Analysis of Alternative Purchase Prices for Rice

in the

Republic of Korea

by

Grains Policy Task Force

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Effects of Alternative Rice Purchase Prices
(RY 1975)

Establishing an annual purchase price for rice is accomplished only after considering the tradeoffs of its impacts on several key economic variables. Those effects of most importance are: inflation, the trade deficit, farm income, cost to the government in terms of the GMSA deficit and achievement of the policy of self-sufficiency in food grains.

To aid the ROK Government in choosing an appropriate purchase price, the Grains Policy Task Force estimated the impacts of four alternative purchase prices on these and additional variables. The results are presented in Tables 1, 2 and 3. Explanation of the tabulated results and assumptions essential to the analysis conclusions and policy recommendations complete the paper.

Analytical Model

The model used to generate Tables 1 and 2 is expanded version of the generalized front end model used by the Grains Policy Task Force during June and July, 1974.

A description of the model and its parameters is presented on pages 5 through 12 and in Appendices A and B of the task force report. [1] Table 3 is from a somewhat different formulation that does not consider consumer substitution among food grains but does allow for analysis of seasonal price rises from storage costs.

Price Assumptions

Tables the analysis in 1 and 2 assumes that government purchase price and government release price for rice are equal at the alternative prices. Table 1 assumes constant barley and wheat flour wholesale prices throughout RY75; wholesale barley price is constant at 6500 won/76.5 kg bag and wholesale wheat flour price is constant at 2050 won/22kg. Table 2 assumes that barley and wheat flour prices vary throughout RY75 in proportion to rice price; wholesale barley price is 50% of rice price, and wholesale wheat flour price is 60% of rice price on an equal weight unit basis.

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[1] Analysis of Short-term Grain Policy Alternatives (for the remainder of 1974 rice year) in the Republic of Korea, Grains Policy Task Force, Kim, Dong Hi, NAERI, et al, 26 July 1974.

These prices for the four alternative government
purchase prices are given below.

Alternative Gov't Purchase Price Rice (W/80kg)	- - - Wholesale price - - -	
	Barley (W/76.5kg)	Wheat Flour (W/22kg)
15360.	7344.	2534.
15970.	7636.	2635.
16500.	7889.	2723.
17065.	8159.	2816.

Both tables assume the current dual price policy for
barley will continue in RY75. Farm price for barley
is assumed to be 25% above the wholesale price.
Farm prices for wheat flour are assumed to be 10%
higher than wholesale price. The government subsidy
base for wheat flour is assumed to be 2790 won/22kg
bag. Government subsidies are not paid at wholesale
wheat flour prices above this level.

Establishing Alternative Purchase Prices

As a justification for establishing a higher
purchase price and as guidelines for the amount of
increase the following comparisons are available.

(1) The index of prices paid by farmers has
risen by 33.8 percent from the first six
months period of 1973 to the first six
months period of 1974. (Estimating the
index for the last half of 1974 provides
an increase of 34.5 percent for calender
year 1974 compared to 1973). One alter-
native rice purchase price might be set
equal to the change in this index to reflect
changing production costs in agriculture
or higher if additional production incentive
is desired.

(2) The wholesale price index has risen by
39.4 percent from the first six months of
1973 to the first six months of 1974.
(Estimating the index for the last half of
1974 provides an increase of 42.4 percent
for calender year 1974 compared to 1973).
One alternative rice purchase price might
be set equal to the change in this index
as a measure of overall inflation in the
economy.

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(3) The average free market selling price in
the seven major producing areas for rice
during the month of August, 1974 was
13,952 W, an increase of 40.7 percent over
August, 1973. At this same rate of
increase, the November-December, 1974
average price would be 14,573. If the
government is to be successful in purchasing
grain on a freely operating market its
purchase price should be equal to or
greater than the prevailing market price .
in the fall of 1974.

(4) From country comparisons, the Korean pur-
chase price in 1973 was 11,377 W, the
Japanese purchase price was 22,700 W and
the U.S. price was 14,420 W. The 1974
price in Japan is 27,960 W and the U.S.
price is 18,270 W. Although country com-
parisons may not be valid because of
different cost structures, these figures
are useful to show the magnitudes of year-
to-year changes.

Based on these changes it seemed appropriate
to consider rice purchase prices that were 35, 40,
45 and to percent greater than in 1973. Using the
1973 purchase price of 11,377 W as a base, the
alternatives considered for the analysis for 1974
were 15,360, 15,970, 16,500 and 17,065 W.

Table 1. Effects of Alternative Government Purchase Prices for Rice(RY75) Assuming Constant Barley and Wheat Flour Prices※

	Actual RY73	---Government Purchase Price for Rice--won/80kg--			
		35 percent 15360	40 percent 15970	45 percent 16500	50 percent 17065
Farm Income(bil won)	469.1	650.6	676.4	698.8	722.8
Average Farm Income(1000won/HH)	193	245	255	263	272
RY75 Rice Production(1000MT)	3,957	4,222	4,270	4,311	4,354
Consumer Price Index(1970=100)	130.3	168.3	169.8	171.1	172.5
Consumer Expenditure on Grains(won/cap)	20,669	29,744	30,464	31,092	31,732
Gov't Share of Rice Requirements(1000MT)	900	994	952	916	880
Gov't Domestic Rice Purchase(1000MT)	451	534	540	545	550
Rice Imports(1000MT)	439	460	412	371	330
Foreign Exchange Costs(mil. won)	102,965	92,081	82,315	74,222	65,967
Change in GMSA					
Rice Account(Mil. won)	—	– 14,627	– 10,625	– 7,759	– 5,287
Total Account(Mil. won)	—	– 70,002	– 66,976	– 64,943	– 63,342
Total Grain Consumption(1000MT)	7,098	6,981	6,978	6,977	6,976
Rice (1000MT)	4,362	3,849	3,800	3,759	3,718
Barley(1000MT)	1,773	1,729	1,753	1,774	1,796
Wheat (1000MT)	963	1,403	1,425	1,444	1,463
Per Capita Grain Consumption					
Rural Total(kg/cap/yr)	221	209	209	209	209
Rice	115	103	102	101	100
Barley	76	66	66	67	67
Wheat	30	39	40	41	41
Urban Total	197	197	197	197	197
Rice	132	118	117	115	114
Barley	35	37	38	39	40
Wheat	30	42	42	43	44

※ Wholesale Barly Price=6,500w/76.5kg ; Wholesale Wheat Flour Price = 2,050w/22 kg

Table 2. Effects of Alternative Government Purchase Prices for Rice (RY 75) Assuming Flexiblity in Barley and Wheat Flour Prices※

	Actual RY 73	35 percent 15360	40 percent 15970	45 percent 16500	50 percemt 17065
		...Government Purchase Price for Rice...won/80kg...			
Farm Income (bil. won)	489.1	650.6	676.4	698.3	722.8
Average Farm Income (1000 won/HH)	193	245	255	263	272
RY 75 Rice Production	3,957	4,222	4,270	4,311	4,354
Consumer Price Index (1970 = 100)	130.8	168.3	169.8	171.1	172.5
Consumer Expenditure on Grains(won/cap)	20,669	31,834	33,180	34,353	35,607
Gov't share of Rice Requirements(1000MT)	900	1,266	1,299	1,326	1,355
Gov't Domestic Rice Purchases(1000MT)	451	485	476	468	460
Rice Imports (1000MT)	439	781	823	858	895
Foreign Exchange Costs(mil. won)	102,965	156,219	164,561	171,639	179,021
Change in GMSA					
Rice Account (mil.won)	—	− 20,171	− 14,592	− 9,226	− 2,993
Total Account (mil.won)	—	− 49,974	− 40,212	− 31,219	− 22,272
Total Grain Consumption (1000MT)	7,098	7,023	7,035	7,046	7,058
Rice (1000MT)	4,362	4,165	4,211	4,247	4,283
Barley (1000MT)	1,773	1,604	1,582	1,559	1,536
Wheat (1000MT)	963	1,244	1,242	1,241	1,239
Per Capita Grain Consumption(kg/cap/yr)					
Rural Total	221	210	211	212	212
Rice	115	114	116	118	119
Barley	76	61	60	59	58
Wheat	30	35	35	35	35
Urban Total	197	198	198	198	198
Rice	132	126	127	127	127
Barley	35	35	34	34	34
Wheat	30	37	37	37	37

※ Wholesale Barley Price = 50% Gov't Rice Purchase Price ; Wholesale Wheat Flour Price = 60% Gov't Rice Purchase Price.

Explanation of Tables I and 2

Farm Income. Value of RY74 rice production is deflated by 22% to account for expected farm loss, nonhuman consumption, and production estimate error. Average prices received by farmers are assumed equal to the alternative government purchase prices.

Average Farm Income. This line is calculated directly from the line above. Assumptions are that farm population in RY75 is 15,525,000 with six persons per farm household.

75 Rice Production. This line is calculated based on a supply elasticity estimate of .28. Base year production is set at the RY73 level of 4212. thousand MT. Base year prices are set at 11377 won/80kg. Deflated prices (deflated by the index of farm prices paid) are used in this calculation.

Consumer Expenditure on Grains (won/cap). This line gives the values of grain consumed per capita by urban population (rural consumption is assumed satisfied by on farm production). It is the sum of per capita consumption times price of rice, barley and wheat flour.

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Government share of Rice Requirements. This
is the sum of government rice purchases and rice
imports and represents the total quantity of grain
available to the government for price stabilization
purposes.

Government Rice Purchases. Government share of
domestic marketed rice supply in RY75 is assumed to
be constant at 30 percent. Domestic marketed rice
supply is the difference between deflated production
and estimated farm consumption.

Rice Imports. Rice imports are calculated as
the residual between deflated domestic production
and total rice requirements for RY75.

Foreign Exchange Costs. This line reflects the
cost of rice imports calculated at 500 dollars
(200,000 won) per metric ton.

Change in GMSA. The changes in the GMSA from
rice operations and the total change in the GMSA from
rice, barley, and wheat operations are given on these
two lines. Storage costs of 22000 won/MT per year
are assumed both for domestic purchases and imports.
Mean storage period is assumed to be 6 months with
no changes in carryovers.

As mentioned above, the dual price system is assumed
for barley, and wheat flour subsidy base is assumed
at 2790 won/22kg.

Total Grain Consumption. These lines represent
the total of estimated rural and urban rice, barley,
and wheat consumption. Per capita consumption
estimates for rice, barley, and wheat are made by
demand models for rural and urban populations. Per
capita consumption estimates are then multiplied by
rural and urban populations and added together to
generate these lines.

Per Capita Grain Consumption. These lines
depict the actual results yielded from the respective
rural and urban demand models used for this exercise
when the four alternative government purchase prices
were specified.

Table 3. Hypothetical Effects of Rice Purchase Prices
When Government Purchase Response Parameter is 15

Variable	Units	Average Purchase Price (Won/80 Kg)			
		35 Percent 15360	40 Percent 15930	45 Percent 16500	50 Percent 17065
Imports	1,000 MT	539.7	519.7	499.7	479.8
Import Timing	Months	10.2	10.3	10.4	10.5
Gov. Stor. Used	1,000 MT	691.9	728.5	765.3	801.9
Pvt. Stor. Used	1,000 MT	2,301	2,320	2,341	2,361
Carryover	1,000 MT	622.3	699.4	717.0	764.8
Cons. Expenditure	Billion Won	770.5	792.2	813.5	834.3
Farm Income	Billion Won	630.1	652.1	674.1	695.9
Gov. Stor. Costs	Billion Won	16.48	18.08	19.75	21.49
Pvt. Stor. Costs	Billion Won	30.46	31.75	33.08	34.45
Gov. Stor. Profit	Billion Won	7.62	10.48	13.37	16.30
Pvt. Stor. Credit	Billion Won	−26.22	−29.05	−32.02	−35.11
Gov. Stor. Credit	Billion Won	138.8	151.4	164.5	178.1
Pvt. Stor. Credit	Billion Won	320.0	326.0	331.5	336.7
Total Stor. Credit	Billion Won	394.5	406.3	417.9	429.2
Total Rice Cons.	1,000 MT/yr	3,928	3,908	3,888	3,868
Min. Cons. Price	Won/80 Kg	14,616	15,123	15,640	16,152
Max. Cons. Price	Won/80 Kg	17,984	18,600	19,208	19,816
Min. CPI	1970=100	166.5	167.8	169.0	170.2
Max. CPI	1970=100	174.7	176.2	177.6	179.1
Foreign Exchange Cost	Million Dollars	280.2	272.0	263.1	253.2
Avg Release Price	Won/80 Kg	16,997	17,590	18,179	18,765.5

Assumes Demand Elasticity is .34 at 20.000 W/80 Kg and 350,000 MT/Mo.

Assumptions used in Teigen's
INTERTEMPORAL PRICE EQUILIBRIUM MODEL
as Used in the RY1975 Purchase Price Analysis

The Demand equation is assumed to be linear with the
elasticity .34 at 20000W/80kg and 350,000 MT/Month

The annual harvest is assumed to be 4344000 MT.

The sum of farm, marketing and statistical losses is
assumed to be 22%.

The interest rate is assumed to be 18% per annum.

The warehouse cost is 460 W/MT/Month.

Import prices are assumed to be $500/Ton.

Prices vary during the year from the minimum at
harvest to the maximum at the end of the year.
The minimum market price is below the Average
Purchase Price.

Government is assumed to purchase 18750 tons of grain
for every 100 W/80kg the market price is from the
targetted threshold price. The government pays
the prevailing market price for these purchases,
rather than a single purchase price.

The threshold prices were assumed to be 650 W/80kg
higher than the Average Purchase Price.

The average release price is the simple average of
the threshold price and the maximum market price
within the year. Government sales take place both
above and below this price.

The weight of rice in the price index is .1404 and
the 1970 base price for rice is 5784 W/80kg. The
index of nonrice prices is assumed to be 152,5
with a 1970 base of 100.

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Total government purchases from the domestic market equals the "Government Storage Used".

"Government Storage Costs" is the interest plus storage charges incurred by the government on the government purchases.

Government Storage Profit is the net change in the GMSA for the year.

Government Storage Credit is the amount of short term financing (within the year) required by GMSA.

Consumption depends on the level of prices as reflected by the demand equation.

Imports represent the shortfall between production and consumption plus losses.

Consumer Expenditure is the value of total rice consumption at market prices, including both urban and rural consumption.

"Farm income" is gross value of rice production at the market prices. The value of non-storage marketing costs, such as transportation costs, need to be subtracted from this to arrive at the value to the farmer. I would suggest about a 20% margin for these costs.

Conclusions

1. <u>Farm Income</u>. As expected gross farm income (value of the rice harvest) rises with higher purchase prices. It should be remembered however, that: (1) the estimate is nominal income that does not reflect the expected inflation in 1975 and (2) production is based on "normal" weather and production conditions. It higher gross farm income to the Rural Sector is the policy objective, it can be accomplished with higher rice prices. But it is difficult to raise per farm income in this manner because farm sales are small.

2. <u>Import requirements</u>. Given the projected estimates of production and consumption, import requirements decline from the 1973 level when barley and wheat prices do not change. Allowing for a 22 percent loss in production figures in table I, rice imports decline from 460 thousand MT to a low of 371 thousand MT at a purchase price of 16,500 W. The decline in import needs reflects a lower rate of consumption at higher price levels.

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Table 2 demonstrates an important point for Korean grains policy. When barley and wheat price changes are considered simultaneously with rice price changes, rice import needs rise instead of decline. Because substitution occurs between the grains as relative prices change, rice consumption is at much higher levels. It therefore seems much more realistic to consider food grains prices together rather than each in isolation.

3. Change in GMSA. In a similar manner, it is difficult to obtain a static analysis of the change in rice price alone on the GMSA. Estimates of the total deficit are much higher in Table I than in Table II because additions to the deficit account accrue under present barley and wheat programs. It should be noted that in both tables the deficit in the GMSA declines as purchase price rises. This occurs primarily because the loss per ton on imports is declining under the assumption that release price equals purchase price. At prices greater than 16,000 a net addition actually accrues to the GMSA from imports.

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4. _Inflation._ Higher purchase prices are reflected in rises in the index of consumer prices. Higher purchase prices directly contribute to the rate of inflation through increased cost to consumers and through the deficit financing of the GMSA account itself. (If the release price is set above the purchase price, a surplus in the account will accrue and partially offset the first effect).

5. _Government storage needs._ Utilization of the storage model, Table III, permits an estimate of government storage capacity needed. At the higher purchase prices government will need more storage than is presently available. At the same time, government will have sufficient quantities of grain on hand to have a significant impact on market prices.

Task Force Recommendations

1. Because of the substitution between wheat, barley and rice in consumer diets, it is not a rational policy to decide one price in isolation from the others. This analysis clearly depicts the inter-dependence in consumption and distorts conclusions regarding import needs, consumption and the GMSA account when a static analysis is followed.

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It is much more logical for the ROK Government to establish a "grains policy" that recognizes that producers and consumers adjust to relative as well as absolute prices. This requires the simultaneous setting of purchase prices for all three major food grains.

2. In making future decisions on the purchase price, consideration should be given to a purchase price that rises during the season to reflect interest charges and storage costs. The results in the storage model, Table III, more nearly approximate economic reality by including these costs. Providing for a pattern of rising inter-year purchase prices will offer incentives for farmers to store grains on farm and release them more in line with market needs rather than selling a high proportion at time of harvest. Such a policy would also recognize the existance of a black market in grains and would take steps to combat it by paying legimate storage costs to the private and public sector.

3. More consideration needs to be given to the inflationary effect of the GMSA deficit.

As long as the deficit grows such as occurs when the
purchase price exceeds the release price, there is
an indirect effect equilivalent to government deficit
financing. In this circumstance the direct effect
on inflation of higher rice prices and indirect effect
of deficit financing operate in the same direction.
However, when the release price rises above the
purchase price, there will be a surplus in the GNSA
(from rice alone) and the effects will tend to be
offsetting. The suggestion is that consideration be
given to both effects when establishing the relative
levels of release and purchase prices.