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# STRUCTURE OF THE RICE MARKET AND PROPOSALS FOR RICE POLICY CHANGES IN KOREA

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## I. Rice in the Korean Economy

The comparative economic importance of agriculture has been significantly decreasing since the 1960's rapid industrialization in Korea. The proportion of agriculture, forestry and fishery products to gross national product decreased from 26.5% in 1970 to 8.0% in 1991<Table 1>. The percentage of the economically active population employed in the sector dropped from 50.4% in 1970 to 16.7% in 1991.

**TABLE 1.** Share of Agriculture in GNP and Employment, 1970~1991

	1970	1975	1980	1985	1991
Gross National Product (bil. Won, A)	2,785	10,136	36,750	78,088	206,681
Product of Agriculture, Forestry and Fishery (bil. Won, B)	739	2,571	5,677	10,352	16,566
B/A (%)	26.5	25.4	15.4	13.3	8.0
Total Employment (1000 people, C)	9,617	11,692	13,683	14,970	18,576
Employment in Agriculture, Forestry and Fishery (1000 people, D)	4,846	5,339	4,654	3,733	3,103
D/A (%)	50.4	45.7	34.0	24.9	16.7

Source: Bank of Korea (BOK), National Statistical Office (NSO)

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However, rice is the most important staple crop in Korea. While the number of farm households cultivating paddy rice decreased from 2,011 thousand in 1970 to 1,506 thousand in 1990, its proportion to total farm households increased from 81.0% to 85.2% during the period <B/A in Table 2>. Additionally, there are more than 16,000 rice milling plants, more than 10,000 facilities for rice storage, and more than 39,000 rice wholesalers/retailers nationwide in 1990. Their employment and value-added are one of the most important economic sources especially in rural area.

The acreage under rice cultivation increased from 1,293 thousand ha in 1970 to 1,244 ha in 1990, which accounts for 60% of total arable land <D/C in Table 2>. The acreage of paddy field per rice farmer increased from 0.60 ha in 1970 to 0.83 ha in 1990, which is relatively very small scale compared to that of western countries,

**TABLE 2.** Household, Acreage, and Income of Rice Farming, 1970-90

	1970	1975	1980	1985	1990
Total Farm Household (1000 households, A)	2,483	2,379	2,156	1,926	1,767
Farm Household Cultivating Rice (1000 households, B)	2,011	...	1,837	1,649	1,506
B/A (%)	81.0	...	85.2	85.6	85.2
Total Arable Land (1000 ha, C)	2,298	2,240	2,196	2,144	2,091
Land for Cultivating Rice (1000 ha, D)	1,203	1,218	1,233	1,237	1,244
D/C (%)	52.3	54.4	56.1	57.7	59.5
Paddy Land per Rice Farm Household (ha, D/B)	0.60	...	0.67	0.75	0.83
Annual Farm Income per Household (1000 Won, E)	256	873	2,693	5,736	11,026
Agricultural Income (1000 Won, F)	194	715	1,755	3,699	6,264
Income Earned from Rice (1000 Won, G)	88	311	741	1,824	3,097
F/E (%)	75.8	81.9	65.2	64.5	56.8
G/E (%)	34.4	35.6	27.5	31.8	28.1
G/F (%)	45.4	43.5	42.2	49.3	49.4

Source: Ministry of Agriculture, Forestry and Fisheries (MAFF), NSO

for example more than 100 ha in California, United States.

Also, while the proportion of farm income earned from rice to total farm income decreased from 34.4% in 1970 to 28.1% in 1990 due to the relatively rapid growth of farmers' non-agricultural income, almost 50% of agricultural income has been earned from rice <G/E and G/F in Table 2>.

The weight of rice in the wholesale price index decreased from 8.8% in 1970 to 2.5% in 1990. The weight of rice in the consumer price index also decreased from 17.8% to 4.5% in 1990. However, the weight of rice in these price indices is still the biggest among commodities and services <Table 3>.

**TABLE 3.** Weight of Rice in Price Indices, 1970~90

Unit: X/1,000

	1970	1975	1980	1985	1990
Weight in Wholesale Price Index <sup>1)</sup>	88.3	58.4	46.1	44.0	25.3
Weight in Consumer Price Index <sup>2)</sup>	178.1	127.1	71.7	79.1	45.3

Source: 1) BOK, 2) NSO

## II. Structure of Rice Production

### 1. Yields and Area Planted

Rice yields almost doubled from the average level of 259 kg/0.1ha (milled weight) in 1955~59 to a peak level of 494 kg/0.1ha in 1977 when the new high-yield variety (tong-il variety) was planted in 55% of total rice planting area <Table 4>.

Annual rice yields were very fluctuating until the late 1960's. The degree of damage by flood and/or drought almost determined the yields. In the 1970's, Government invested in large-scale irrigation projects for paddy fields, developed new high-yield varieties, and guaranteed the Government procurement price of the new varieties. Consequently, the yield jumped in the middle of the 1970's and became stable afterward, except in the year of 1980 when the cold

**TABLE 4.** Yields, Area Planted and Production of Rice, 1955~1992

	Yields <sup>1</sup>			Area Planted		Production
	Average	Traditional Varieties	High-Yield Varieties	Total	High-Yield Varieties	
	kg/0.1ha			1,000 ha		1,000 mt
1955~59	259 <sup>2</sup>	259 <sup>2</sup>	-	1,102 <sup>3</sup>	0	3,037 <sup>2</sup>
1960~64	303 <sup>2</sup>	303 <sup>2</sup>	-	1,148 <sup>3</sup>	0	3,423 <sup>2</sup>
1965~69	303 <sup>2</sup>	303 <sup>2</sup>	-	1,193 <sup>3</sup>	0	3,674 <sup>2</sup>
1970~74	343 <sup>2</sup>	339 <sup>2</sup>	447 <sup>2</sup>	1,194 <sup>3</sup>	...	4,056 <sup>2</sup>
1975~79	453 <sup>2</sup>	418 <sup>2</sup>	489 <sup>2</sup>	1,225 <sup>3</sup>	628 <sup>3</sup>	5,502 <sup>2</sup>
1980~84	432 <sup>2</sup>	414 <sup>2</sup>	470 <sup>2</sup>	1,221 <sup>3</sup>	419 <sup>3</sup>	5,193 <sup>2</sup>
1985~89	460 <sup>2</sup>	450 <sup>2</sup>	496 <sup>2</sup>	1,250 <sup>3</sup>	254 <sup>3</sup>	5,710 <sup>2</sup>
1990~92	453 <sup>4</sup>	449 <sup>4</sup>	515 <sup>4</sup>	1,203 <sup>4</sup>	63 <sup>4</sup>	5,440 <sup>4</sup>
1980	289	292	287	1,233	604	3,550
1981	416	408	437	1,224	321	5,063
1982	438	413	489	1,188	386	5,175
1983	442	420	483	1,228	419	5,404
1984	463	446	502	1,231	367	5,682
1985	456	437	504	1,237	343	5,626
1986	454	449	472	1,236	272	5,607
1987	436	431	457	1,262	247	5,493
1988	481	469	536	1,260	225	6,053
1989	470	463	511	1,257	182	5,898
1990	451	442	520	1,244	138	5,606
1991	446	444	494	1,208	49	5,384
1992	461	461	531	1,157	1	5,331

1 Yield of paddy rice

2 5-year average excluding the lowest and the highest.

3 5-year simple average.

4 3-year simple average.

Source: MAFF

weather was detrimental and the yield dropped to 289kg. The self-sufficiency rate of rice which exceeded 100% in the rice year of 1976~78 dropped to 66% in the rice year of 1981 <Table 5>.

**TABLE 5.** Supply and Demand of Rice, Milled Weight, 1970~92

Rice Year	Supply				Demand				Self Sufficiency Rate (%)
	Beginning Stock	Production	Import	Total	Domestic Consumption	Export	Ending Stock	Per Capita Consumption (kg)	
	1,000 mt				1,000 mt				
1970	88	4,090	541	4,719	4,394	0	325	136.4	93.1
1971	325	3,939	907	5,171	4,777	0	394	134.8	82.5
1972	394	3,998	584	4,976	4,361	0	613	134.5	91.7
1973	613	3,957	437	5,007	4,296	0	711	129.4	92.1
1974	711	4,212	205	5,128	4,640	0	488	127.8	90.8
1975	488	4,445	481	5,414	4,699	0	715	123.6	94.6
1976	715	4,669	168	5,552	4,646	0	906	120.1	100.5
1977	906	5,215	0	6,121	5,045	0	1,076	126.4	103.4
1978	1,076	6,006	0	7,082	5,784	80	1,218	134.7	103.8
1979	1,218	5,797	501	7,516	6,764	0	752	135.6	85.7
1980	752	5,136	580	6,468	5,402	0	1,066	132.7	95.1
1981	1,066	3,550	2,245	6,861	5,366	0	1,495	131.4	66.2
1982	1,495	5,063	269	6,827	5,404	0	1,423	130.0	93.7
1983	1,423	5,175	216	6,814	5,303	0	1,511	129.5	97.6
1984	1,511	5,404	7	6,922	5,540	135	1,247	130.1	97.5
1985	1,247	5,682	0	6,929	5,501	0	1,428	128.1	103.3
1986	1,428	5,626	0	7,054	5,805	0	1,249	127.7	96.9
1987	1,249	5,607	0	6,856	5,617	0	1,239	126.2	99.8
1988	1,239	5,493	0	6,732	5,611	0	1,121	122.2	97.9
1989	1,121	6,053	0	7,174	5,602	0	1,572	121.4	108.1
1990	1,572	5,898	0	7,470	5,444	1	2,025	119.6	108.3
1991	2,025	5,606	0	7,631	5,478	12	2,141	116.3	102.3
1992	2,141	5,384	0	7,525	5,523	2	2,000	112.9	97.5

Source: MAFF

The new dictatorial Government established by military forces imported more than 2.2 million tons of rice from United States for political security in 1981. The shortage amount was 1.2 million tons. The excess import resulted in Government excess stock problems. The year-end stock jumped from 1.1 million tons in 1980 to 1.5

million tons in 1981. Afterwards, good harvests continued so the self-sufficiency rate exceeded 97% every year. The self-sufficiency rate in 1989~90 reached 108%, so that the year-end stock has exceeded 2.0 million tons since 1990, which accounts for almost 40% of total annual consumption.

In the 1980's, the consumption pattern changed. Per capita rice consumption decreased annually, and consumers preferred traditional varieties (medium grain) to high-yield ones (hybrid of medium and long grain), so the planted area for high-yield varieties decreased rapidly in the 1980's. The Government terminated purchases for high-yield varieties since 1992. In the last ten years, the yields ranged from 436 to 481 kg/0.1 ha.

The rice area planted has been stable and slowly increasing since the Korean War in the early 1950's, until the middle of the 1980's. The average rice area planted was 1,102 ha in 1955~59. The area increased to 1,148 ha in 1960~64, 1,193 ha in 1965~69, 1,194 ha in 1970~74, and 1,225 ha in 1975~79. The proportion of the area planted for high-yield varieties to total rice area peaked to be 76% in 1978. The total rice acreage in the 1980's fluctuated somewhat. After peaking in 1987 at 1,262 thousand ha, the acreage started to decline at an increasing rate. That is, acreage decrement was 2 thousand ha in 1987/88, increased to 3 thousand ha in 1988/89, 13 thousand ha in 1989/90, 36 thousand ha in 1990/91, and increased to 51 thousand ha in 1991/92. One of the reasons for the decrement since 1987 is that as the self-sufficiency rate exceeded 100% in the rice year of 1989~91, the farmers' selling price to the market decreased in real term. That is, the annual rate of increase for farmers' selling price for rice since 1988 was consistently lower than the rate of increase of the consumer price index. The average annual rate of increase of farmers' selling prices for rice was 3.5% in 1988~91, while the rate of increase of the consumer price index was 8.0% <Table 6>.

Also, as land prices have risen steeply since 1987 due to the speculative demand of the non-agricultural sector, there has been little incentive to enlarge the cultivating area for rice farmers. The average annual rate of increase of return to land by producing rice was -0.3% during 1988~91, while the rate of increase of the land prices was 18.3% <Table 6>. The rate of return to paddy for rice decreased from 11.8% in 1988 to 7.0% in 1991, which was far below the interest rates

**TABLE 6.** Prices of Rice and Paddy Fields, Rice Income, and Consumer Price Index, 1985~91

	Farmers' Selling Price of Rice <sup>1</sup>	Average Production Costs of Rice	Price of Paddy Field (A)	Return to Investment for Paddy <sup>2</sup> (B)	Rate of Return for Paddy (B/A)	Consumer Price Index (1985=100)
	— Won/80kg —		— 1,000 Won/0.1ha —		%	
1985	66,066	41,675	2,347	236	10.1	100.0
1986	70,489( 6.7)	43,977( 5.5)	2,961(26.2)	264(11.9)	8.9	102.7(2.7)
1987	76,416( 8.4)	48,394(10.0)	2,787(-5.9)	297(12.5)	10.7	105.9(3.1)
1988	85,321(11.7)	51,714( 6.9)	3,335(19.7)	392(32.0)	11.8	113.4(7.1)
1989	85,981( 0.8)	59,309(14.7)	4,812(44.3)	398( 1.5)	8.3	119.9(5.7)
1990	91,698( 6.6)	66,728(12.5)	5,494(14.2)	389(-2.3)	7.1	130.2(8.6)
1991	94,584( 3.1)	69,890( 4.7)	5,525( 5.6)	388(-0.3)	7.0	142.8(9.7)
Average Annual Rate of Increase (%)						
1985~88	8.9	7.5	12.4	18.4	5.3	4.3
1988~91	3.5	10.6	18.3	-0.3	-16.0	8.0
1985~91	6.2	9.0	15.3	8.6	-5.9	6.1

Numbers in parentheses are the annual rates of increase with respect to previous years.

1 Price in the main selling season (Nov. and Dec.)

2 Net Profit + Imputed Cost for Land

(10~12%) of commercial banks. As most crops other than rice are imported freely at cheap prices, there are few substitute crops for rice. Consequently, the rural society became aged as young farmers moved to urban areas, and the acreage of idle paddy fields increased annually.

## 2. Costs of Production

The Korean production cost of rice is the third highest in the major rice producing countries. The highest cost country is Japan, whose production cost per metric ton is \$2,644 in 1987~89 average, and the second is Argentina of \$1,243. The production cost in Korea is \$942, which is 3.4 times that of United States, and 6.7 times that of Thailand <Table 7>.



**TABLE 7.** Production Costs of Rice in Major Rice Producing Countries, 1987~89 Average

	Production Costs per 0.1 ha			Yields (milled)	Production Costs per ton		
	Cash Expenses	Imputed Costs	Total		Cash Expenses	Imputed Costs	Total
	U.S.\$/0.1 ha			kg/0.1ha	U.S.\$/mt		
Japan	313	980	1,293	489	640	2,004	2,644
Argentina	296	139	435	350	846	397	1,243
Korea	182	253	435	462	394	548	942
Italy	160	159	319	411	389	387	776
Portugal	159	52	211	392	405	133	538
United States	88	34	122	440	200	77	277
Colombia	57	58	115	393	145	148	293
Egypt	41	-	-	370	111	-	-
Australia	31	-	-	490	63	-	-
Indonesia	26	21	47	403	65	52	117
Thailand	18	19	37	265	68	72	140
Philippines	11	21	32	258	43	81	124

Sources: FAO, *A Comparison of Production Rice in Selected Countries*, 1991  
 FAO, *Production Yearbook*, selected years  
 MAFF, *Report on the Farm Household Economy Survey*, selected years  
 USDA, *Cost of Production - Major Field Crops*, 1989, 1991

In Korea, the production cost of rice per 0.1 ha doubled from 200 thousand Won in 1982 to 397 thousand Won in 1992 <Table 8>. The mild annual rate of increase of production costs during 1983~87 (4.7~5.3%) jumped to 11.5~16.3% in 1987~89, and reduced to -0.7~3.7% in 1990~92. The proportion of the cost for land (owned or rented) to total production costs increased from 37.9% in 1982 to 54.6% in 1988, and declined to 43.1% in 1992. From 1990, the costs for land started to decrease. On the other hand, the proportion of the cost for labor (owned or hired) declined from 28.7% in 1982 to 20.7% in 1988, and increased to 27.9% in 1992. The cost for capital goods (seed, fertilizer, chemicals, rent for machinery, water, depreciation, etc.) also declined from 33.4% in 1982 to 24.0% in 1989, and then increased to 29.0% in 1992. That is, the cost for land was the major

**TABLE 8.** Economic Production Costs of Rice, 1982~92

	Total Economic Costs(A) <sup>1</sup>	Costs for Land(B)	Costs for Labor(C)	Costs for Capital Goods(D) <sup>1</sup>	B/A	C/A	D/A
	Won/0.1ha				%		
1982	199,993	75,850	57,431	66,712	37.9	28.7	33.4
1983	227,444(13.7)	101,143(33.3)	60,759( 5.8)	65,542(-1.8)	44.5	26.7	28.8
1984	239,421( 5.3)	108,790( 7.6)	62,614( 3.1)	68,017( 3.8)	45.4	26.2	28.4
1985	252,140( 5.3)	115,594( 6.3)	66,871( 6.8)	69,675( 2.4)	45.8	26.5	27.7
1986	264,082( 4.7)	126,559( 9.5)	65,219(-2.5)	72,304( 3.8)	47.9	24.7	27.4
1987	277,885( 5.2)	136,237( 7.6)	64,496(-1.1)	77,152( 6.7)	49.0	23.2	27.8
1988	323,170(16.3)	176,501(29.6)	66,802( 3.6)	79,865( 3.5)	54.6	20.7	24.7
1989	360,314(11.5)	191,917( 8.7)	81,624(22.2)	86,773( 8.6)	53.3	22.7	24.0
1990	385,851( 7.1)	193,572( 0.9)	94,159(15.4)	98,120(13.1)	50.2	24.4	25.4
1991	400,065( 3.7)	185,640(-4.1)	105,150(11.7)	109,275(11.4)	46.4	26.3	27.3
1992	397,296(-0.7)	171,396(-7.7)	110,837( 5.4)	115,063( 5.3)	43.1	27.9	29.0
Average Annual Rate of Increase (%)							
1982~92	7.1	8.5	6.8	5.6			

Numbers in parentheses are the annual rates of increase with respect to previous years.

<sup>1</sup> Excluding taxes and public charges.

Source: MAFF

factor for the cost-push until 1988, and afterward the costs for labor and capital goods were the major factors.

The large share of the production area farmed by small operations is indicated in Table 9. In 1990, almost 75% of the rice

**TABLE 9.** Percentages of Total Acres Planted and Number of Rice Farmers by Size of Acres Planted to Rice per Farm, 1990

	Less than 0.5 ha	0.5 to 1.0 ha	1.0 to 1.5 ha	1.5 to 2.0 ha	2.0 to 2.5 ha	2.5 to 3.0 ha	More than 3.0 ha
Percent Rice Area Planted	7.4	22.7	24.4	18.4	11.2	6.4	9.6
Percent of Rice Producing Farmers	40.7	33.8	14.9	5.9	2.4	1.1	1.2

Source: MAFF

producers planted less than 1 ha of rice per household, accounting for 30% of the total area of rice planted. At the other extreme, 1.2% of the rice producers planted rice in areas larger than 3 ha, but these producers accounted for 9.6% of the total rice area.

Table 10 shows production costs by farm size in 1992. Total costs per 0.1 ha decreased by 11.2% as farm sizes increased from less than 0.5 ha to more than 3.0 ha. The costs for land increased by 13.8% from 160 thousand Won for farmers with less than 0.5 ha to 182 thousand Won for farmers with more than 3.0 ha. Costs for owned land decreased as farm size increased, and the costs for rental land increased as farm size increased. The legal upper limit of farmers'

**TABLE 10.** Costs of Rice Production by Farm Size, 1992

	Less than 0.5 ha	0.5 to 1.0 ha	1.0 to 1.5 ha	1.5 to 2.0 ha	2.0 to 2.5 ha	2.5 to 3.0 ha	More than 3.0 ha
	Won/0.1ha						
Costs for Land	159,736	165,145	170,660	180,688	173,983	186,352	181,726
Owned	116,666	112,811	108,513	103,292	107,687	102,808	71,876
Rented	43,070	52,334	62,147	77,396	66,296	83,544	109,850
Costs for Labor	132,871	122,181	108,416	104,922	96,366	88,151	87,866
Owned	106,979	101,939	92,325	89,432	84,319	77,735	75,883
Hired	25,892	20,242	16,091	15,490	12,047	10,416	11,983
Costs for Capital Goods	131,141	120,442	112,873	111,956	109,383	101,745	101,029
Seed	6,547	6,225	6,018	5,961	5,819	5,813	5,495
Inorganic Fertilizer	10,233	10,405	10,532	10,579	11,173	10,625	10,956
Organic Fertilizer	4,966	5,209	5,179	4,697	5,051	5,403	4,648
Chemicals	12,760	12,483	12,299	12,971	13,051	12,365	11,022
Fuel & Electricity	732	998	1,214	1,251	1,517	1,209	1,665
Irrigation	2,750	2,461	2,635	3,090	3,014	4,366	3,226
Animals	1,031	950	482	489	345	37	323
Depreciation	12,560	14,054	15,957	15,678	19,608	17,178	21,400
Repairs	50,961	43,824	37,480	36,109	28,224	24,839	20,420
Interest	21,183	19,859	18,215	17,980	19,790	17,385	20,377
Custom Operation, etc.	7,418	3,974	2,862	3,151	1,791	2,525	1,497
Total	423,748	407,768	391,949	397,566	379,732	376,248	370,621

Source: MAFF

**TABLE 11.** Rural Wage Rates and Labor Input for Rice Production, 1985~92

	Rural Wage Rates		Labor Inputs for Rice Production						Total
	Men	Women	Own Labor			Hired Labor			
			Men	Women	Total	Men	Women	Total	
	— Won/day —		hours/0.1ha						
1985	9,695	6,940	43.0	19.8	62.8	13.6	9.1	22.7	85.5
1986	10,142	7,254	40.5	18.7	59.2	12.3	8.4	20.7	79.9
1987	10,568	7,699	39.0	19.1	58.1	10.5	7.7	18.2	76.3
1988	12,275	8,855	36.0	16.1	52.1	9.3	6.3	15.6	67.7
1989	15,162	10,666	35.2	16.2	51.4	8.5	5.5	14.0	65.4
1990	18,563	13,224	32.0	15.4	47.4	7.5	4.5	12.0	59.4
1991	24,444	17,187	28.5	14.2	42.7	5.9	3.0	8.9	51.6
1992	28,758	19,920	26.0	12.4	38.4	4.8	2.0	6.8	45.2
Average Annual Rate of Increase (%)									
1989~92	23.8	23.1	-9.6	-8.5	-9.3	-17.3	-28.6	-21.4	-11.6

Source: MAFF

land possessions used to be limited to 3.0 ha, but will be relaxed to 20.0 ha in late 1993.

The costs for labor decreased by 33.9% from 133 thousand Won for farmers with less than 0.5 ha to 88 thousand Won for farmers with more than 3.0 ha. The costs for hired labor decreased as much as 53.7% for comparable farm sizes.

The costs for capital goods decreased by 23.0% from 131 thousand Won for farmers with less than 0.5 ha to 101 thousand Won for farmers with more than 3.0 ha. Smaller farmers pay more for seed, animal, repairs, interest, and custom operations, and input less inorganic fertilizer, fuel and electricity, irrigation and depreciation for equipment. More efficient utilization of equipment and lower expenditures for fees and borrowings contribute to size economies.

Costs for land will have a trend of decreasing for a few years as long as the rate of return for the paddy is low, the possession of the paddy by non-farmers is legally prohibited, and rural society continues aging so that supply exceeds demand for the paddy field.

Costs for labor will increase for a few years. Wage rates are an increment factor, while mechanization is a decrement factor. In recent

years (1989~92), the increasing rate of rural wages was more than 23% per annum which exceeds the decreasing rate of labor input per acre of 11.6% per annum. The increasing trend of rural wage will continue as long as the young farmers keep on quitting agriculture <Table 11>.

Costs for capital goods will increase. If we extend recent trends, costs for irrigation, depreciation and repair of equipment, custom operation, interest, taxes and public charges will increase. There will be small cost savings for fertilizer and animals <Table 12>. The Korean Government has a plan for rice farming to achieve full mechanization by 1998. Mechanization rates for various rice farming stages were 80~93% in 1991.

**TABLE 12.** Expenses for Capital Inputs for Rice Production, 1985~92

	1985	1986	1987	1988	1989	1990	1991	1992	89~92 Annual Rate of Incr.
	Won/0.1ha								%
Seed	3,440	3,830	4,006	4,332	4,880	5,539	5,885	6,055	7.5
Inorganic Fertilizer	11,386	11,183	11,277	10,169	10,059	10,345	10,229	10,561	1.6
Organic Fertilizer	4,200	4,184	4,326	4,869	5,331	5,186	5,158	5,041	-1.8
Chemicals	9,368	9,580	10,585	9,726	10,687	12,394	13,076	12,459	5.2
Fuel & Electricity	1,448	1,188	1,198	1,272	1,152	1,014	1,069	1,169	0.5
Irrigation	5,725	6,204	6,826	3,825	2,507	2,380	2,689	2,820	4.0
Animal	1,689	1,465	1,253	984	975	1,007	786	631	-13.5
Depreciation	7,140	7,796	8,572	10,454	11,172	12,789	13,778	15,807	12.3
Repairs	10,452	11,937	14,004	17,865	22,547	28,690	35,520	37,806	18.8
Interest	12,034	12,204	12,486	14,018	14,998	16,384	17,795	19,224	8.6
Custom Operation	2,793	2,733	2,619	2,353	2,465	2,392	3,290	3,490	12.3
Taxes and Charges	3,313	2,799	2,904	2,707	2,255	2,292	2,723	2,904	8.8
Total	72,988	75,103	80,056	82,574	89,028	100,412	111,998	117,967	9.8

Source: MAFF

### **III. Structure of Rice Consumption**

#### **1. Household Consumption**

Table 13 shows the change in food consumption during the last two decades. While consumers' expenditure for meat, milk and eggs, fruits, seafood and "away from home" food increased rapidly, the proportion of expenditure on cereals and vegetables decreased <C/B ~ J/B in Table 13>. In particular, the proportion of urban household expenditure for rice to total expenditure for food and beverages dropped from 38.6% in 1970 to 12.7% in 1992. The Engel's index for rice, that is the proportion of expenditure for rice to total expenditure, decreased from 15.4% to 3.5% during the period <D/A in Table 13>.

In respect of nutrition, rice has been contributing more than 40% of calories, and more than 25% of proteins <L/K and N/M in Table 13>.

There were chronic shortage of grain for domestic consumption until the late 1960's. Grains such as wheat, barley, rice and soybeans from United States have made up for the shortage under the U.S. foreign aid program (PL 480) since 1955. The Korean Government campaigned to substitute wheat and barley for rice consumption, and prohibited processing of rice for cakes and liquor. Payment by Korean currency for the imported grains changed to payment by U.S. currency in 1968. As a consequence of a lack of dollars and rice, the Korean Government invested in large-scale irrigation projects, developed new high-yield varieties, guaranteed the Government procurement price of the new varieties to encourage rice production, and enforced the restriction of rice consumption in the 1970's.

The prohibition on rice processing was relaxed in 1977. Until then, rice consumption for processing was below 0.5% of total domestic consumption. The proportion of rice consumption for processing doubled from 0.4% in 1975 to 0.8% in 1985 through the private use of rice for cakes and liquor. From 1986, Government started to release rice, more than 2-years in storage to processing firms producing rice cake, rice biscuit and liquor, at 20~30% cheaper prices than normal release prices to rice wholesalers for food consumption, so as to reduce the excess stock. Also from 1991, the Government started to release rice, more than 3-years in storage, to brewing companies at less than half the price than the price for other processing. In 1992, the proportion of rice

**TABLE 13.** Annual Expenditure for Food in Urban Household, and Nutrition Intake from Rice, 1970~92

	1970	1975	1980	1985	1990	1991	1992
Annual Total Expenditure per Urban Household(1000 Won, A)	364	727	2,252	4,093	9,065	10,750	12,474
Expenditure on Food and Beverages (1000 Won, B)	145	334	930	1,427	2,634	3,083	3,396
Expenditure on Cereals (1000 Won, C)	62	163	328	401	504	520	504
Expenditure on Rice (1000 Won, D)	56	143	296	362	446	454	432
Expenditure on Meat (1000 Won, E)	13	26	94	179	314	386	418
Expenditure on Milk and Eggs (1000 Won, F)	4	10	37	72	125	130	149
Expenditure on Vegetables(1000 Won, G)	22	42	127	181	295	346	367
Expenditure on Fruits (1000 Won, H)	5	13	52	89	187	248	275
Expenditure on Seafood (1000 Won, I)	13	24	78	124	253	300	335
Expenditure on "Away from Home" (1000 Won, J)	3	7	35	107	538	664	803
Composition of Major Food Categories in Expenditure on Food and Beverages							
C/B (%)	42.8	48.8	35.3	28.1	19.1	16.9	14.8
D/B (%)	38.6	42.8	31.8	25.4	16.9	14.7	12.7
E/B (%)	9.0	7.8	10.1	12.5	11.9	12.5	12.3
F/B (%)	2.8	3.0	4.0	5.0	4.7	4.2	4.4
G/B (%)	15.2	12.6	13.7	12.7	11.2	11.2	10.8
H/B (%)	3.4	3.9	5.6	6.2	7.1	8.0	8.1
I/B (%)	9.0	7.2	8.4	8.7	9.6	9.7	9.9
J/B (%)	2.1	2.1	3.8	7.5	20.4	21.5	23.6
Engel's Index for Food and Beverage (B/A, %)	39.8	45.9	41.3	34.9	29.1	28.7	27.2
Engel's Index for Rice (D/A, %)	15.4	19.7	13.1	8.8	4.9	4.2	3.5
Daily Per Capita Calories Supplied (kcal, K)	2,533	2,390	2,485	2,687	2,853	2,883	
Calories Supplied from Rice (kcal, L)	1,246	1,116	1,234	1,245	1,175	1,183	
Daily Per Capita Protein Supplied (grams, M)	73.9	71.1	73.6	6.6	89.3	89.7	
Protein Supplied from Rice (grams, N)	23.8	21.3	23.6	25.3	23.2	22.3	
L/K (%)	49.2	46.7	49.7	46.3	41.2	41.0	
N/M (%)	32.2	30.0	32.1	29.2	26.0	24.9	

Source: NSO. KREI

**TABLE 14.** Domestic Rice Consumption by Use

Rice Year	Food Consumption	Processing	Seed	Loss & Others	Total
	1,000 mt				
1970	4,218 (96.0)	16 (0.4)	37 (0.8)	123 (2.8)	4,394 (100.0)
1975	4,361 (92.8)	17 (0.4)	35 (0.7)	286 (6.1)	4,699 (100.0)
1980	5,057 (93.6)	36 (0.7)	44 (0.8)	265 (4.9)	5,402 (100.0)
1985	5,259 (95.6)	43 (0.8)	45 (0.8)	154 (2.8)	5,501 (100.0)
1986	5,308 (91.4)	44 (0.8)	45 (0.8)	408 (7.0)	5,805 (100.0)
1987	5,247 (93.4)	56 (1.0)	46 (0.8)	268 (4.8)	5,617 (100.0)
1988	5,129 (91.4)	70 (1.2)	45 (0.8)	367 (6.5)	5,611 (100.0)
1989	5,145 (91.8)	72 (1.3)	45 (0.8)	340 (6.1)	5,602 (100.0)
1990	5,127 (94.2)	80 (1.5)	45 (0.8)	192 (3.5)	5,444 (100.0)
1991	5,032 (91.7)	148 (2.7)	43 (0.8)	267 (4.9)	5,490 (100.0)
1992	4,930 (89.2)	257 (4.7)	42 (0.8)	297 (5.4)	5,526 (100.0)

Numbers in parentheses are percentages of annual total consumption.

Source: MAFF

consumption for processing accounted for 4.7% of the total annual consumption <Table 14>.

Per capita annual rice consumption dropped from 136.4 kg in 1970 to 120.1 kg in 1976. After reaching self-sufficiency in rice in 1977, the Government terminated the anti-consumption campaign, and per capita annual rice consumption jumped to 135.6 kg in 1979 <Table 5>. Per capita consumption has been decreasing since 1979. Rice became an inferior good like in Japan, Taiwan, Singapore and Hong Kong, which are higher-income Asian countries and whose per capita annual rice consumption historically has been above 100 kg. In the 1980's, annual rate of decrease of per capita rice consumption was 1.1% (1.4 kg per annum). In recent years of 1990~92, the annual rate of decrease was 2.8% (3.4 kg per annum). The annual rate of decrease is predicted to be 2~3% through the 1990's, and the annual per capita rice consumption will reduce from 112.9 kg in 1992 to 86~94 kg in 2001.

## 2. Government Procurement and Use

Government procurement of rice started in 1948, the year of



**TABLE 15.** Government Purchasing Price, Production Cost, Rural Market Price, Government Selling Price, and Government Handling Cost of Rice, 1960~93

Rice Year	Gov't Procurement Price(A) <sup>1</sup>	Average Production Cost <sup>2</sup>	Rural Market Price <sup>3</sup>		Gov't Selling Price(B) <sup>4</sup>	Gov't Handling Cost(C)	Gov't Deficit (B-A-C)
			Traditional	Tong-II			
Won/80kg							
1960	1,059	1,300	952	-	1,216	157	0
1961	1,059	1,313	1,257	-	1,216	157	0
1962	1,550	1,377	1,418	-	1,792	242	0
1963	1,650	1,422	1,780	-	1,888	233	5
1964	2,060	1,373	2,544	-	2,312	252	0
1965	2,967	1,636	2,978	-	3,450	346	137
1966	3,150	2,672	2,968	-	3,350	394	-194
1967	3,306	2,795	3,140	-	3,900	446	148
1968	3,590	2,735	3,565	-	4,100	507	3
1969	4,200	3,403	4,782	-	5,200	446	554
1970	5,150	3,565	5,296	-	5,400	578	-328
1971	7,000	4,642	6,557	-	6,500	664	-1,164
1972	8,750	6,115	8,365	...	9,500	738	12
1973	9,888	6,578	9,768	...	9,500	792	-1,180
1974	11,377	8,683	10,918	...	11,264	915	-1,028
1975	15,760	12,434	16,414	...	13,000	1,488	-4,248
1976	19,500	13,891	19,671	...	16,730	1,996	-4,766
1977	23,200	15,171	23,419	19,854	19,500	2,424	-6,124
1978	26,260	20,665	25,371	19,764	22,420	3,372	-7,212
1979	30,000	24,878	30,979	26,131	26,500	5,088	-8,588
1980	36,000	40,238	39,160	32,448	32,000	7,126	-11,126
1981	45,750	36,033	55,932	46,373	44,000	9,750	-11,500
1982	52,160	36,033	52,164	48,196	53,280	10,184	-9,064
1983	55,970	36,853	54,986	49,967	52,280	9,358	-13,048
1984	55,970	39,158	54,533	48,200	52,000	12,622	-16,592
1985	57,650	39,124	58,277	51,990	54,260	16,262	-19,652
1986	60,530	41,675	66,066	56,000	56,970	16,934	-20,494
1987	64,160	43,977	70,489	59,776	55,120	16,800	-25,840
1988	73,140	48,394	76,456	62,645	49,610	13,360	-37,340
1989	84,840	51,714	85,321	63,190	47,770	8,766	-45,836
1990	96,720	59,309	85,981	63,242	55,520	10,593	-51,793
1991	106,390	66,728	91,685	...	92,000	25,115	-39,505
1992	113,840	69,890	94,584	...	96,600	32,400	-49,640

1 Second grade; Procurement prices during 1972~89 are for high-yield variety.

2 Average production costs for traditional and high-yield varieties.

3 Second grade; Average price in November and December

4 Selling price for less than 1 year old rice in storage; The selling prices during 1972~89 are for high-yield varieties.

Source: MAFF

**TABLE 16.** Government Procurement and Use for Rice, 1960~92

Rice Year	Gov't Procurement <sup>1</sup>					Gov't Use <sup>2</sup>				
	Begin. Stock	Purchase by Cash	"Taxes in kind"	Imports	Total	Military & Public	Price Sta- bilization	Pro- cessing	Others	Ending Stock
1,000 mt (%)										
1960	118	0	198(6.3)	0	316	163(5.2)	76(2.4)	0	18	59(1.9)
1961	59	0	141(4.6)	0	200	136(4.4)	20(0.6)	0	21	23(0.7)
1962	23	200(5.8)	109(3.1)	0	332	133(3.9)	159(4.7)	0	23	17(0.5)
1963	17	193(6.4)	85(2.8)	118	413	120(3.8)	263(8.4)	0	22	8(0.3)
1964	8	64(1.7)	160(4.3)	0	224	121(3.3)	60(1.6)	0	0	43(1.2)
1965	43	66(1.7)	174(4.4)	0	283	121(3.1)	91(2.3)	0	0	71(1.8)
1966	71	58(1.7)	244(7.0)	32	405	105(3.0)	217(6.1)	0	67	16(0.5)
1967	16	77(2.0)	274(7.0)	113	480	117(3.0)	285(7.2)	0	10	68(1.7)
1968	68	107(3.0)	179(5.0)	216	570	119(3.1)	442(11.6)	0	3	6(0.2)
1969	6	21(0.7)	135(4.2)	755	917	144(3.6)	578(14.6)	0	133	62(1.6)
1970	62	162(4.0)	164(4.0)	541	929	91(2.1)	749(17.0)	0	17	72(1.6)
1971	72	244(6.2)	107(2.7)	907	1,330	116(2.4)	1,180(24.7)	0	7	27(0.6)
1972	27	405(10.1)	87(2.2)	584	1,103	128(2.9)	589(13.5)	0	45	341(7.8)
1973	341	438(11.1)	69(1.7)	437	1,285	120(2.8)	606(14.1)	0	44	515(12.0)
1974	515	420(10.0)	60(1.4)	205	1,200	113(2.4)	972(20.9)	0	0	115(2.5)
1975	115	668(15.0)	67(1.5)	481	1,331	123(2.6)	553(11.8)	0	0	656(14.0)
1976	656	673(14.4)	117(2.5)	168	1,614	99(2.1)	848(18.3)	0	0	667(14.4)
1977	667	871(16.7)	172(3.3)	0	1,710	133(2.6)	606(12.0)	0	0	971(19.2)
1978	971	1,314(21.9)	89(1.5)	0	2,374	...	1,183(20.5)	0	...	...
1979	...	1,262(21.8)	94(1.6)	501	...	...	1,683(24.9)	0	...	471(7.0)
1980	471	1,156(20.8)	145(2.6)	580	2,352	152(2.8)	1,742(32.2)	0	16	442(8.2)
1981	442	416(11.7)	130(3.7)	2,245	3,233	154(2.9)	1,560(29.1)	0	24	1,495(27.9)
1982	1,495	785(15.5)	130(2.6)	269	2,679	157(2.9)	699(12.9)	0	449	1,374(25.4)
1983	1,374	914(17.7)	177(3.4)	216	2,681	148(2.8)	911(17.2)	0	111	1,511(28.5)
1984	1,511	1,042(19.3)	177(3.3)	7	2,737	147(2.7)	902(16.3)	0	441	1,247(22.5)
1985	1,247	1,056(18.6)	159(2.8)	0	2,462	148(2.7)	680(12.4)	0	206	1,428(26.0)
1986	1,428	1,051(18.7)	39(0.7)	0	2,518	176(3.0)	904(15.6)	5	184	1,249(21.5)
1987	1,249	867(15.5)	23(0.4)	0	2,139	199(3.5)	655(11.7)	15	169	1,101(19.6)
1988	1,101	788(14.3)	0	0	1,889	215(3.8)	490(8.7)	28	95	1,061(18.9)
1989	1,061	967(16.0)	0	0	2,028	227(4.1)	440(7.9)	28	70	1,263(22.5)
1990	1,263	1,692(28.7)	0	0	2,955	220(4.0)	766(14.1)	33	45	1,891(34.7)
1991	1,891	1,203(21.5)	0	0	3,094	225(4.1)	660(12.0)	114	49	2,046(37.3)
1992	2,046	1,078(20.0)	0	0	3,124	202(3.7)	751(13.6)	245	16	1,910(34.6)

1 Numbers in parentheses are percentages of Government purchase to annual production.

2 Numbers in parentheses are percentages of Government release to annual total consumption.

Source: MAFF

establishment of the Korean Government. Until 1961, the procurement of rice for things such as military use, price stabilization and social welfare was mainly characterized with in-kind, payment for land tax and exchanges of fertilizers for rice. As a result of a lack of Government budget, the Government persuaded farmers to sell at a price far below the market price to meet Government requirements, so that the Government's purchase of rice by cash was nil, or at most 6.0% of annual production.

In the 1960's, the procurement price covered production costs. Also, the Government sold rice for price stabilization at the price of purchase plus handling costs until 1964 <Table 15>. The proportion of Government purchase by cash was below 6.4% of annual production, while that of Government procurement by "taxes in kind" was 2.8~7.0% in the 1960's <Table 16>. The Government released 3.0~5.2% of annual nationwide consumption for military and public use, and 0.6~14.6% for price stabilization in the 1960's. The

**TABLE 17.** Ratios of Rice Prices in Summer to the Prices in Winter of the Previous Year<sup>1)</sup>, 1961~92

	Seasonal Price Ratio in Farmers' Selling Price of Rice	Seasonal Price Ratio in Wholesale Price of Rice	Seasonal Price Ratio in Retail Price of Rice
1961-65 Average	1.49	1.49	-
1966-70 Average	1.25	1.16	1.08
1971-75 Average	1.19	1.15	1.17
1976-80 Average	1.20	1.16	1.15
1981-85 Average	1.19	1.12	1.13
1986	1.12	1.10	1.11
1987	1.07	1.07	1.09
1988	1.12	1.12	1.09
1989	0.99	1.00	1.01
1990	1.12	1.11	1.08
1991	1.04	1.03	1.05
1992	1.06	1.03	1.04

1) Average price in July, August and September divided by the average price in November and December of the previous year.

Government operated "nonrecourse loan" program for 0.4~6.6% of annual production to stabilize seasonal price fluctuations during the period 1957~68. Until the middle of the 1960's, rice prices in the off-season were be more than 50% higher than prices in the harvest season. Price fluctuation have been stabilized since the middle of the 1960's <Table 17>.

In the 1970's, the Government purchased rice at a price higher than farmers' selling price to market, and sold at a price lower than even the procurement price. The Government increased their purchases to 4.0~11.1% of annual production during 1970~74, and 15.0~21.9% during 1975~79, and started to purchase high-yield varieties in 1971. The Government released 2.1~2.9% of annual nationwide consumption for military and public use, and 11.8~24.9% for price stabilization in the 1970's. The policy goals of the Government procurement program in the 1970's was to promote rice production, to increase farm income and consumers' surplus, and to stabilize seasonal price fluctuations. Consequently, Government deficits grew annually. The deficit per bag of milled rice (80kg) increased from 328 Won in 1970 to 11,126 Won in 1980.

In the 1980's, the Government continued "higher price" purchases and "lower price" releases, and the deficit per bag increased to 51,793 Won in 1990. The Government purchase volume accounted for 11.7~20.8% of annual production in the 1980's, and the "in kind" procurement dropped to below 3.7% and nil in 1988 and thereafter. Government releases for military and public use accounted for 2.7~4.1% of annual domestic consumption, and releases for price stabilization dropped from 32.2% in 1980 to 7.9% in 1989.

The "Grain Management Act", legislated in 1950, was amended in 1988 so that Government purchases of grain became subject to the agreement of the Congress. Government purchases of rice doubled from 14.3% of production in 1988 to 28.7% in 1990. The good harvests since 1989 led the Government to release much less volume than procurement, and to hold excess stocks of rice.

#### **IV. Structure of the Rice Market**

The major structural change in the rice marketing of the private sector

since the 1960's has been in the direction of decentralization. Until the 1960's centralized marketing process, rice were collected at large-scale shipping-point markets in major rice production areas. The rice were collected again and distributed through the wholesale terminal markets in the metropolitan areas. The price discovery process was mainly performed in the wholesale markets. It was reported that 65% of the shipping volume to the Seoul metropolitan area was through the concentrated marketing channel in the 1960's. As the Government became a major price leader in the 1970's, along with the development of transportation and information systems, rice marketing became decentralized. The percentage of shipping volume through the wholesale markets in Seoul decreased to 20% in the 1970's, and to less than 10% in 1992. As a consequence, the price discovery process shifted to scattered small-scale shipping-point markets (mainly rice millers).

Rice millers are categorized into millers processing Government release, and millers processing rice of private marketing volume. Each of the categories are divided into "commission based" ones and "buying and selling" ones. Table 18 shows the change in the number of millers by category during 1985~92. The number of the millers processing Government release on a commission base decreased from 474 in 1985 to 258 in 1992. Licenses for processing

**TABLE 18.** Number of Rice Millers by Type, 1985~92

	1985	1986	1987	1988	1989	1990	1991	1992
<b>Millers for Gov't release</b>								
Commission basis	474	423	380	361	347	335	301	258
"Buying and selling" basis	0	37	69	72	72	72	103	140
Sub-total	474	460	449	433	419	407	404	398
<b>Millers for private marketing</b>								
Commission basis	...	...	...	...	...	...	...	14,088
"Buying-and-selling" basis	...	...	...	...	...	...	...	1,230
Sub-total	18,570	18,367	17,810	17,579	17,116	16,370	16,073	15,318
<b>Total</b>	<b>19,044</b>	<b>18,827</b>	<b>18,259</b>	<b>18,012</b>	<b>17,535</b>	<b>16,777</b>	<b>16,477</b>	<b>15,716</b>

Source: MAFF

Government release on "buying and selling" were issued by the Government from 1986. The number of such millers increased from 37 in 1986 to 140 in 1992. The number of millers processing the private marketing volume decreased from 18,570 in 1985 to 15,318 in 1992, of which 1,230 millers operated on "buying and selling" basis. Development of transportation made the millers more competitive, and as a consequence almost 500 mills have closed annually. But there is still an overcapacity problem. The average daily capacity of the mills for Government release is 30 tons, which is more than 4 times larger than 7 tons of the mills for private marketing in 1992. The average annual operation rate of the former is 29%, while the rate of the latter is as low as 8%. The former mainly operates in the off-season (May~September), and the latter mainly operates in the post-harvest season (November~January) <Table 19>.

**TABLE 19.** Percentages of Monthly Rice Processing Volume by Type of Millers, 1991/92

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sep.
Millers for Gov't release	2.5	3.7	2.7	2.0	1.4	1.8	10.2	15.3	17.2	15.9	13.5	13.8
Millers for private marketing	6.5	16.8	19.0	12.9	8.9	7.0	7.1	6.8	4.0	3.3	2.9	4.8

Source: KREI; Sample survey result for 48 millers.

The millers for Government release on a commission basis perform only a milling function. The millers for Government release on "buying and selling" basis buy the Government release at predetermined prices, to mill and sell to the wholesalers and retailers in urban area or collecting merchants in rural areas at negotiated price. The millers of private marketing perform a storage function and a price finding function as well as a milling function. The millers of private marketing on a commission basis are consigned rice sales by farmers in the harvest season, and negotiate the selling price with wholesalers and retailers mainly by phone or with collecting merchants face to face. The millers of private marketing on a "buying

and selling" basis buy the rice from the farmers in the harvest season at the price of negotiation between millers and farmers, to store and sell at the price of negotiation between millers and merchants.

Millers and merchants of rice should be licensed legally by the local government. The rural market structure of rice between farmers and millers used to be monopsony or duopsony, where hundreds of farmers face one or two rice millers. Development of transportation and information systems has enabled the farmers to face several competing millers. The intermediate market structure of rice between millers and wholesalers/retailers is competitive. Each of them faces tens of counterparts with almost symmetric information. The urban regional market structure of rice between retailers and consumers is monopolistic or oligopolistic with asymmetric information on price and quality. Not all the supermarkets or stores are licensed to sell rice, so consumers are restricted to compare various prices and qualities of rice. Though consumers want to buy good quality of varieties produced in reputable areas, low quality rice including old Government rice is mixed with high quality rice to meet the price guideline of the Government during marketing.

## V. Impacts of Rice Trade Liberalization

### 1. Measurement of Social Welfare Changes<sup>1</sup>

Through the Uruguay Round of the GATT negotiations, some agricultural exporting countries including United States are demanding gradual removal of all domestic policies that distort agricultural trade flows. Rice imports into Korea have been banned under the regulation of the Grain Management Act. The domestic wholesale price of rice was 3 times less than the f.o.b. price of medium grain rice from California, U.S. in the early of 1980's, and the difference has increased to more than 4 times since the late of 1980's <Table 20>. The price differences are greater when compared with Thailand rice, and even greater with Chinese rice.

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<sup>1</sup> This section is mainly quoted from Kim, S. H. et. al., *Rice: How to Protect*. 1992

**TABLE 20.** Comparison of Rice Prices in Korea, Thailand and U.S., 1982-91

	Korea medium grain(A) <sup>1</sup>	Thailand long grain(B) <sup>2</sup>	United States		A/B	A/C	A/D
			long(C) <sup>3</sup>	medium(D) <sup>4</sup>			
US\$/ton							
1982	1,013	280	412	351	3.6	2.5	2.9
1983	961	278	439	341	3.5	2.2	2.8
1984	928	240	412	336	3.9	2.3	2.8
1985	910	225	371	345	4.0	2.5	2.6
1986	1,034	221	256	287	4.7	4.0	3.6
1987	1,170	294	438	371	4.0	2.7	3.2
1988	1,497	317	343	368	4.7	4.4	4.1
1989	1,580	323	357	357	4.9	4.4	4.4
1990	1,660	313	343	355	5.3	4.8	4.7
1991	1,598	308	378	395	5.2	4.2	4.0

<sup>1</sup> milled, second grade, wholesale price

<sup>2</sup> milled, second grade, f.o.b. price, Bangkok

<sup>3</sup> milled, second grade, f.o.b. price, Houston, Texas

<sup>4</sup> milled, second grade, f.o.b. price, California

Table 21 shows a prediction for domestic price decrements when the Korean rice market is open according to the Dunkel's

**TABLE 21.** Predictions of Domestic Farmers' Selling Prices of Rice, 1994-99

	1994	1995	1996	1997	1998	1999
	Won/80kg (in real price of 1990)					
Scenario 1	95,700	96,600	97,400	98,200	99,100	99,900
Scenario 2	86,000	84,500	83,100	81,300	79,600	78,000
Scenario 3	84,200	82,800	81,500	80,200	78,900	77,500
Scenario 4	81,900	78,200	74,600	70,900	67,300	63,700
Scenario 5	87,600	86,400	85,100	83,700	82,000	80,400
Scenario 6	85,000	84,500	83,900	83,400	82,000	80,400
Scenario 7	84,000	82,400	80,800	79,300	77,800	76,200

Source: Kim, S. H. et. al., *Rice: How to Protect*. 1992



**TABLE 22.** Predictions of Self-Sufficiency Rates of Rice, 1994~99

	1994	1995	1996	1997	1998	1999
Scenario 2	96.7	96.3	96.0	95.7	95.3	95.0
Scenario 3	95.9	95.6	95.4	95.2	95.2	95.0
Scenario 4	93.8	91.1	88.1	84.3	80.1	75.0
Scenario 5	97.9	97.8	97.7	97.5	97.4	97.2
Scenario 6	96.6	96.7	96.8	96.9	97.0	97.2
Scenario 7	95.8	95.2	94.9	94.4	94.1	93.8

Source: Kim, S. H. et. al., *Rice: How to Protect*, 1992

proposal of Dec., 1991. Scenario 1 is the base line assuming that the market is not opened, and the real domestic price keeps the increasing trend of 0.86% per annum. Scenario 2 ~ scenario 4 are according to the Dunkel's proposal for developed countries, and scenario 5 ~ scenario 7 are for developing countries.

According to the scenario 2, assuming that the minimum market access (MMA) of 3% of domestic consumption is imported in 1993 and linearly increases to 5% in 1999, and the tariff equivalent (TE) is not applicable, the price is predicted to drop to 86,000 Won/80kg (in real price for 1990 hereafter) in 1994, and to 78,000 Won/80kg in 1999. According to scenario 3, assuming that the MMA schedule is the same as scenario 2, and the TE of the base year (1986~88) is linearly decreased by 15% during 1993~99, the price would drop to 84,200 Won/80kg in 1994, and to 77,500 Won/80kg in 1999. According to scenario 4, assuming that the MMA schedule is the same as scenario 2, and the TE is decreased by 36%, the price would drop to 81,900 Won/80kg in 1994, and to 63,700 Won/80kg in 1999. According to scenario 5, assuming that the MMA is 2.0% in 1993 and increases to 3.3% in 2002, and the TE is not applicable, the price would drop to 87,600 Won/80kg in 1994, and to 80,400 Won/80kg in 1999. According to scenario 6, assuming that the MMA schedule is the same as scenario 4, and the TE is decreased by 10% during 1993~2002, the price would drop to 85,000 Won/80kg in 1994, and to 80,400 Won/80kg in 1999. According to scenario 7, assuming that the MMA schedule is the same as scenario 5, and the TE is decreased by 24%, the price would drop to 84,000 Won/80kg in 1994,

**TABLE 23.** Predictions of Consumers' Surplus Gain Compared to Scenario 1, 1994~99

	1994	1995	1996	1997	1998	1999
	————— bil. Won (in real price of 1990) —————					
Scenario 2	612	757	889	1,035	1,174	1,303
Scenario 3	731	860	986	1,106	1,221	1,329
Scenario 4	879	1,154	1,423	1,685	1,973	2,178
Scenario 5	511	635	763	889	1,026	1,157
Scenario 6	679	758	833	906	1,028	1,157
Scenario 7	745	888	1,027	1,161	1,289	1,410

Source: Kim, S. H. et. al., *Rice: How to Protect*, 1992

and to 76,200 Won/80kg in 1999.

Table 22 shows a prediction of self-sufficiency rate of rice. Scenario 5 shows the mildest decrement of the self-sufficiency rate, that is 97.9% in 1994 and 97.2% in 1999. Scenario 4 shows the greatest decrement of the self-sufficiency rate, that is 95.9% in 1994 and 75.0% in 1999.

Table 23 and Table 24 show predictions of consumers' surplus gain and producers' surplus loss through rice import compared to import ban. Scenario 5 shows the mildest result; the consumers' surplus gain is predicted to be 511 billion Won at the cost of the

**TABLE 24.** Predictions of Producers' Surplus Loss Compared to Scenario 1, 1994~99

	1994	1995	1996	1997	1998	1999
	————— bil. Won (in real price of 1990) —————					
Scenario 2	654	813	961	1,127	1,290	1,447
Scenario 3	776	918	1,060	1,199	1,338	1,474
Scenario 4	922	1,202	1,471	1,720	1,953	2,157
Scenario 5	549	687	831	978	1,141	1,301
Scenario 6	724	814	906	996	1,141	1,300
Scenario 7	790	946	1,101	1,253	1,404	1,551

Source: Kim, S. H. et. al., *Rice: How to Protect*, 1992

producers' surplus loss of 549 billion Won in 1994, increasing to 1,157 and 1,301 billion Won in 1999, respectively. According to scenario 4, the consumers' surplus gain is predicted to be 879 billion Won at the cost of the producers' surplus loss of 922 billion Won in 1994, increasing to 2,178 and 2,157 billion Won in 1999, respectively.

It is estimated that there will be a net welfare loss for almost every scenario and for almost every year. Furthermore, there will be reverse income redistribution effect as a result of rice imports. The consumers' group, a relatively high-income class, gains a surplus at the cost of surplus loss for producers, a low-income group. As for exporting countries, there will be welfare gains for producers at the price of consumers' welfare loss.

## 2. External Diseconomy of Opening the Rice Market

Rice imports will shrink the value-added and employment of agribusiness industries such as chemicals, fertilizers, agricultural equipment, and storage and milling companies. Population mobilization to urban areas will be accelerated, and the social costs of urban housing, transportation and pollution will increase.

Also, food security problems will be worsened. The nationwide paddy fields have function as dams preventing serious flood damage in the monsoon season. The total volume of water storage by the paddy field is estimated as much as 3 billion tons of water, which is equivalent to 2 times the capacity of six large scale flood control dams. The well maintained drainage systems and ridges around paddy fields have prevented flood damage for hundreds of years. Rice imports may result in significant paddy acreage becoming idle, drainage systems and ridges being broken, to increase the flood damages.

The world rice market is characterized as thin in terms of the small volume of trade relative to production. Rice trade accounted for 3.6% of production in 1990 <Table 25>. The percentages for other major grains were 16.6% for wheat, 15.0% for corn, and 11.6% for barley. More than 90% of the world's rice production and consumption is concentrated in Asia. The uncertainty of rice yields in the developing Asian countries caused the world rice price to fluctuate more than wheat, corn and barley, whose production is

**TABLE 25.** The World Production and Trade Volume of Rice, Wheat, Corn, and Barley, Rough Weight, 1970~90

		Rice	Wheat	Corn	Barley
Production (A) (1,000 ton)	1970	307,657	317,657	260,042	139,011
	1975	348,570	355,824	324,670	156,591
	1980	397,597	444,603	394,056	159,567
	1985	472,714	505,729	487,367	176,582
	1990	518,508	595,149	475,429	180,437
Trade Volume (B) (1,000 ton)	1970	12,245	50,168	29,160	10,366
	1975	13,246	67,304	50,932	12,412
	1980	20,129	89,676	80,280	16,215
	1985	17,209	96,309	69,767	21,900
	1990	18,722	98,559	71,264	20,985
B/A (%)	1970	4.0	15.8	11.2	7.5
	1975	3.8	18.9	15.7	7.9
	1980	5.1	20.2	20.4	10.2
	1985	3.6	19.0	14.3	12.4
	1990	3.6	16.6	15.0	11.6

Source: FAO, *Production Yearbook, Trade Yearbook*, selected years

stable in major developed countries such as U.S., Canada, France, and Australia. The coefficient of variation, that is the ratio of standard deviation to the mean, of the world rice price was 0.19 in the 1980's, which was greater than the 0.15 for wheat, 0.12 for corn, and 0.18 for

**TABLE 26.** Coefficients of Variation of the World Prices for Rice, Wheat, Corn, and Barley in the 1980's

	Rice	Wheat	Corn	Barley
Mean of the Annual Price in 1980~89 (US\$/ton. f.o.b.) (A)	322	157	133	141
Standard Deviation of the Prices in 1980~89 (US\$/ton) (B)	60	24	16	25
Coefficient of Variation (B/A)	0.19	0.15	0.12	0.18

Source: FAO, *Trade Yearbook*, selected years

barley <Table 26>. Price elasticity of demand for rice is very low in the Asian countries including Korea, so the occasional poor harvest in Asia may result a big jump in rice prices.

## **VI. Proposals for Rice Policy Changes**

Government has operated the grain management account since 1970. Receipts are contributed from Government budget, long-term credit from the Central Bank at low interest rates (terminated in 1984), short-term credit through the issue of grain bonds with high interest rates, and sales receipts from rice. Expenditures are on rice purchases, handling costs, and interest payments. Table 27 shows deficits for the grain management account since 1970. The deficit incurred during 1970~85 was 2,334 billion Won (146 million Won per annum). A deficit of 253 billion Won was incurred in 1988, and increased to 1,381 billion Won in 1992. The sales deficit caused by the operation of the two-tier pricing system accounted for 62.3% of the total deficit in 1992, 32.1% of which was for the interest payment of 1-year grain bonds. The short-term grain bonds with high interest rates should be substituted by the long-term bonds with low interest rates.

What are the huge deficits for? The policy goals since the 1980's are to subsidize farm income through purchase, and price stabilization through release, at the cost of huge Government deficits and excess supply. The Congress persuades more purchases of rice at a higher price during harvest season, and the Bureau of Price Stabilization in the Economic Planning Board insists on a lower releasing price during the off-season. As we saw in Table 17, the rice price in summer was even lower than the price in the previous winter in 1989. As there are no incentive for farmers and merchants to store rice, farmers demonstrate for "purchase all" every year, and the rice market function is distorted by the cheap Government release. Consumers cannot buy good quality rice, because the old Government rice are mixed with the new harvest during the marketing to meet the price guidelines of the Government.

The market distortion by the Government should be minimized. The difference between the Government procurement price and the farmers' selling price to the market should be reduced. Also, the

**TABLE 27.** Deficits of Government Grain Management Account, 1970~92

	1970~85	1986	1987	1988	1989	1990	1991	1992
	bil. Won							
Sales Deficits	-968	-142	-104	-148	-261	-371	-651	-865
Interests on Bonds	-964	-141	-130	-148	-207	-311	-359	-444
Others	-402	-90	-99	43	32	-66	-46	-73
Total Deficit	-2,334	-373	-333	-253	-436	-748	-1,056	-1,381
Gov't Compensates	780	350	275	538	951	880	550	730
Year-End Deficits	-1,554	-1,577	-1,635	-1,350	-834	-702	-1,208	-1,860

Source: MAFF

purchase volume is to be reduced to the amount sufficient to meet public and military use and to keep reasonable price increment during the harvest season through the off-season. The price increment of 15~20% between the seasons is reasonable when we consider the storage costs, interest payments, and losses.

The price support program may be substituted by direct or indirect income support programs. A deficiency payment program may be one of the alternatives for direct income support. As farm households are disadvantaged in relation to medical and children's educational services, Government subsidies for certain portions of the payments for medical insurance and education expenditure, including housing, is recommended as an indirect support program.

There are few reasons why the Government should release rice at predetermined low prices. Consumers as a whole no longer need to be subsidized. Poor consumer groups may be subsidized by issuing food stamps. Also, as the weight of rice in the price indices becomes lower, the Government does not have to burden the Nation with huge deficits to keep the consumer price of rice at a lower level. The price of the Government release may be determined through auctions involving private millers or wholesalers. The Government may control the release volume so the market price increases smoothly in the off-season.

As the world rice market is thin and farm income is heavily

reliant on rice production, the maintenance of a 100% self-sufficiency rate for food consumption of rice, not including processing use, may be one of the major policy goals. The excess Government stock may be used for processing, and for barter with North Korea.

Reducing production costs is crucial for Korean rice to be competitive with possible tariffed rice in the future. To reduce costs for land, the supply of rental land by the aged farmers is to be extended. Social welfare programs for retirement from farming should be established, and payment should be subsidized by the Government. On the other hand, the Government should recruit and train young farmers to be productive, and give a sufficient amount of long-term credits for land and equipment. Taxes on idle land possessed for speculative purposes should be heavier. To reduce the cost for labor, mechanization and scale economies of farming are to be promoted.

Integrated post-harvest process of drying, storing, milling, sorting, packing and selling are to be efficiently performed by rice processing complexes. The Government may promote small-scale millers and storages to be merged into the complexes to achieve scale economies. Agricultural cooperatives should also invest in construction and management of the complexes to positively engage in the rice marketing. The Government may give long-term loans for the construction of the complexes, and short-term loans for the rice purchases in the harvest season. To increase the annual operation rate of the complexes, it is recommended that they handle the private marketing volume in the post-harvest season and the Government releases in the off-season. And the Government regulations for grading and packing should be enforced.

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