, imports were either discouraged by the Government or subsidized by the United States as food aid. While the 1980-83 episode was not commercial

Box figure 1

Korean rice imports by origin, 1980-83 total



Source: USDA, Economic Research Service, using data from Republic of Korea, Statistical Yearbooks of Foreign Trade.

free trade, it was a serious effort to provide Korean consumers their staple grain when local supplies were reduced. It can be regarded as an imperfect indicator of the type of rice that Korea might import to replace domestic rice. Over the 1980-83 period, Korea imported over 50 percent of the rice from the United States, primarily medium-grain rice from California and the Southern States. Japan supplied over 25 percent, on a Government-to-Government basis. The rest of the world supplied over 15 percent, including from countries where rice exports are characterized as medium and short grain: Australia, Italy, Spain, Argentina, Brazil, and Egypt (Appendix fig. 1). Thailand, the source of the world's largest rice exports at the time, supplied less than 4 percent of the rice, and most of that (81 percent) was glutinous rice, a specialty rice not used as everyday table rice in Korea. Korea imported very little long-grain table rice from Thailand and other countries, despite the predominance of such rice in world trade. The Korean Government thus chose primarily medium- and short-grain rice types to replace domestic production during this exceptional period.

In 1995, under the URA, Korea availed itself of Annex 5 (Section B) to the agreement, which states that “a primary agricultural product that is the predominant staple in the traditional diet of a developing country Member” can receive special treatment for a limited period (WTO, legal texts). Rather than be subjected to “tariffication,” or the unlimited importation of a product subject to a tariff or tariff-rate quota, the product can be subject to a minimum access quota with no provision for imports outside the quota. Korea applied this provision to rice. The minimum access quota specified in Annex 5 began in 1995 as 1 percent of the average consumption in the 1986-88 (UR) base period, and expanded in equal increments to 2 percent in 1999 and then in equal increments from 2001 to 4 percent of base-period consumption in 2004. The required minimum market access (MMA) imports were specified on an annual basis (table 5).

However, Korea did not always purchase imports in the specified year, but delayed purchase until the following year or years. Korea's total commitment, to purchase 1,154,409 tons, on a milled basis, was met by 2005. Over half of the imports were of short-grain rice from China, which won the tenders under the Korean government practice of selecting the lowest-price offers (Choi and Voboril, 1996).

In 2004, the Annex 5 permission for a continued prohibition of rice imports beyond the minimum access level of 205,228 tons was scheduled to expire. Annex 5 allowed continued special treatment if agreed to by trading partners, in which case Korea “shall confer additional and acceptable concessions as determined in that negotiation” (General Agreement on Tariffs and Trade, 1995). Accordingly, Korea applied for continuation, and, in negotiations that ended on December 31, 2004, agreed with its trade partners to continue the minimum access for another 10 years. Korea agreed to double the size of the quota, to ensure that a portion of the imports would be sold to Korean consumers as table rice, and to apportion half the quota to four countries, and the other half to imports from any country.

All imports were to be handled by Korea's state-trading enterprise, aT (Korea Agro-Fisheries and Food Trade Corporation) (Yim, 2006). The company extended tenders for rice imports of certain characteristics and/or origins, and generally accepted those bids that were lowest. The aT sold table rice shipments through a public auction system. The Ministry for Agriculture, Food, and Rural Affairs (MAFRA) distributed processing rice to end users such as food processors and alcoholic beverage producers at a set price throughout the year (Choi, 2014). The aT and MAFRA kept any profits on these transactions for Government use, because under the URA Korea had reserved the right to charge a markup on imported rice, within a ceiling binding (WTO, country schedules).

Table 5

Korea: Rice allocation per country in the buying tenders under MMA (Milled basis, mt)

Calendar year	MMA quota	United States	People's Republic of China	Thailand	Australia	Others
1995	51,307	0	0	0	0	51,307 ²
1996	64,134	0	64,134	0	0	0
1997	76,961	0	58,961	18,000	0	0
1998	89,787	0	83,487	6,300	0	0
1999	102,614	0	80,114	13,500	0	9,000 ³
2000	102,614	0	84,614	18,000	0	0
2001	128,268	27,000	63,000	18,000	20,268	0
2002	153,921	36,000	95,421	22,500	0	0
2003	179,575	49,500	103,075	27,000	0	0
2004	205,228	58,500	117,028	29,700	0	0
2005	225,575	56,179	127,351	33,015	9,030	0
2006	245,922	63,101	145,343	37,478	0	0
2007	266,270	71,719	148,511	46,040 ¹	0	0
2008	286,617	69,610	151,285	65,722	0	0
2009	306,964	81,346	159,788	60,310	0	5,520 ⁴
2010	327,311	93,719	158,570	70,310	0	4,712 ⁴
2011	347,658	101,490	161,070	50,657	0	34,441 ⁵
2012	368,006	100,901	166,070	29,963	9,030	62,042 ⁶
2013	388,353	114,600	151,439	55,163	23,351	43,800 ⁷
2014	408,700	60,076	205,905	62,463	30,256	50,000 ⁸
Total	4,325,785	983,741	2,325,166	664,121	91,935	260,822

Source: Choi and Myers, 2015a.

¹Thai suppliers delivered only 8,470 mt of the total contracted amount due to price rises. ²India. ³Vietnam.

⁴Pakistan. ⁵Vietnam (19,441 mt) and Burma (15,000 mt). ⁶Vietnam (45,400 mt), India (11,642 mt), and Burma (5,000 mt).

⁷Vietnam (13,800 mt), India (30,000 mt); however, Vietnamese domestic conditions failed to allow contract performance of 10,800 mt. ⁸Vietnam (41,000 mt) and India (9,000 mt).

The second decade of Korea's special treatment was difficult to manage, because Korea's rice consumption had declined (Smith and Choi, 2009; Choi and Smith, 2010a, 2010b, 2012; Park et al., 2010). The minimum access quota was expanding from 4 to 8 percent of base period consumption, which corresponded to more than 10 percent of the consumption level in 2014. Since Korea's farm policies subsidized enough domestic production to supply the domestic food-use market, there were periods in which Korea had too much rice. In 2005, Korean policies changed and the Government ceased its purchases to support prices and switched to direct payments aimed at income support (see Production Policy section). Also, older farmers retired and younger farm-household members ceased to see rice farming as an attractive career. Nevertheless, Korean officials, farmers, and the media began to see oversupply as a chronic problem.

In the second period of special treatment, U.S. rice competed well in the general portion of the TRQ (not assigned to individual exporting countries). As China's prices rose, U.S. rice could compete successfully on price at times. Acceptance of U.S. rice in the table use category was good, as U.S. rice proved easier to auction off than rice from other origins (e.g., Choi and Myers, 2015b). Australia was unable to supply its country-specific quota in most years, with California rice taking its place.

In 2014, Korea might have had the option to negotiate another extension of special treatment. However, such a negotiation, if allowed, would have involved additional concessions “acceptable” to its trade partners. Fearing still more enlargement of the minimum access, Korea decided in July 2014 not to pursue this route. In September 2014, Korea formally announced its intention to abandon special treatment and to operate a tariff-rate quota for rice as of January 1, 2015 (Choi, 2014, Choi and Myers, 2014).

To establish an over-quota tariff (i.e., to “tariffy” its rice import regime), Korea was obliged to follow the attachment to Annex 5 of the URA (Box: The Tariffication of Korea’s Rice Import Regime). Korea announced that the over-quota tariff would be 513 percent, while the in-quota tariff would remain at 5 percent. Korea’s UR obligation to purchase the full quota amount (called MMA) remained. However, with the expiration of the MMA agreement, country-specific sub-quotas were terminated, as was commitment to allow some imported rice to reach household consumers (Choi and Myers, 2014).

The Tariffication of Korea’s Rice Import Regime

Korea retained its control over rice imports in the UR by agreeing to an MMA quota, with no provision for imports outside the quota. Unlike other agricultural commodities, no tariff was specified for commercial rice imports outside the quota. This tariffication was postponed until 2004, and then again until 2014.

In 2014, the Korean Government decided not to postpone tariffication again, and announced that it would switch to a TRQ import regime for rice. The TRQ itself was set at the final MMA amount reached in 2014 (408,700 mt), with imports inside the TRQ subject to a 5-percent tariff and possible markups. The tariff on imports outside the TRQ was announced as 513 percent. Five of Korea’s trade partners in the WTO (Australia, China, Thailand, the United States, and Vietnam) filed formal reservations concerning Korea’s proposed rectification and modification to its tariff schedule, effectively blocking its certification.

In setting a tariff rate for rice, Korea was bound by a procedure outlined in the URA, in an attachment to Annex 5, Guidelines for the Calculation of Tariff Equivalents for the Specific Purpose Specified in Paragraphs 6 and 10 of this Annex. The guidelines state that “The calculation of the tariff equivalents, whether expressed as ad valorem or specific rates, shall be made using the actual difference between internal and external prices in a transparent manner. Data used shall be for the years 1986 to 1988.” The attachment states that tariff equivalents (TEs) should primarily be established at the 4-digit harmonized system (HS) level, but could be done at 6- or higher-level HS codes. External prices should be actual average cost, insurance, freight (c.i.f.) import unit values for the importing country. However, “Where average c.i.f. unit values are not available or appropriate,” external prices must be “either appropriate c.i.f. unit values of a near country; or estimated from average free on board (f.o.b.) unit values of (an) appropriate major exporter(s) adjusted by adding an estimate of insurance, freight and other relevant costs to the importing country.” The internal price was to be a “representative wholesale price” (General Agreement on Tariffs and Trade, 1994, Agreement on Agriculture, Attachment to Annex 5).

The wholesale price chosen by Korea as the internal price for TE calculation was for the average of high- and medium-quality rice, on a milled basis. The average value in 1986-88 was 959 won/kg (Song, 2014). Korea chose to look for a TE using the 4-digit HS code for rice, 1006. Korea imported small quantities of rice in 1986-88, according to its trade statistics. The average value of these imports was 340 won/kg, c.i.f. (Customs Office, Yearbook, various issues). Korea deemed these imports not appropriate for comparison, because volumes were small (Song,

2014), summing to 2,354 mt over the 3 years, and most imports were of glutinous rice (Customs Office, Yearbook, various issues). Instead, Korea chose to use the unit value of Chinese imports in 1986-88 as the external price. The difference between the internal and external price, given these choices, was 557 percent in 1986, 669 percent in 1987, and 488 percent in 1988. The average of these 3 years was 571 percent. Korea then decreased the TE by 10 percent, following the URA rule for developing countries, and declared the result, 513 percent, to be the tariff for the new over-quota import trade. Rather than the old import regime, in which only the Korean Government could authorized imports, this tariffication in theory opened up rice trade to any party willing to pay a 513-percent tariff.

Korea examined other TE possibilities, such as actual Japanese imports of rice and import unit values based on average export values from the United States, Thailand, and China in 1986-88. However, Korea stated that these possible external prices “hold little value for utilization as they are calculated to be higher than the import price of China that is a near country of South Korea” (Song, 2014). The external price chosen by Korea, the Chinese import price, is based on imports from Thailand (73 percent), Burma (17 percent), and North Korea (8 percent). Thai trade data from the period indicate that 86 percent of Thai exports to China were either in the category of rice with 25- to 35-percent broken kernels, or 100-percent broken rice (Customs Department, Ministry of Finance, Thailand, 2014). These are very low-valued types of rice. Neither Burma nor North Korea had a reputation for high-quality rice, and the Chinese import unit values for these imports reflect that. Thus, Korea chose an external price of a neighboring country’s imports of low-quality, mostly indica rice, rather than calculating a TE using types of rice more comparable to Korea’s internal quality.

The Korean Government expressed confidence that the over-quota tariff would preclude over-quota imports in the future (Choi and Myers, 2014). Its analysis of 2013 rice prices depicts the burden that the 513-percent tariff places on importers (box table). While without the tariff, Chinese rice marketed in Korea would be half as expensive as domestic Korean rice, with the tariff included the Chinese price is three times the Korean price.

Box table

Rice prices, given Korean tariffication at 513 percent

	2013 average unit value ¹		Tariff ³	Import distribution price ⁴	Domestic price, average for 2013 ⁵	Ratio of import to domestic price	
						Tariff	
	U.S.\$/mt	won/80 kg ²				0	513%
U.S. medium grain	683	63,303	324,744	388,047	174,871	0.36	2.22
China short grain	919	85,177	436,958	522,135	174,871	0.49	2.99
Thai long grain	488	45,230	232,030	277,260	174,871	0.26	1.59

Notes: ¹Average unit value of hypothetical imports of rice uses average f.o.b. unit values of exports, and was converted by the Korean Government to an estimated import value in Korea by adding an estimate of costs, insurance, and freight. ²The Korean Government used an exchange rate of 1,095.04 won/U.S. dollar. ³Calculated by multiplying the average unit value by 5.13. ⁴The sum of the average unit value and the tariff. ⁵Described by the Korean Government as average domestic rice price at point of origin.

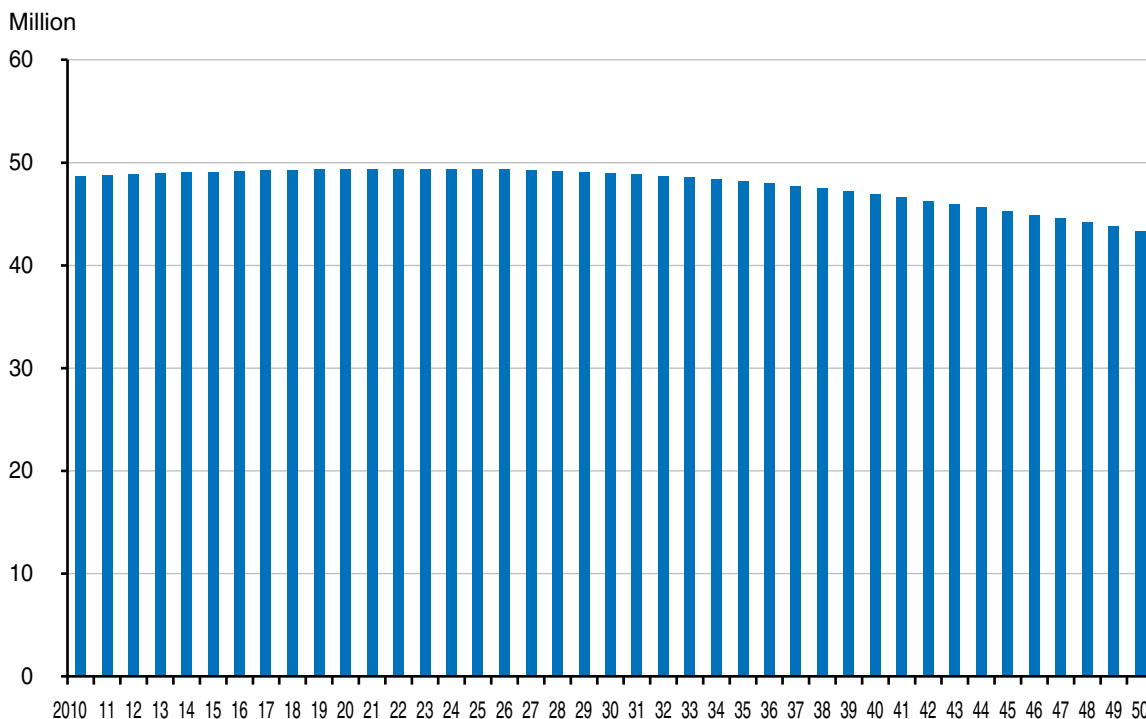
Source: USDA, Economic Research Service, using Press Release by the Korean Government, Ministries of Agriculture, Food and Rural Affairs; Trade, Industry and Energy; and Strategy and Finance, Sept. 18, 2014, translated and conveyed in Choi and Myers, 2014.

The Future of Korea's Rice Market

KREI projects that rice consumption per person will continue to fall. Currently estimated at 49.181 million, Korea's population is projected to rise slightly by 225,000 people by 2023 (0.5 percent), and then begin to decline. In 2050, population is expected to be almost 12 percent below current levels (lower by 5.8 million) (fig. 9; U.S. Census Bureau). With less rice eaten per person and fewer people, Korea's food demand for rice will continue to fall.

Given the long-term decline in traditional food use of rice, the projected further decline in direct food use is reasonable. However, other uses for rice might expand. Use in processed foods, as a flour for baking, or in production of beverages, could increase. Until 2016, Korea did not use rice as a feed, although neighboring countries have done so. China uses large quantities of rice for feed each year. Feed use of rice is promoted by the Japanese Government, which, like Korea and China, has subsidized rice production. The use of rice for feed without Government subsidies would only be possible if the prices of feed grains and Korean low-quality rice converged, which would require a large drop in the price of rice available to feeders. However, in February 2016, the Korean Government, for the first time, released brown rice (99,000 mt) from its stocks for sale as animal feed. The rice sales price was 200 won/kg, about one-tenth of the amount the Government paid for it, implying a large subsidy for the rice (Choi and Myers, 2016).

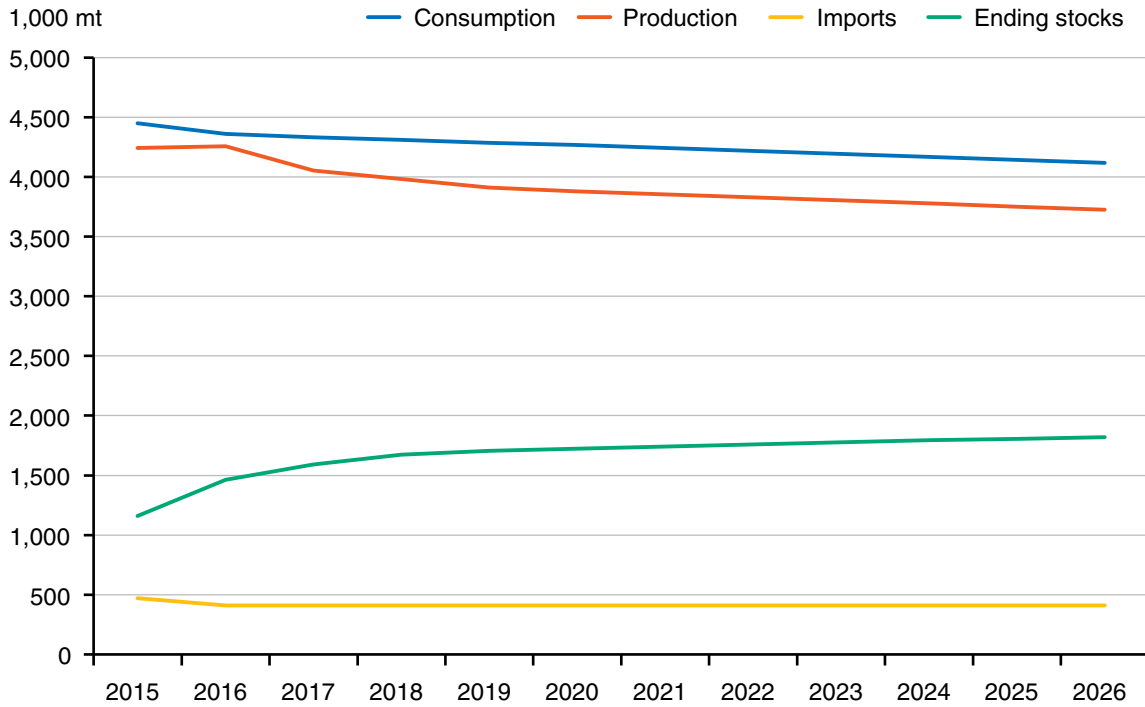
Figure 9
Korea: Projected population



Source: USDA, Economic Research Service, using U.S. Census Bureau, International Data Base, accessed 4-21-16.

Figure 10

Korea: Projected rice supply and demand



Source: USDA, (2016).

Decreased domestic demand will likely force either production to fall, stocks to rise, or exports to rise. South Korea did provide rice to North Korea in 1995 and in 2002-2007 (Francom et al., 2007) and nearby Japan annually donates rice exports to a number of countries in order to deal with a similar oversupply. Donating rice is expensive, as is holding large stocks. Thus, the USDA Baseline assumes that the Korean market will be balanced by a 517,000 mt decrease in production over the next decade (fig. 10; USDA, 2016).

Outlook for U.S. Rice Exports to Korea

The United States is currently the world's largest exporter of japonica rice—the kind of rice Koreans normally eat—shipping around a million tons (milled basis) a year. These exports are classified as medium- and short-grain and account for about one-third of annual U.S. rice exports. The remaining U.S. rice exports are nearly all classified as long-grain, and have the cooking, visual, and eating characteristics of indica rice. The United States is currently the fifth-largest rice exporting country and accounts for 8-9 percent of global trade. Although a major exporter, the United States accounts for about 1.5 percent of global rice production, with exports typically accounting for nearly half of total U.S. production.

The global japonica market is small, currently accounting for around 7 percent of global exports and exhibiting only slight growth. Expansion of the global japonica market is expected to be small over the next decade, with indica continuing to account for most of the annual growth. Furthermore, there is little, if any, substitution globally by importers between indica and japonica rice. In addition to the United States, Egypt, Australia, China, Russia, and the European Union regularly export japonica rice. Japan also exports japonica rice, all as food aid. None of the major Southeast and South Asian rice exporters ship japonica rice. The import market is concentrated as well. Northeast Asia (Japan, South Korea, and Taiwan) is the largest market, buying around half of total global japonica shipments. The United States competes with both Australia and China for japonica sales to Northeast Asia. The Middle East and North Africa is the next-largest market, with Libya and Turkey the top buyers in the region. The United States competes primarily with Egypt and Russia in this regional market. Russia also exports japonica rice to markets in Central Asia. Oceania is also a market for japonica rice, with Australia typically supplying most of these imports.

Japan is consistently the largest buyer of U.S. japonica rice, taking almost 330,000 tons a year, with milled rice accounting for the bulk of purchases. Turkey typically ranks second, purchasing mostly medium-grain rough rice from the United States. Korea is typically the third-largest buyer of U.S. japonica rice, taking both milled and brown rice. Taiwan, Jordan, and Libya are the next-largest buyers of U.S. japonica rice. Although mostly a long-grain importer, Canada regularly takes smaller amounts of U.S. japonica rice. Asian buyers of U.S. japonica rice typically prefer the varieties grown in California instead of the medium-grain varieties produced in the South, despite consistently lower prices for Southern rice. However, importers in the Middle East often purchase Southern medium-grain varieties, especially when the price difference is wide.

The United States is likely to remain a major supplier of japonica rice to Korea, if TRQ imports reflect Korean domestic demand. Australia's crop experienced several years of drought, resulting in a contraction in planted area. Egypt has a large population to feed and has periodically restricted exports in recent years to diminish domestic food price inflation. Egypt placed restrictions on rice exports in April 2016. The European Union is a high-cost grower unlikely to expand production to increase exports. China is currently the world's largest rice importer—nearly all indica—and is facing record or near-record total domestic use, quality concerns regarding domestic rice, and a long-term substitution to japonica from indica rice in the domestic market. China had seen prices rise because of internal demand and supply dynamics and its rising minimum support prices (Gale, 2013). It is evident that japonica rice is a premium grain product in China.

Critical for steady U.S. rice exports to Korea is a return to a normal level of rice plantings in California after 4 years of drought and resulting substantial crop shortfalls in 2014/15 and 2015/16.

Despite at least a 25-percent price discount to California's prices, Korea has yet to purchase japonica rice from the U.S. South, which expanded plantings in both 2014/15 and 2015/16. With a return to normal plantings in California—the 2016/17 area is back to normal—Korea is likely to remain an important outlet for California rice.

Conclusion

Rice remains the principal food grain consumed and principal crop raised in Korea. Korean consumers have maintained a strong preference for the short-grain japonica rice traditionally grown in Korea. A major government attempt throughout the 1970s to switch consumption and production to a new high-yielding variety failed. The Korean government's drive for self-sufficiency ultimately succeeded in the 1980s, however, as yield increases among traditional rice types and declining consumption of rice for table use, combined with a total ban on imports, brought the domestic market into balance. The cost, both to consumer prices and to budget outlays, has been high. Since 1995, Korea has been obliged to import a minimum amount of rice in order to be part of the WTO and benefit from lower barriers to its nonfood exports to other countries. Korea's use of a special mechanism to ban rice imports outside of the minimum access quota was renewed in 2004, with the introduction of a special quota share to be auctioned for table use. Most imported rice since 1995, however, has been used for processing food and beverage products. Korea decided in 2014 not to renew the absolute quota and switched to a tariff-rate quota in which imports above the quota are permitted. The Korean Government retained its complete market control of in-quota imports, and imposed an extremely high tariff (513 percent) that will in practice preclude over-quota imports. Countries that export rice to Korea have voiced their objections to this decision, which remains under discussion at the WTO.

Korea has a long familiarity with U.S. rice, and medium- and short-grain California rice in particular is acceptable there. This was demonstrated when Korea made large, emergency rice imports in 1980 and 1981, and again under the MMA, when U.S. rice often competed successfully on price and quality with japonica imports from China.

An underlying question is whether Korea can now or in the future compete in the world market to supply its own market and export destinations with japonica rice. Korean sources have pointed out how the price gap with foreign japonica rice has narrowed at times. Korean farmers have maintained high yields with less use of costly inputs. However, by instituting a very high over-quota tariff and announcing its intention to tightly manage the disposition of government-imported rice in the TRQ, Korea has continued to isolate its rice from world markets.

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Appendix

Appendix table 1
**Rice supply and use in the Food Balance Sheet of
 the Korea Rural Economic Institute**

Year	Pro- duc- tion	Import	Carry in	Total sup- ply	Carry- over	Export	Feed	Seed	Loss	Pro- cess- ing	Total con- sump- tion	Per per- son	Popu- lation
Unit: 1000 mt													1,000 people
1962	3,015	-	2,836	5,851	2,373	-	-	77	107	5	3,289	124.4	26,432
1963	3,758	117	2,373	6,248	3,086	-	-	34	128	6	2,994	110.1	27,184
1964	3,954	-	3,086	7,040	3,271	13	-	48	138	20	3,550	127.0	27,958
1965	3,501	-	3,271	6,772	2,801	16	-	36	125	23	3,771	141.4	26,670
1966	3,919	18	2,801	6,738	3,202	33	-	36	135	18	3,314	113.9	29,086
1967	3,603	139	3,202	6,944	2,870	-	-	35	128	5	3,906	131.1	29,784
1968	3,195	247	2,870	6,312	2,510	-	-	32	114	4	3,652	119.9	30,469
1969	4,090	631	2,510	7,231	3,448	-	-	36	142	-	3,605	118.3	30,469
1970	3,939	696	3,448	8,083	3,643	-	-	37	143	571	3,689	116.0	31,793
1971	3,998	910	3,646	8,554	3,809	-	17	37	147	17	4,527	142.2	31,828
1972	3,957	489	3,331	7,777	3,298	-	20	35	142	9	4,273	132.0	32,360
1973	4,212	394	3,298	7,904	3,533	-	14	34	148	5	4,170	126.7	32,905
1974	4,445	206	4,288	8,939	4,192	-	-	35	160	7	4,545	135.8	33,459
1975	4,445	481	448	5,374	922	-	-	35	142	17	4,258	120.7	35,281
1976	4,669	157	992	5,818	1,280	-	-	35	147	17	4,339	121.0	35,860
1977	5,215	-	1,291	6,506	1,543	-	-	35	306	17	4,605	123.8	37,184
1978	6,006	-	1,076	7,082	1,218	80	-	35	559	202	4,988	134.7	37,019
1979	5,797	502	1,218	7,517	757	-	-	35	1,408	204	5,113	136.0	37,605
1980	5,136	580	752	6,468	682	-	-	44	649	18	5,075	132.9	38,189
1981	3,550	2,245	1,066	6,861	1,495	-	-	44	195	18	5,109	131.9	38,723
1982	5,063	269	1,495	6,827	1,370	-	-	44	223	49	5,141	130.7	39,331
1983	5,175	216	1,423	6,814	1,517	-	-	45	141	25	5,086	127.3	39,951
1984	5,404	-	1,518	6,922	1,262	135	-	44	162	43	5,276	130.0	40,578
1985	5,682	-	1,247	6,929	1,432	-	-	45	170	25	5,257	128.0	41,056
1986	5,626	-	1,428	7,054	1,251	-	-	45	405	25	5,328	128.2	41,569
1987	5,607	-	1,249	6,856	1,239	-	-	46	148	27	5,396	129.8	41,575
1988	5,493	-	1,239	6,732	1,121	-	-	45	212	30	5,324	126.8	41,975
1989	6,053	-	1,121	7,174	1,572	-	-	45	242	36	5,279	124.6	42,380
1990	5,898	-	1,572	7,470	2,025	-	-	45	201	22	5,177	120.8	42,869
1991	5,606	-	2,025	7,631	2,141	-	-	43	267	95	5,085	117.5	43,268
1992	5,384	-	2,141	7,525	1,999	-	-	42	269	185	5,030	115.2	43,663
1993	5,331	-	1,999	7,330	1,820	-	-	41	267	194	5,008	113.7	44,056
1994	4,750	-	1,820	6,570	1,156	-	-	40	195	174	5,005	112.6	44,453
1995	5,060	-	1,156	6,216	659	-	-	38	514	72	4,933	110.6	44,606

-continued

Appendix table 1

Rice supply and use in the Food Balance Sheet of the Korea Rural Economic Institute - continued

1996	4,695	115	659	5,469	244	-	-	38	209	36	4,942	108.5	45,545
1997	5,323	-	244	5,567	497	-	-	38	181	-	4,851	105.5	45,991
1998	5,450	75	497	6,022	806	-	-	38	401	-	4,777	102.9	46,430
1999	5,097	97	806	6,000	722	-	-	38	525	-	4,715	100.6	46,858
2000	5,263	107	722	6,092	978	-	-	46	468	-	4,600	97.9	47,008
2001	5,291	217	978	6,486	1,335	-	-	47	712		4,392	92.8	47,343
2002	5,515	154	1,335	7,004	1,447	-	-	45	1,030	144	4,338	91.1	47,640
2003	4,927	180	1,447	6,554	1,099	-	-	44	1,111	101	4,199	87.8	47,849
2004	4,451	193	924	5,568	850	-	-	43	388	29	4,258	88.6	48,082
2005	5,000	192	850	6,042	832	-	-	42	1,029	132	4,007	83.2	48,138
2006	4,768	238	832	5,838	830	-	-	41	734	171	4,062	84.4	48,138
2007	4,680	246	830	5,756	695	1	-	41	806	202	4,011	82.8	48,456
2008	4,408	258	695	5,361	686	-	-	41	443	146	4,045	83.2	48,607
2009	4,843	257	686	5,786	993	3	-	40	701	88	3,961	80.5	49,182
2010	4,916	307	993	6,216	1,509	4	-	39	437	202	4,025	81.5	49,410
2011	4,295	327	1,509	6,131	968	4	-	37	867	244	4,011	81.2	49,410
2012	4,224	370	1,051	5,645	762	3	-	36	724	148	3,972	79.4	50,004
2013	4,006	526	762	5,294	803	2	-	36	492	56	3,905	77.8	50,220
2014	4,230	268	803	5,301	875	2	-	35	512	78	3,799	75.3	50,436

Source: Korea Rural Economic Institute (KREI) 2013 and earlier editions, Food Balance Sheet.

Appendix table 2

Korea: Consumption per person of major grains

	Kilocalories per person per day			Kilograms per person per year		
	Cereals	Rice	Wheat flour	Cereals	Rice	Wheat flour
1962	1,862	1,159	179	198.9	124.4	18.5
1963	1,783	1,026	215	190.3	110	22.2
1964	1,795	1,183	242	191.5	127	25
1965	1,910	1,225	145	204.3	131.5	14.9
1966	1,835	1,061	196	195.9	113.9	20.2
1967	1,941	1,222	131	207.6	131.1	13.5
1968	1,931	1,117	169	206.5	119.9	17.5
1969	1,921	1,077	246	206.6	115.6	25.4
1970	2,006	1,246	181	216.1	133.8	18.8
1971	2,038	1,299	201	219.5	139.5	20.9
1972	2,082	1,230	294	223.9	132.1	30.7
1973	1,879	1,124	354	201.2	120.6	36.6
1974	1,651	1,195	249	198.5	128.3	25.7
1975	1,801	1,116	292	193	119.8	30.1
1976	1,797	1,124	296	194.1	121	30.6
1977	1,768	1,177	304	190.8	126.4	31.3
1978	1,813	1,255	313	193.3	134.7	32.3

-continued

Appendix table 2

Korea: Consumption per person of major grains - continued

1979	1,805	1,267	321	192.4	136	33.1
1980	1,730	1,234	284	185	132.9	29.4
1981	1,783	1,229	334	189.9	131.9	34.4
1982	1,763	1,218	301	187.8	130.7	31
1983	1,776	1,238	292	183	127.3	30.4
1984	1,776	1,264	299	183.1	130	31.1
1985	1,798	1,245	307	185.4	128	32
1986	1,804	1,246	302	186.1	128.2	31.5
1987	1,796	1,262	316	185.4	129.8	32.9
1988	1,788	1,234	325	184.9	126.9	32.9
1989	1,764	1,211	309	182.3	124.6	32.2
1990	1,697	1,175	285	175.4	120.8	29.7
1991	1,731	1,178	300	176.2	117.5	31.3
1992	1,723	1,155	312	175.4	120.8	29.7
1993	1,671	1,140	287	176.2	117.5	31.3
1994	1,698	1,129	312	172.9	112.6	32.6
1995	1,660	1,054	343	173.1	110.6	34.1
1996	1,648	1,035	340	171.8	108.2	33.8
1997	1,636	1,006	339	170.6	105.5	33.7
1998	1,608	981	348	167.6	102.9	34.6
1999	1,610	959	361	167.8	100.6	35.8
2000	1,665	997	363	166.8	97.9	36.1
2001	1,578	945	346	158.1	92.8	34.4
2002	1,551	928	348	155.4	91.1	34.6
2003	1,500	894	326	150.3	87.8	32.4
2004	1,531	903	337	153.5	88.6	33.5
2005	1,498	848	318	150.5	83.2	31.6
2006	1,506	857	326	151.2	84.1	32.4
2007	1,496	844	332	150.2	82.8	33
2008	1,449	848	320	145.3	83.2	31.8
2009	1,388	821	324	138.9	80.5	32.2
2010	1,447	830	335	145.1	81.5	33.3
2011	1,431	801	344	144.5	80.6	34
2012	1,453	790	344	146.8	79.4	34.1
2013	1,369	773	319	138.2	77.8	31.6
2014	1,351	749	323	136.4	75.3	32.0

Source: Ministry of Agriculture, Food and Rural Affairs, Yearbooks, various issues; KREI Food Balance Sheet.

Appendix table 3

Korea: Rice utilization patterns, MAFRA database

(1,000 MT)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Rice year (Nov./Oct.)	MY 92/93	MY 93/94	MY 94/95	MY 95/96	MY 96/97	MY 97/98	MY 98/99	MY 99/00	MY 00/01	MY 01/02	MY 02/03	MY 03/04	MY 04/05	MY 05/06	MY 06/07	MY 07/08	MY 08/09	MY 09/10	MY 10/11	MY 11/12	MY 12/13 ²	MY 13/14 ²
Beginning stock	1999	1820	1156	659	244	487	806	722	978	1335	1297	924	850	832	830	695	686	993	1509	1051	762	801
Production	5331	4750	5060	4695	5323	5450	5097	5263	5291	5615	4927	4451	5000	4768	4680	4408	4844	4916	4295	4224	4006	4230
Import	0	0	0	115	0	75	97	107	217	154	154	193	192	238	246	258	257	307	419	370	526	268
Total supply	7330	6570	6216	5469	5567	6022	6000	6092	6486	7004	6378	5568	6042	5838	5756	5361	5787	6216	6223	5645	5294	5299
Food	4856	4814	4777	4778	4710	4606	4541	4425	4209	4145	3987	3952	3815	3860	3789	3755	3683	3670	3610	3554	3435	3340
Processing (for food)	347	365	228	200	341	171	174	175	183	337	313	335	324	373	424	436	366	554	644	566	526	535
(for liquor)	153	191	156	164	341	171	174	175	183	193	212	306	192	202	222	290	278	347	400	418	470	457
Seed	194	174	72	36	0	0	0	0	0	144	101	29	132	171	202	146	88	207	244	148	56	78
Loss/others	41	40	38	38	38	38	37	46	47	46	44	43	42	41	41	40	40	39	37	36	36	35
Total demand	5510	5414	5406	5225	5070	5216	5278	5114	5151	5306	5054	4613	4901	4840	4887	4674	4791	4698	5168	4880	4491	4422
Export ¹ (export)	0	0	151	0	0	0	0	0	0	400	400	105	309	168	174	1	3	9	4	3	2	2
(DPRK)													0	0	0	1	3	4	4	3	2	2
Ending stock	1820	1156	659	244	497	806	722	978	1335	1297	924	850	832	830	695	686	993	1509	1051	762	801	875
Total distribution	7330	6570	6216	5469	5567	6022	6000	6092	6486	7004	6378	5568	6042	5838	5756	5361	5787	6216	6223	5645	5294	5299

Notes: DPRK = Democratic People's Republic of Korea (North Korea). ¹Includes exports to DPRK. ²Preliminary.

Source: USDA, Economic Research Service using data recorded by USDA, Foreign Agricultural Service from Ministry of Agriculture, Food and Rural Affairs (MAFRA) Yearbooks, various issues, for 1993-2013. For 2014, personal communication from MAFRA to the authors.