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Price Targets and Import Levels for Korean Rice

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This paper analyzes the tradeoffs between price targets and import levels for rice based upon the competitive model for rice storage and marketings that I have developed elsewhere [5].

It is obvious that there is an inverse relation which exists between commodity import amounts and market prices. This is because the effect of commodity imports is to increase the supply in the face of an uneffected demand. By the same token, if a government agency wants to move the free market price toward some price target, other than the self-sufficiency price, net imports or exports will be required in order to accomplish this aim.

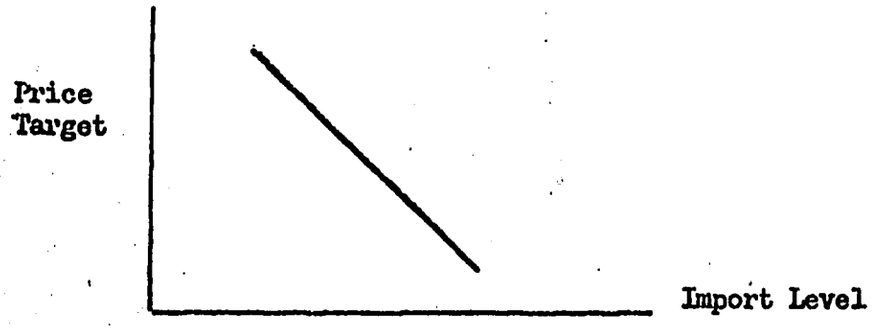

Figure 1: The Relation between Import Levels and Target Prices

Thus some relation of the type illustrated in Figure 1 exists between price targets (or levels) and imports. The purpose of this paper is to provide some numerical information about the slope of this relation, if not the scales on the axis of the diagram.

The paper is divided into sections which present the structure of the rice storage model, the data for and interpretation of the model, the solution of the model, and the analysis of the price-import trade-offs.

Structure of the Rice Storage Model

Storage Level

$$S(t) = S(0) + \int_0^t (H(y) + G(y) - D(y))\, dy.$$

Inventory Cost

$$IC(t) = r\, P(t)\, S(t) + k\, S(t).$$

Demand Equation

$$P(t) = a - b\, (D(t) + G(t)).$$

Storage Profit Level

$$\pi(t) = \pi(0) + \int_0^t [P(y)\, (-S'(y)) - IC(y)]\, dy.$$

Farm Harvest Rate

$$H(t) = H\, \frac{256}{6}\, t^3\, e^{-4t}.$$

Original Government Sales Rate

$$G(t) = C(-1/3 + t/18).$$

New Government Sales Rate

$$G(t) = RP\, (P(t) - PT).$$

Gross Farm Income

$$FY(t) = FY(0) + \int_0^t P(y)\, H(y)\, dy.$$

Consumer Expenditure

$$X(t) = X(0) + \int_0^t P(y)\, D(y)\, dy.$$

Revenue from Government Sales

$$TX(t) = TX(0) + \int_0^t P(y)\, G(y)\, dy.$$

Table 1: Variables and Parameters Within the Model

Variables

P(t)	= Price	W/MT*
D(t)	= Sales rate to consumers	MT/Month
S(t)	= Private storage level	MT
IC(t)	= Inventory cost rate	W/Month
π(t)	= Accumulated profit level	W
FY(t)	= Accumulated farm income	W
X(t)	= Accumulated consumer expenditure on the commodity	W
TX(t)	= Accumulated revenue from government sales, ignoring government storage costs	W
H(t)	= Harvest rate	MT/Month
G(t)	= Government sales rate	MT/Month

Parameters

r	= Interest rate	%/Month
k	= Warehousing costs	(W/MT)/Month
a	= Price intercept	W
b	= Price response to total demand	W/(MT/Month)
H	= Level of farm harvest	MT/Year
C	= Government inventory capacity	MT
RP	= Government purchase response parameter	(MT/Month)/(W/MT)
PT	= Government price target	W/MT

* Won per metric ton. At the current time $1.00 U.S. = 400 Won Korean, approximately.

Operational Assumption

Storage levels and sales to consumers are such that the month-to-month rise in prices is just sufficient to equal the average cost of holding inventories.

Data for and Interpretation of the Model

The empirical numbers which are used in the application of this model are taken to broadly represent the marketing environment for domestic Korean rice. While careful thought preceded the choice of the parameter values, they are not the results of any exhaustive econometric study,

The storage equation reflects the identity which states that if additions to the private supply (harvest plus government sales) exceed the withdrawals for private consumption (or sales by the private sector to the public) the inventory of the commodity will increase.

The inventory cost equation states that there are two components of the (variable) costs of storage. The interest charge is based upon the instantaneous value of the inventory. By so doing the annual sum of these charges is equal to the annual interest rate multiplied by the average value of the inventory over the year. The second component of inventory cost indicates that there are storage costs that vary directly with the physical size of the inventory irrespective of its value. Such costs might include the costs of operating heating, cooling or drying equipment, the costs from quality deterioration and theft, and the losses due to rodents and bin leak-

age. Costs which depend more upon the changes in the inventory, such as loading and unloading, and buying and selling costs, are not analyzed in this paper.

The assumed interest rate is 1.5 percent per month, which is the same rate charged by the Medium Industry Bank for operation loans[1]. Some interest rates on loans are higher and some lower. If anything, this rate may be lower than the opportunity cost of capital for many storage enterprises, since the so-called "curb-market" rates are much higher than the official bank rates.

The noninterest cost of storage is assumed to be 250 won per metric ton per month. The January 1971 MAF specification of storage charges for polished rice in Seoul was 7.70 won per metric ton per day, with an insurance fee of 1.09 won per metric ton per day, in addition to that[2].

The demand equation, which determines the price in this model, states that price responds to the rates of private plus government demand in the same degree. If the government is purchasing (G(t) is negative), the price will be higher than it would be if the government is selling, for a given level of private consumption. This formulation assumes that any income effects which may alter the level or form of the demand relationship occur at the outset of the year, but are unchanging through the year. It further assumes that there is no seasonal price fluctuations which cannot be explained by quantity variations.

The demand equation is assumed to be linear, with no intra-year income effects, and in price-dependent form. This is assumed to have an own-price elasticity of -0.4 at the equilibrium price of 125 won per kilogram and the consumption rate of one-third of a million metric tons per month[3/]. Thus, price (in won per metric ton) is given by the relation: $P = 437500 - 0.9375\ Q$.

The profit equation assumes that the same price is paid or received for the commodity whether it is being purchased or sold. Moreover, it assumes that the government pays the same prices for both buying and selling as consumers or private storage firms do. No buying or selling costs are assumed in this model. The profits in the model derive from buying the commodity when it is plentiful and the prices are low and selling it later when the prices are higher, taking account of the costs of holding the inventory. The time interval $[0, 12]$ is assumed to be such that it begins at the outset of harvest and ends just prior to the next harvest.

The interpretation of $H(t)$ as a harvest rate implies that the farmers participate in the storage activities. The sales from farmers to commercial warehouses at times other than harvest are ignored under this interpretation because the profit from the farmer's storage to that point would be a cost to the commercial warehouse and the storage profit equation represents the sum of the farm plus commercial storage profits. The model assumes that the farmer's production activity is reimbursed at the price which prevails at the moment of harvest and that farm consumption is included with

urban consumption in D(t). By default, the value of some marketing and transportation services are included in the "Farm Income" variable.

The particular form of the harvest equation assumes that the 4 million ton annual harvest is distributed according to a fourth order gamma probability function with mean of one month and standard deviation of ½ month. This annual harvest is virtually the same as the 1971 production of 3.998 million tons[4/].

Table 2 shows that the assumed harvest is more than 95% completed by the end of the second month of the harvest season. In this model, the crop year and the time indexing begins at the time the harvest begins.

Table 2: Assumed Harvest Rate

Months since the Start of Harvest	Percentage of Crop yet to be Harvested
.000	100.0%
.918	50.0%
1.670	10.0%
1.940	5.0%
2.511	1.0%
3.266	0.1%

The original government purchase equation reflects the assumption that the government agency buys the grain at a linearly decreasing

rate for six months, at which time all of its storage facilities will be full, and then begins to sell from its stocks at the same linearly increasing rate for the next six months.

The new government purchase equation assumes that the government agency determines a target price for the rice year and buys grain while the price is below the target and sells when the price is higher. There is no reason that domestic purchases should necessarily equal sales and the accumulated difference would have to be either imported or exported.

In the original formulation government storage capacity was assumed to be 700,000 metric tons[5/]. In the revised formulation, it is assumed that there is no binding constraint on government storage capacity.

Solution of the Model

The general solution to original form of the storage model is

$$S(t) = S_0 + S_1 e^{rt} - \left(\frac{ra+k}{rb} + \frac{2C}{3}\right)t + \frac{Ct^2}{18} - He^{-4t}\left(1+4t+8t^2+\frac{32t^3}{3}\right),$$

with the price level determined to be $P(t)=br\ S_1 e^{rt}-k/r$.

The numerical constants S_0 and S_1 are determined by the boundary conditions imposed upon storage behavior in the particular situation. If we impose the conditions that there is no carry-in and no carry-out (i.e. $S(0) = S(12) = 0$) we can derive the values of the S_0 and S_1 parameters[6/].

$$S_0 = (He^{12r} - 12(\frac{ra+k}{rb}))/(e^{12r}-1) \quad \text{and}$$

$$S_1 = (12\ (\frac{ra+k}{rb}) - H)/(e^{12r}-1).$$

If the carry-in equaled the carry-out, but equaled a minimum level of working stocks, rather than zero, S_0 would be increased by the amount of these working stocks and S_1 would not be changed.

To determine S_0 and S_1 in the actual use of the model I prefer to use the conditions which state $S(0) = S(12)$ and that the minimum storage level is zero. This involves a two stage process, the first step of which uses these parameter definitions to calculate storage levels. Then the entire storage function is raised by the amount necessary to guarantee that storage levels remain non-negative. In order to adapt the solution to the original model for analysis of the import-price target trade-off three changes must be made. First, the "C" parameter in the original model must be set equal to zero. Then the "a" and "b" parameters must be replaced wherever they occur by the values[7].

$$a = (a + 2b\ RP\ PT)/(1 + 2b\ RP) \text{ and}$$

$$b = b/(1 + 2b\ RP).$$

Finally, of course, the original government purchase equation would have to be replaced by the new equation.

The solution of the new form of the model in no way affects the definition of the numerical constants S_0 and S_1 which are determined by the initial conditions of the model.

Analysis of the Price Target/Import Tradeoff

To open this discussion, I want to state the numerical results presented here must be considered to be hypothetical effects rather than estimated empirical results. They are hypothetical in that they are based on an assumed self sufficiency rice price of 125 won per kilogram, which in fact is not a self sufficiency price but resulted imports of 485 thousand metric tons in 1973[8/]. My expectation is that the use of an "equilibrium" price more nearly equal to the true self sufficiency price would result in changes only in the absolute magnitudes rather than the relative magnitudes.

The model is analyzed for two possible levels of the government purchase response parameter. The actual value of this parameter can be chosen by the government grain management bureau in such a way that it will produce an "optimum" set of results from the system. The values selected are 15 and 20, which mean that for every one won per kilogram the free market price is below the target price the government agency buys grain to add to its inventory at the rate of 15000 or 20000 metric tons per month. Similarly if the market price is above the target the government would sell at that rate.

To evaluate the effects of alternative price targets on the rice import levels and other related variables, target prices from 110 to 135 won per kilogram were chosen in five won per kilogram

increments. The model was then run and the criteria variables calculated. These are tabulated in Table 3 and Table 4.

An examination of these results reveals that for every five won per kilogram the target price is set below the self sufficiency price, about 31000 tons of rice must be imported.[9/] (30901 tons are required, if the purchase response parameter is 15, while 31169 tons are required when the response parameter is 20).

In the tabulation, imports are calculated as the excess of government sales over government purchases. In this way, delivery timing for imports can also be inferred. In all of the cases analyzed in Tables 3 and 4 delivery was not required until the last month of the crop year.

The next two entries in the tables indicate the maximum levels of storage achieved by government and private storage facilities, respectively. Generally the maximum level is achieved in the second month of the crop year for the private inventories and about six months after the onset of harvest for government inventories.

The carryover is the minimum level of storage required at the beginning of the crop year to assure that private storage levels are non-negative in the year.

Farm income is the value of the rice harvest at the market prices, so that this entry includes the value of the marketing and transportation services in it. These services may account for 20 percent or more of this "Farm Income" figure.

Table 3

Hypothetical Effects of Target Rice Prices
When Government Purchase Response Parameter is 15
Assuming an Equilibrium Price of 125 Won per Kilogram

Variable	Units	Price Target (Won/kg) 110	115	120	125	130	135
Imports	MT	92708	61807	30906	4.8	-30896	-61797
Gov. Storate Used	1000 MT	468.9	503.5	538.4	573.5	608.9	644.4
Pvt. Storage Used	1000 MT	2686	2668	2649	2631	2612	2594
Carryover	1000 MT	98.2	100.8	103.4	106.0	108.6	111.1
Farm Income	Billion Won	404.7	422.6	440.5	458.4	476.3	494.2
Cons. Expenditure	Billion Won	443.9	459.4	474.5	489.6	504.1	518.4
Gov. Stor. Profit 2/	Billion Won	11.35	7.89	4.12	.01	-4.42	-9.19
Pvt. Stor. Profit 2/	Billion Won	-2.267	-2.415	-2.566	-2.724	-2.885	-3.050
Gov. Stor. Credit	Billion Won	51.74	58.09	64.82	71.88	79.42	87.29
Pvt. Stor. Credit	Billion Won	266.5	276.0	285.2	294.3	303.1	311.8
Max. Cons. Rate	1000 MT/Mo	519.4	523.6	527.8	532.0	536.2	540.4
Min. Cons. Rate	1000 MT/Mo	151.6	141.9	132.1	122.3	112.6	102.8
Min. Cons. Price	Won/kg	99.4	103.8	108.2	112.6	117.0	121.4
Max. Cons. Price	Won/kg	122.3	127.6	132.9	138.1	143.4	148.7
Import Timing	Months	11.4	11.6	11.8	11.9	NA	NA

1/ Negative values indicate exports.
2/ Excludes costs and revenues from imports or exports.

Table 4

Hypothetical Effects of Target Rice Prices
When Government Purchase Response Parameter is 20
Assuming an Equilibrium Price of 125 Won per Kilogram

Variable	Units	Price Target (Won/kg) 110	115	120	125	130	135
Imports 1/	MT	93512	62343	31175	5.8	-31163	-62331
Gov. Storage Used	1000 MT	639.2	608.8	722.7	764.7	806.9	849.2
Pvt. Storage Used	1000 MT	2543	2544	2548	2553	2560	2568
Carryover	1000 MT	133.3	162.1	192.7	224.9	258.5	293.3
Farm Income	Billion Won	404.2	422.3	440.3	458.4	476.4	494.5
Cons. Expenditure	Billion Won	440.9	456.3	471.5	486.3	500.8	514.9
Gov. Stor. Profit 2/	Billion Won	11.44	7.97	4.16	.01	-4.56	-9.27
Pvt. Stor. Profit	Billion Won	-3.068	-3.870	-4.766	-5.757	-6.842	-9.018
Gov. Stor. Credit 2/	Billion Won	70.54	78.56	87.02	95.91	105.26	115.06
Pvt. Stor. Credit	Billion Won	247.8	256.0	264.0	271.7	279.1	286.4
Max. Cons. Rate	1000 MT/Mo	574.8	581.2	587.5	593.9	600.2	606.6
Min. Cons. Rate	1000 MT/Mo	93.0	80.9	68.8	56.7	44.6	32.5
Min. Cons. Price	Won/kg	99.3	103.7	108.2	112.6	117.1	121.5
Max. Cons. Price	Won/kg	122.2	127.5	132.8	138.1	143.5	148.8
Import Timing	Months	11.5	11.6	11.8	11.9	NA	NA

1/ Negative values indicate exports.
2/ Excludes costs and revenues from imports or exports.

Consumer expenditure is the value of the demand for rice at the prevailing market prices.

The storage profit and storage credit calculations are closely related to each other. For both private and government storage operations, the profit is the difference between the year and gross margin on purchase and selling activities and the year and accumulated storage costs. Storage credit is the amount of the largest deficit which accumulates through the year in these "profit" accounts.

Because the cost of purchasing and storing imports or the revenues and reduced costs from selling exports are not included in these calculations, both the government storage profit and the government storage credit estimates are biased. If rice is imported the government storage profit would be over-estimated and the credit requirements under-estimated, while if rice is exported the government storage profits would be under-estimated and the credit requirements over-estimated.

The consumption rate is the rate at which the rice in being sold to consumers through the year. The maximum rate of consumption occurs at the onset of harvest and the minimum rate occurs at the end of the crop year, just before the onset of the next year's harvest.

The consumer price is the market price calculated in this model. Its minimum value occurs at the onset of harvest and the maximum is achieved just before the onset of the next year's harvest.

Table 5

Hypothetical Effects of Time-Linear Government Purchases and No Government Storage Assuming an Equilibrium Price of 125 Won per Kilogram

Variable	Units	Original Model (Time Linear Government Purchases)	No Government Storage
Imports 1/	MT	-.016	0.0
Gov. Storage Used	1000 MT	700.0	0.0
Pvt. Storage Used	1000 MT	2513	3181
Carryover	1000 MT	135.2	32.9
Farm Income	Billion Won	458.4	458.4
Cons. Expenditure	Billion Won	487.4	499.3
Gov. Stor. Profit 2/	Billion Won	.02	0.0
Pvt. Stor. Profit	Billion Won	-3.468	-.856
Gov. Stor. Credit 2/	Billion Won	87.67	0.0
Pvt. Stor. Credit	Billion Won	277.3	368.0
Max. Cons. Rate	1000 MT/Mo	579.9	346.5
Min. Cons. Rate	1000 MT/Mo	86.0	319.3
Min. Cons. Price	Won/kg	112.6	112.6
Max. Cons. Price	Won/kg	138.1	138.1

1/ Negative value indicates exports.
2/ Excludes costs and revenues from imports and exports.

An examination of the influence of increased target prices on the non-import criterion variables reveals few suprises. The minimum consumer price rises by less than the target does and the maximum consumer price rises by more than the target, so that the intra-year price range which may be an important indicator of seasonal inflation increases as the target price increases.

Because of the relatively heavier concentration of the rates of both harvest and demand in the earlier months of the crop year (during which prices have been increased less than proportionately), both the farm income and consumer expenditure totals increase by less than the amount of the increase in the target price times the annual harvest.

When we look at the effects of differing intensities of government market intervention, as indicated by comparing Table 3 with Table 4, we see that the more active the government purchase policy is (i.e. the larger the purchase response parameter), the larger the requirement for government storage. In addition to this, higher price targets call for more storage space.

The increased government activity reduces the amount of private storage used, which indicates that governmental storage activity and private storage are substitutes.

Even though the more intense government activity reduces the total amount of private storage, it increases the required level of

carryovers. This is because the relatively heavier buying activity which occurs early in the year strains the supplies on the market.

The most pronounced effect of heavier governmental activity is on the rate of private consumption. The more intense the government activity, the more steeply sloped is the time path of consumption. In the limiting case of no governmental activity (Table 5), there is less than 5 percent variation around the annual average consumption rate, compared with as much a 80 percent in some other cases.

The effect of the intensified governmental purchase activity on prices is virtually unobservable in the comparisons which we can make from these tables. Thus there is no effect on the value of the farm rice harvest, and the effect on the amount of consumer rice expenditure occurs only as a result of the re-arrangement of consumption timing. This lumping of consumption toward the beginning of the year with its lower prices has the effect of reducing consumer expenditures.

In order to establish a link between the results of this paper and those of the original paper discussing rice storage [5], Table 5 presents the results of the storage model when government rice purchases depend only on time, not on price levels. This formulation states that the government filled its 700000 ton storage capacity

by purchasing at a linearly decreasing rate per month for six months. Afterward linearly increasing amounts per month are sold until government inventories are depleted at the end of the year. The results of the original model seem to fall largely in the middle ground between the results for the two values of the government purchase response parameter when the target price is 125 won per kilogram, which is the assumed equilibrium price. Other than this brief comment, no further mention of the results of the original model will be made.

Conclusions

These results suggest that a five won per kilogram increase in the target price for rice will reduce the rice import requirements by 31 thousand tons. If this relation holds more generally than just in this single analysis we will be able to estimate a self sufficiency price for Korean rice. Based upon the 1973 frozen price of 125 won per kilogram and the 1973 imports of 485000, our estimate of the 1973 self sufficiency rice price is 203 won per kilogram or 16258 won per 80 kilograms.

The second conclusion is that the more active a role the government plays in the rice market and the higher the target price set for rice, the more storage space the government will require for these activities.

The third conclusion is that since these government market interventions do not noticeably affect market prices, and hence

farm income, the primary justification for them must be because of their effect in redistributing rice demand through the year and hence to reduce total consumer expenditure on rice.

Finally, the rice storage sector (both government and private) has need of between 275 and 350 billion won to cover the intra-year operating deficits. This is not simply the sum of the government deficit and the private deficit, since the larger private deficit reaches its peak about four months before the government deficit. In addition to this short-term financing, some arrangement is necessary to cover the longer run cost (currently charged in the model against the private sector) of maintaining the year to year carryover stocks.

Footnotes

1/ [1, p. 337].

2/ [3, p. 224]. In a September 12, 1973, Interview the Planning Division of the MAF Food Bureau provided the current year specification of 9.55 won per metric ton per day storage charge for polished rice in Seoul, with an insurance fee of 1.32 won per metric ton per day in addition to that.

3/ The elasticity is the same as that used in other KASS analyses [4]. The price level is the level at which wholesale rice price were frozen in 1973 by the Korean government. The consumption rate is 1/12 the annual harvest.

4/ [2, p. 136].

5/ A USAID study in 1971 [6, p. B-5-13] estimated the MAF and NACF capacity to store bagged grain in December 1970 to be 625000 tons.

6/ The actual parameters, S_0 and S_1, differ from the values computed in the expressions by a term of the order of magnitude approximagely 10^{-10}. $19633\ He^{-48}/(e^{12r}-1)$ is subtracted from S_0 and added to S_1.

7/ If these redefinitions take place within a computer program, it is necessary that the redefinition of a precede the redefinition of b.

8/ Korea Times, November 10, 1973, p. 4.

9/ This knowledge can be used to infer self-sufficiency prices from observed prices and import levels. Five times the actual import quantity divided by 31000 would be an estimate of the number of won per kilogram the actual price is below the self-sufficiency price.

References

1. Economic Planning Board. Korea Statistical Yearbook 1972; Seoul: Economic Planning Board, Republic of Korea, September 1972.

2. Ministry of Agriculture and Forestry. Yearbook of Agriculture and Forestry Statistics, 1972; Seoul: Ministry of Agriculture and Forestry, Republic of Korea, December 1972.

3. Ministry of Agriculture and Forestry. Yearbook of Agriculture and Forestry Statistics - Grain Statistics, 1971-72; Seoul: Ministry of Agriculture and Forestry, Republic of Korea, November 1972.

4. Rossmiller, G.E. et al. Korean Agricultural Sector Analysis and Recommended Development Strategies 1971-1985; East Lansing: Michigan State University, 1972.

5. Teigen, Lloyd D. "A Model for Private Storage Behavior under Competition and Monopoly with an Application to Korean Rice Storage". KASS Working Paper 73-5; Seoul, Korea: Agricultural Economics Research Institute, December 1, 1973.

6. USAID/Korea. Korean Agriculture Food Grain Subsector Supply and Demand, Farm Mechanization, Storage, and Fertilizer; Seoul, February 1971.

Hypothetical Effects of Target Rice Prices
When Government Purchase Response Parameter is 15
Assuming an Equilibrium Price of 250 Won per Kilograms

Variable	Units	Price Target (Won/kg) 110	115	120	125	130	135
Imports	1000 MT	440.2	424.5	408.7	393.0	377.3	361.6
Gov. Storage Used	1000 MT	322.6	348.0	373.7	399.6	425.6	451.8
Pvt. Storage Used	1000 MT	2688.	2669.	2651.	2632.	2613.	2595.
Carryover	1000 MT	98.1	100.7	103.3	105.8	108.4	111.0
Farm Income	Billion Won	411.8	430.1	448.3	466.5	484.7	502.9
Cons. Expenditure	Billion Won	490.9	510.2	529.3	548.3	567.1	585.7
Gov. Stor. Profit 1/	Billion Won	54.81	55.14	55.29	55.28	55.09	54.74
Pvt. Stor. Profit 1/	Billion Won	-2.298	-2.448	-2.603	-2.760	-2.924	-3.093
Gov. Stor. Credit	Billion Won	35.57	40.12	44.96	50.08	55.48	61.16
Pvt. Stor. Credit	Billion Won	271.4	281.0	290.4	299.6	308.6	317.5
Max. Cons. Rate	1000 MT/Mo	545.1	550.5	555.8	561.2	566.5	571.9
Min. Cons. Rate	1000 MT/Mo	184.1	175.7	167.3	159.0	150.6	142.2
Min. Cons. Price	Won/kg	101.2	105.7	110.1	114.6	119.1	123.6
Max. Cons. Price	Won/kg	124.4	129.8	135.2	140.5	145.9	151.3
Import Timing	Months	9.4	9.6	9.9	9.9	10.1	10.2

1/ Excludes costs of purchasing and storing imports.

Hypothetical Effects of Target Rice Prices
When Government Purchase Response Parameter is 20
Assuming an Equilibrium Price of 250 Won per Kilogram

Variable	Units	Price Target (Won/kg) 110	115	120	125	130	135
Imports	1000 MT	442.1	426.3	410.5	394.7	379.0	363.2
Gov. Storage Used	1000 MT	487.0	519.8	552.8	585.9	619.1	652.5
Pvt. Storage Used	1000 MT	2543.	2544.	2548.	2553.	2559.	2567.
Carryover	1000 MT	132.1	160.8	191.3	223.4	256.9	291.7
Farm Income	Billion Won	409.6	427.9	446.2	464.5	482.8	501.0
Cons. Expenditure	Billion Won	485.8	505.0	524.1	542.9	561.6	580.0
Gov. Stor. Profit 1/	Billion Won	55.03	55.11	55.29	55.30	55.13	54.79
Pvt. Stor. Profit 1/	Billion Won	-3.075	-3.883	-4.786	-5.785	-6.879	-8.068
Gov. Stor. Credit	Billion Won	53.72	59.94	66.52	73.4[illegible]	80.71	88.35
Pvt. Stor. Credit	Billion Won	251.2	259.5	267.4	275.4	283.0	290.3
Max. Cons. Rate	1000 MT/Mo	600.5	608.1	615.6	623.1	630.7	638.2
Min. Cons. Rate	1000 MT/Mo	125.6	114.9	104.2	93.4	82.7	72.0
Min. Cons. Price	Won/kg	100.6	105.1	109.6	114.1	118.6	123.1
Max. Cons. Price	Won/kg	123.8	129.1	134.5	139.9	145.3	150.7
Import Timing	Months	10.0	10.2	10.3	10.4	10.5	10.6

1/ Excludes costs of purchasing and storing imports.