The Growth of Productivity in Agriculture and Its Implications to Agricultural Policies in Korea

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Experiences of economic development abound with high hopes and quick setbacks. While there are not too many success stories of economic development in general, still less are those of agriculture in particular. Agriculture is easily one of the most agonizing of all problems besetting an underdeveloped economy.

The Korean agriculture does not seem to have many success stories to tell. It has been unable to rid itself of many difficult problems. Some of these problems may be regarded as fundamental ones, while others more or less incidental. The *fundamental* problems refer here to those problems the solutions of which are necessary conditions for economic development, and the *incidental* problems are those which are subsidiary to the fundamental ones. Thus, the incidental problems cannot usually be solved independently of the fundamental ones, and to the extent that it can be done at all, the effects on economic development, in and by itself, cannot be expected to be more than marginal.

The purpose of this paper is to analyze what I regard to be the fundamental problem of the Korean agricultural sector for the last decade or so—the slow growth of productivity of labor and land owing to the lack of improvement in agricultural technology. As is analyzed in the following pages, whatever increase in agricultural output that occurred during the period under study can be ascribed to an increase in the quantity of the factors of production, and not

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to an improvement in agricultural technology[1]. Inasmuch as the increase in the quantity of factor inputs cannot continue indefinitely, improvement in agricultural technology assumes special importance for the future of the Korean agriculture.

From this standpoint, I will contend in the latter part of the paper that problems such as land tenure and agricultural finance through the National Agricultural Cooperatives are, from the standpoint of agricultural development, only incidental in the sense defined in the previous paragraphs, and successful solutions to these problems are possible only when the agricultural sector experiences a widespread technical improvement.

The data used in this paper are hardly satisfactory both in quantity and quality. Nor is the technique employed in the analysis adequately refined. A conclusive treatment of a subject so weighty as this has to wait for further studies. Thus, the readers are advised that whatever value this paper may possess would lie not so much in presenting any conclusive evidence to support a particular proposition, as in making a few observations using whatever quantitative data that are avaialble to the author at the moment of writing this paper.

Section I discusses the growth of factor inputs in agriculture during 1953—64 period. Only two factors of production, land and labor, are considered in the section. Section II analyzes the growth of the demand for and supply of cereals during the same period. Section III discusses various aspects of employment and wage in the agricultural sector, with special emphasis on the question of disguised unemployment. Section IV is devoted to an analysis of the trend of productivity of land and labor. Section V draws some policy implications, and the last section offers some concluding observations.

I. The Growth of Factor Inputs in Agriculture

1. Labor

The agricultural population[2] in Korea in 1964 was 15.55 million (Table 1), approximately 18.1 percent increase over that of 1954. The total cultivated area in 1964, including paddy fields and dry fields, was approximately 2,189,000

(1) The analysis deals only with production of cereals, and *not* of all agricultural products.
(2) Some "farm households" are engaged in non-agricultural activities, while some "non-agricultural" households are partly engaged in farming.

chungbos[3] (5,265,000 acres) and the average land-holding per household was about 2.19 acres[4]. This is about the smallest average land-holding per household in the world[5]; it is smaller than that of Japan both during her post-Restoration period and during the post-World War II period[6].

The Korean agriculture is the subsistence sector—subsistence in the sense of lack of specialization; the farmers produce primarily for the purpose of their own consumption rather than of exchange, though the extent of market exchange is by no means negligible.

Farms in Korea are almost all family-operated, each farm consisting of 6.4 members in average. The average size of the family seems very steady over the years, and whatever change thereon during the period under study will be ignored in the following pages. Farm-workers consist typically of all members of the family, except for school children, and the too old and the too young.

TABLE 1

Trend of Increase in Farm Population and Farm Labor, 1953—64 (in thousands)

Year	Total population (1)	Farm population (2)	Number of farm workers (3)	Index: (1954=100.0) (4)
1953	20,167	13,151	3,904.8	(100.0)
1954	21,163	13,170	3,910.5	(100.0)
1955	21,502	13,300	3,910.4	(100.0)
1956	22,307	13,455	3,992.1	(102.1)
1957	22,949	13,592	4,035.5	(103.2)
1958	23,611	13,750	4,082.6	(104.4)
1959	24,291	14,126	4,194.1	(107.3)
1960	24,989	14,559	4,322.8	(110.5)
1961	25,731	14,509	4,407.8	(112.7)
1962	26,470	15,097	4,482.4	(114.6)
1963	27,226	15,266	4,532.8	(115.9)
1964	27,958	15,553	4,611.1	(118.1)

Source: Economic Planning Board, *Korea Statistical Yearbook*, 1964. National Agricultural Cooperatives Federation, *Agricultural Yearbook*, 1965.

(3) The *chungbo* is a Korean unit of area; one *chungbo* is equivalent to 2.45 acres.

(4) The Korean statistics on these matters are not completely accurate.

(5) See data given in United Nations, *Land Reform: Defects in Agrarian Structure and Obstacles to Economic Development*, New York, 1951, reprinted in T. Morgan, G. Betz, and N. Choudhry, *Readings in Economic Development*, Belmont, Calif., 1963, p. 301.

(6) The average landholding in Japan today is about 2.5 acres. *Ibid.*, p. 302. During the late 19th century and early 20th century, the Japanese landholding was also about 2.5 acres. Cf. William W. Lockwood, *The Economic Development of Japan*, Princeton, 1954. p. 194.

The productivity of these workers will be different depending upon their sexes and ages. In order, therefore, to derive the agricultural labor force that is equivalent to that of full-time male workers between the ages of 15 and 59, workers' ages and sexes have to be given weights in an appropriate manner. This is done in Table 2. While a male worker with the age of 15-59 is given the weight of 1.0, a female worker of the same age of 0.6, etc. It has been found that when the workers are given the weights as shown in the table, the average farm family of 6.4 members has a working force of 1.9 men[7]. The ratio of total farm population to man-equivalent working force is (6.4/1.9)=3.368. Thus, when the total agricultural population is divided by

TABLE 2

Weight Given to Workers of Different Age and Sex to Derive Man-Equivalent Labor Force

Sex	Age 14 and under	15—19	60 and above
Male	0.3	1.0	0.6
Female	0.3	0.6	0.4

Source: Yong Sam Cho, "*Disguised Unemployment*" *in Underdeveloped Areas*, Berkeley and Los Angeles, Univ. of Calif. Press. 1963.

3.368, we get the total agricultural labor force that is equivalent to full-time, male workers with 15-59 years of age. This is shown in Column 3 of Table 1. It will be noted that the agricultural labor force in 1964 was approximately 18.1 percent larger than that in 1953.

2. Land

The high labor-land ratio suggest that there is a pressure for both intensive and extensive cultivation. The intensive cultivation implies two aspects in the Korean context: (1) an accelerated rate of application of variable inputs, such as labor, fertilizers, and pesticides, to a given amount of land during a given period of time; and (2) an extention of the time-span of the use of the land. The latter refers to the technique of multiple crops.

The summer crops are cultivated on dry fields, but in the southern parts of the country, extended areas of paddy fields are used for cultivating two major summer crops (barley and wheat) before the rice plants are transplanted

(7) See Yong Sam Cho, "*Disguised Unemployment*" *in Underdeveloped Areas*, Berkeley and Los Angeles, Univ. of Calif. Press, 1963.

to the rice fields in early summer months. Approximately 61 % of the barley production and 67 % of the wheat production in 1964 was produced in the rice fields on the double crops production method[8]. This is shown in Table 3. The Column (3) shows the total area of cultivation, and Column (4) the area of rice cultivation plus the area of summer crops cultivation. Column (5) shows the area of double crops, and it can be seen that in 1964, the proportion of the area of double crops in the total area of cultivation was 19.9 % while the same figure in 1954 was 15.3. This is about a 30 % increase in the proportion of the area of double crops to the total area of cultivation during the decade. This can be considered one measure of intensive cultivation, as it does measure the proportion of land the use of which is extended to almost a year-round

TABLE 3

Growth of Cultivated Areas (in thousands of chungbos)

Year	Rice paddy field	Dry field	Total area of cultivation (index : 1954 = 100)	Total "seeded" area[a]	Area of double crops[b]	$\frac{(5)}{(3)} \times 100$	Index : (1954 = 100.0)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1953	1,162.0	793.7	1,955.7 (99.4)	2,523.6	283.9	14.5	99.4
1954	1,170.6	796.0	1,966.6 (100.0)	2,569.6	301.5	15.3	100.0
1955	1,197.3	814.2	2,011.5 (102.3)	2,640.9	314.7	15.6	102.0
1956	1,198.7	809.8	2,008.5 (102.1)	2,687.8	339.7	16.9	110.6
1957	1,202.9	812.6	2,015.5 (102.5)	2,758.1	371.3	18.4	120.3
1958	1,209.7	819.5	2,029.1 (103.2)	2,694.8	332.8	16.4	107.2
1959	1,212.9	820.1	2,033.0 (103.4)	2,704.3	335.7	16.5	107.8
1960	1,216.3	825.4	2,041.7 (103.8)	2,727.4	342.9	16.8	109.8
1961	1,221.0	828.5	2,049.5 (104.2)	2,763.8	357.2	17.4	113.7
1962	1,233.3	846.6	2,079.9 (105.8)	2,828.3	374.2	18.0	117.6
1963	1,238.3	858.6	2,097.0 (106.6)	2,916.0	418.5	20.0	130.7
1964	1,271.6	917.5	2,189.1 (111.3)	3,062.4	436.7	19.9	130.0

a. Total "seeded" area means the total "single" crop area *plus* the double crop area.

b. $\frac{(4)-(3)}{2}$

Source: The Bank of Korea, *Economic Statistical Yearbook*, 1960—1964. The National Agricultural Cooperatives Federation, *Agricultural Yearbook*, 1965.

(8) *Agricultural Yearbook*, 1965.

basis.

The expansion of the area of cultivation on the extensive basis can be measured by the proportion of the newly cultivated area to the total area of cultivation. We note in Column (3) of Table 3 that there was 11.3 % increase in the total area of cultivation between 1954 and 1964.

The figures in the table have been taken from official records, but actually they seem to be quite inaccurate and have understated the total cultivated area. In 1966, the Ministry of Agriculture, in cooperation with the United States AID Mission in Korea, surveyed the area of cultivated land. According to this survey, the total area of cultivated land in 1965 was found to be 2.4 million *chungbos*[9], rather than 2.2 million *chungbos* as is shown in Table 3. That is to say, the actual area of cultivated land was greater than the official figure by approximately 10 percent. We have no way of finding out how much the area of cultivated land increased during the period under study, for we do not know what actually was the cultivated area in 1953. Undoubtedly, the official figure for 1953 too understated the actual area of farm lands. We do infer, however, that the increase of cultivated land was quite substantially larger than what is shown in the table.

The increase in farmland can be brought about by new cultivation of privately owned woodland and public domains. Powerful incentives seem to exist as regards expansion of farmlands. First, the newly cultivated areas are, either officially, and in many cases unofficially, tax-exempt. The cadastral survey for tax purposes is ususally not up-to-date, and tax officials and village representatives who are selected each year to evaluate the crop conditions of the farmers are typically not anxious to charge taxes on new farmlands. It is not rare that the farmlands are classified as woodlands in official cadastral records. There is, furthermore, an unceasing tendency for the villagers to resort to illegal felling of trees and trimming of twigs and branches, and raking of fallen leaves. As the timber resources are thus depleted, the owners of these "woodlands" find it advantageous to turn them into farmlands.

Incentives for expansion of farmlands into public domains are provided by the government. According to the New Cultivation Acceleration Law of 1964, an impressive amount of public land, considered to be fitting for cultivation in

(9) *The Seoul Kyong-je Shin-mun* (The Seoul Business Daily), March 2, 1966.

terms of terrain and density of trees per unit of land, have been sold to private individuals for cultivation. The government provides loans for the new cultivators, and generous tax concessions are provided to them.

It is not hard to see that the expansion of cultivated area will get progressively more difficult. The cost in the form of diminishing wooded area will become progressively greater. The depletion of timber resources and grass in the hilly part of the country will make the preservation of water and moisture, flood control, and provision of irrigation progressively more difficult. Whatever the short-run benefit the expansion of extensive cultivation may bring, the future of Korean agriculture does not lie in this direction; it lies only in much more intensive use of existing area of cultivation.

II. The Growth of Supply and Demand for Cereals

Table 4 summarizes the record of production of cereals[10] during 1954-1964 period. The year 1954 was the first year since 1950 that the level of production of cereals reached the 1949 level.[11] As shown in the table, the production of rice in 1964 was 35.2 percent greater than that of 1954, other cereals 87 percent, and all cereals including rice 58.8 percent. There is, the table shows, a great difference between 1964 and all previous years in cereals production; 1964 witnessed an unusually good harvest of cereals. Except for 1964, the rate of increase of cereals is by no means very rapid.

With this domestic supply of cereals, let us compare the demand for them. Until the 1945 Liberation, Korea was a major supplier of rice to Japan. Owing to a great repatriation of population from abroad after the Liberation, and the low level of agricultural production caused by the shortage of chemical fertilizers (of which Korea produced none), the shortage of food became an acute problem after the Liberation, except in 1949[12]. During the Korean War the agricultural production was greatly reduced, and it was not until 1954 that the total pro-

(10) In view of the importance of potatoes in the Korean diet, I have included potatoes in cereals. Potatoes and "other" cereals are very different in terms of caloric content, so that it is not entirely appropriate to add them, as is done in the table. However, the main arguments remain the same if potatoes are excluded.

(11) Robert Nathan and Associates, *The Programme for Korean Reconstruction* —A Report to the United Nations Korean Reconstruction Agency, New York, 1954, p. 264.

(12) *Ibid.*, p. 264.

TABLE 4

Food Production in Korea, 1953—64 (in thousands of metric tons)

Year	Rice (Index: 1954=100)	Other crops[a] (Index:1954=100)	Total (Index: 1954=100)
1953	2,035.6 (94.2)	1,734.5 (98.4)	3,770.1 (96.1)
1954	2,160.4 (100.0)	1,763.5 (100.0)	3,923.9 (100.0)
1955	2,234.2 (103.4)	1,756.7 (99.6)	3,990.9 (101.7)
1956	1,840.5 (85.2)	1,662.3 (94.3)	3,502.8 (89.3)
1957	2,266.2 (104.9)	1,639.8 (93.0)	3,906.0 (99.5)
1958	2,389.9 (110.6)	1,834.3 (104.0)	4,223.9 (107.6)
1959	2,390.8 (110.7)	1,897.5 (107.6)	4,288.3 (109.3)
1960	2,296.7 (106.3)	1,951.6 (110.7)	4,248.3 (108.3)
1961	2,722.0 (126.0)	2,202.9 (124.9)	4,924.9 (125.5)
1962	2,295.1 (106.2)	2,228.7 (126.4)	4,523.8 (115.3)
1963	2,765.9 (128.0)	1,674.0 (94.9)	4,439.9 (113.2)
1964	2,921.9 (135.2)	3,310.3 (187.7)	6,232.2 (158.8)

a. Other crops include all summer and autumn crops, such as barley, wheat, and other summer grains, pulses, and potatoes.

Source: Bank of Korea, *Economic Statistical Yearbook*, 1964. National Agricultural Cooperatives Federation, *Agricultural Yearbook*, 1965.

duction of food reached the 1949 level.

Talbe 5 shows a crude estimate of demand for cereals during the period under study (Col. 7). This table rests on a series of conjectures and assumptions, and it is hoped that they do not seriously distort the actual development. First, it is conjectured that in 1949, when a small amount of export of rice occurred for the first time since the Liberation of 1945, the supply of cereals was roughly equal to the demand for them. Second, it is further conjectured that per capita income in 1954 was roughly equal to that of 1949, so that the demand for cereals in 1954 was about 4.9 percent greater than that in 1949, inasmuch as the increase in population during the quinquennium was 4.9 percent. The estimate of demand for cereals during the subsequent years is calculated on the assumption that the rate of increase of demand for food as a whole will be equal to the rate of increase of population *plus* the rate of increase of per capita income multiplied by the income elasticity of demand for food[13]. It is at this

(13) This procedure of estimating the demand for food does contain a serious pitfall. Apart from the fact that the figures we are using may not be accurate, there is a conceptual difficulty, and it is that the estimate given here is only a *physical* quantity which does not reflect the relationship between price and quantity. In other words, this demand function does not contain price of food; it assumes that the price of food relative to other goods is given.

stage impossible to estimate a reasonably accurate numerical estimate of income elasticity of demand for food, and so it has been arbitrarily assumed that for the entire period under study, the income elasticity is 0.5[14].

TABLE 5

Supply and Demand for Food, 1953—64 (in thousands of metric tons)

Year	(1) Demestic supply of food[a] (1954=100)	(2) Rate of increase of population	(3) Rate of increase rase of real GNP	(4) Rate of increase of per capita income	(5) (4)×0.5(0.5=income elasticity of demand for food	(6) (2)+(5)	(7) Quantity of food demanded[b]	(8) Shortage of food (7)—(1)	(9) Net import of grain	(10) "Overall" surplus (+) or shortage(—) (9)—(8)
1953	3,770.0 (96.1)									
1954	3,923.9 (100.0)	1.6	6.0	4.4	2.2	3.8	4,116.0(96.2)	192.1	202.4	+ 10.3
1955	3,990.9 (101.7)	1.6	6.3	4.7	2.4	4.0	4,280.6(100.0)	289.7	84.6	−205.1
1956	3,502.8 (89.3)	3.7	1.3	−2.4	−1.2	2.5	4,387.6(102.5)	884.8	502.2	−382.6
1957	3,906.0 (99.5)	2.8	7.2	4.4	2.2	5.0	4,607.6(107.6)	701.0	965.3	+264.3
1958	4,223.9 (107.6)	3.0	6.1	3.1	1.6	4.6	4,818.9(112.6)	595.0	968.4	+373.4
1959	4,288.3 (109.3)	2.9	4.6	1.7	0.9	3.8	5,002.0(116.9)	713.7	226.7	−487.0
1960	4,248.3 (108.3)	2.9	1.5	−1.4	−0.7	2.2	5.112.0(119.4)	863.7	467.7	−396.0
1961	4,924.9 (125.5)	3.0	4.7	1.7	0.9	3.9	5.311.3(124.1)	386.4	603.1	+216.7
1962	4,523.8 (115.3)	2.9	3.2	0.3	0.2	3.1	5,475.9(127.9)	952.1	499.2	−452.9
1963	4,439.9 (113.1)	2.8	8.6	5.8	2.9	5.7	5,788.0(135.2)	1,348.1	1,318.1	− 30.0
1964	6,232.2 (158.8)	2.7	8.0	5.3	2.7	5.4	6,100.6(142.5)	−131.6	750.9	+882.5

a. See Column (3) of Table 4.

b. Quantity of food demanded in the year $t+1=Q_t+rQ_t=Q_t(1+r)$, where Q_t stands for quantity of food demanded in the previous year, and r the rate of increase of demand for food. The rate of increase of demand for food (r) is equal to the rate of increase of population *plus* the rate of increase of per capita income multiplied by the income elasticity of demand for food. (This magnitude is given in Column (6) In this table, the income elasticity of demand for food is assumed to be 0.5.

Source: Bank of Korea: *Economic Statistical Yearbook*, 1964.
Economic Planning Board, *Korea Statistical Yearbook*, 1964.
National Agricultural Cooperatives Federation, *Agricultural Yearbook*, 1965.

Thus, for example, the demand for food in 1955 has been calculated as 4% larger than that of 1954 (1.6 % is due to the increase in population, and the remaining 2.4 % is due to the increase in real income). It is shown that throughout our entire period, except for 1964, the supply of cereals lagged

(14) The Japanese income elasticity of demand for food during 1878—1917 period has been estimated by K. Ohkawa and H. Rosovsky as somewhere between 0.6 and 0.7. See "The Role of Agriculture in Modern Japanese Economic Development", *Economic Development and Cultural Change*, October 1960.

behind the demand for them, and the gaps were filled by imports from abroad (Col. (9)), During the eleven-year period, overall 'surplus' after the food import occurred in five years (Column (10) with *plus* signs) and the 'shortage' occurred in six years (Column (10) with *minus* signs).

The supply and demand for any good, defined *ex post*, should be equal, and this equality is brought about by the movement of prices of cereals relative to those of other goods. When the demand for grains exceeded the supply (so that the column(10) of Table 5 has the minus sign), one would expect that the prices of grains would rise relatively more (or decrease relatively less) than other goods, and on the other hand, when the overall supply of grains including domestic production and imports from abroad exceeds our estimates of demand for food, one would expect that the prices of food would either decrease relatively more (or increase relatively less) than other goods. The imports of foodstuffs did not mean in the case of Korea that they were distributed immediately, so that there was a lag between the surplus and the shortage of food supply and the corresponding fluctuation of food prices. In fact, comparisons of our "surplus" and "shortage" of foodstuffs and the relative price movement for the period under study shows this. This is done in Table 6. When surplus occurred during a year, prices of food either decreased (as in 1957-58, 1958-59, and 1964-65), or if increased, increased less than prices of goods other than grains (as between 1961-62). On the other hand, when a substantial shortage of grains developed, (as in 1955, 1956, 1959, 1960, and 1962), the prices of grains increased substantially more than the prices of other goods.

Had there not been grain imports through the United States aid, whatever economic development the country experienced during the period under study would not have occurred. Until 1961, the value of food imports was substantially greater than the value of total exports of the country. Imports of food under normal circumstances occur only when there is a corresponding amount of exports, and when there is exports, it is by definition impossible to use that resources for competing uses, i.e. for domestic uses. The shortage of cereals therefore would impose a great burden on the industrial sector, and the slow increase in agricultural production can be considered as one of the forces retarding economic development of the country.

We have seen in the previous two sections that a great increase in factor

TABLE 6

Index of Price of Grains and Other Commodities (Wholesale) (1960=100)

(In metric tons)

Year	Index of wholesale prices (1)	Annual rate of increase (2)	Index of price of grains (3)	Annual rate of increase (4)	Index of price of goods other than grains (5)	Annual rate of increase (6)	'Surplus' or short-age' of grains (7)
1954	34.0						+ 10.3
1955	61.5	80.8	63.5	—	60.6	—	−205.1
1956	81.0	31.7	101.3	59.5	74.2	22.4	−382.6
1957	94.1	16.2	116.4	14.9	86.6	16.7	+264.3
1958	88.2	− 7.0	95.3	−18.1	85.6	− 1.2	+373.4
1959	90.3	2.3	83.5	−12.4	92.4	7.9	−487.0
1960	100.0	10.7	100.0	19.8	100.0	8.2	−396.0
1961	113.2	13.2	123.9	23.9	111.3	11.3	+216.7
1962	123.2	9.4	131.4	6.1	122.5	10.3	−452.9
1963	149.3	20.6	208.3	58.5	139.1	13.6	− 30.0
1964	201.1	34.7	263.1	26.3	190.4	36.9	+882.5
1965	221.2	10.0	246.5	− 6.3	216.8	13.9	.....

Source: Bank of Korea, *Economic Statistical Yearbook*

inputs occurred in the Korean agricultural sector during 1953-64 period (The labor force increased by 18.1 percent and the area of farmland increased by more than 11 percent). And yet the supply of cereals tend to lag behind the demand for them. We now proceed to study the productivity of the factor inputs in the subsequent sections.

III. Employment and Wage in Agricultural Sector

The view is commonly held that in the agricultural sector of some under-developed countries, a widespread disguised unemployment exists. Although the term disguised unemployment is interpreted in a variety of ways,[15] a most commonly held view seems to be that the marginal product of labor is zero(and the supply of labor is unlimited). This popular proposition has led to many gratuitous advices as regards capital formation and industrial development in

(15) For interpretation of many different meanings of the concept of disguised unemployment, see Yong Sam Cho, *op. cit.*, and Morton Paglin, "Surplus Agricultural Labor and Development: Facts and Theories", *Ameican Economic Review*, September 1965, Vol. 55, 815—34, and B. L. Bennett, "Surplus Agricultural Labor and Development: Facts and Theories: Comment," and Morton Paglin's "Reply", *American Economic Review*, March 1967, Vol. 57, 194—209.

these countries. If this popular doctrine is valid, it implies that the 18 percent increase in labor in the Korean agricultural sector during the 1953—64 period contributed nothing to the increase in agricultural production, which has to be attributed to the increase in the area of farmland, and improvement in agricultural technology. This section attempts to examine the doctrine of the disguised unemployment and related problems in the Korean context.

To those who are unaccustomed to Korean villages, the impression is naturally overwhelming that the number of human beings is simply too many. The impression is confirmed and strengthened when one observes the recurrent phenomenon of "spring famine". A large number of farm households face the problem of minimal biological subsistence each year, and even during the good harvest year, the appearance of these indigent farmers is recurrent. Assuming that, with substantial realism, those farm-households which own less than 0.735 acres (1 *chungbo*) have to face this perennial disaster, it appears that about 1/5 of the total farm households are experiencing foodless condition sometime during the annual harvest cycle. For these farm households, the store of grain and other food is gradually exhausted starting mostly in the early months of the calendar year[16], and the condition becomes increasingly lean until the midyear, when the summer crops are harvested.

It must be noted that those farm households which face this problem are typically not those who are employed by someone else, but those who are self-employed. If a farmer is employed by some other farmer, the employee will receive the competitive wage. The reason, then, why the number of self-employed persists, must be that there must be some forces which effectively limit the supply of employees and that the prevailing wage rate is too high for the employers to hire all of the self-employed workers. That is to say, there must be a gap between the going wage rate and the wage rate that would prevail if all the self-employed would be induced to be employed, and that this gap can not easily be eliminated.

It is commonly regarded that in an underdeveloped country, there are income-sharing devices, particularly through an extended family system. It is maintained that the extended family system provides the farmers with insurance and

(16) It was reported in February of 1965 that the foodless farm households were estimated to become 479,000, which is approximately 19% of the total farm households. See *The Chosun Ilbo*, Feb. 16, 1966.

security, and that the farmers' preference for the traditional way of living is such that they are loath to lead a new way of life even when the latter involves an economic gain. This kind of thinking is very common in sociological studies. For example, as regards the Korean village life, it is stated:

"The strong family ties, the clan, and the village system represent special values for those who live in a rural community. They enjoy a sense of "belonging" and of employment security through their family ties. This is why so many Koreans want to live in rural areas[17]."

The strong preference of the villagers for the family ties, which may have existed once upon a time, has very notably attenuated in recent years. The "force of tradition", if there is still such a thing, has all but disappeared from the Korean countryside, if only because it is too expensive to maintain. If one were to argue that people in many underdeloped societies live in the same style for many generations, it is more likely the result of the *lack of alternatives* rather than that of *love of tradition.*

To be sure, the family-tie may appear, at least ostensively, to have inhibited the growth of labor market in the countryside. Employment with some other family involves at least temporary suspension of family life of the employee, because the employment is usually contracted on annual basis, so that the employee stays and lives with the employer[18]. Nobody would be prepared to deny categorically that the family tie plays a part in working of the labor market, but its influence must not be overemphasized, becuase it is more apparent than real.

It seems that there are roughly three means by which the potential employees in the rural Korea are kept self-employed. First, the indigent self-employed can and do get government subsidies in the form of transfer payment. Second, the self-employed do get occasional part-time employment in villages, and/or they find a source of income in collecting firewood mostly by illegally felling trees from privately owned woodland and from public domains, and carrying it to adjacent towns and vending it. The third means of income-sharing devices

(17) Yong Sam Cho, *op. cit.*, p. 100.

(18) The employment contract in the rural Korea can be on annual, monthly or daily basis. If it is done on annual basis, which is very common, the employee receives wage in kind, e.g. in the form of meals, clothes, and so much grain at the end of the employment term.

seems to be that the indigent farmers incur debt (particularly private debt), and subsequently default when they are unable to honor debt contract. Frequently it appears that those debtors who are able to repay also default on debt and there are not too many legal recourses for the creditors to take, because legal processes are typically too time-consuming and expensive compared with the amount of debt contract.

The discussion above leads up to the question: whether or not the marginal product of labor in the rural Korea is zero. I already suggested that there does exist the surplus labor on the part of the farmers who are self-employed on extremely small plots of land, surplus labor being defined not as the marginal product of labor being zero, but as that part of labor whose implicit wage is lower than the competitive wage. The marginal product of these self-employed farmers, is very low. But, the marginal product of labor is never zero, or even close to it. Indeed, for many households, it is the shortage rather than the surplus of labor that is the problem. Before I present some empirical data, let us consider the following.

First, it must be remembered that the Korean agricultural technique consists mainly of a series of manual operations. Equipment that the farmers use are almost all geared to manual labor, save for the use of cattle. It is also true that rice paddies are unfit for the use of heavy equipments, and the hilly terrain which mark the Korean countryside would not permit any extensive use of machines even if they existed. Under the circumstances, the area of land which an individual farmer can cultivate will be severely limited. An unmechanized agricultural production is inherently labor intensive. A labor intensive method of production implies a great variety of combination of labor and land and it would further mean the elasticity of marginal product of labor is rather high, i.e., the law of diminishing returns operate more slowly than when more capital intensive method of cultivation is used and the range of combinations of factor inputs is limited.

Professor Harvey Leibenstein advanced the thesis that since the people in underdeveloped areas are mostly undernourished and physically weak, the number of workers on a given area of land has to be very large. This, according to Leibenstein, leads to the paradoxical result that the more undernourished the people are, the larger the marginal productivity of labor, and this is the

reason why the marginal product of labor in underdeveloped countries is still positive, and the so-called disguised unemployment does not exist. However, as people become better nourished, they can work more, the marginal product of labor will in fact become zero.[19]

Out of all the arguments about disguised unemployment, I find Leibenstein's argument most to the point, except that it is too ingenious, for it appears that the reason for the absence of the so-called disguised unemployment is simpler than that. Even if the workers were well-nourished, the amount of land a single worker can cultivate is technologically very limited. Assume, for the sake of illustration, that a representative Korean family is transplanted bodily to a North American prairie where land is a free good. The area of land that the family cultivate will be that amount of land which makes the marginal return from extensive cultivation per hour of work equal to the marginal return from intensive cultivation per hour of work, and these marginal returns will in turn be equal to the marginal disutility per hour of work. Given the low level of technology available to this family, the extensive margin of cultivation will be very quickly reached. Now, the representative Korean family has 1.9 man-equivalent workers with virtually no mechanized equipments, with a little animal draught power. Under the circumstances it is obvious that the family will be unable to cultivate much more than 2.3 acres. The extensive margin of cultivation is reached quickly. Furthermore, the limit to the extent of cultivation is imposed by the fact that the agricultural sector is subsistence sector in the sense that it produces goods primarily for its own consumption. The family has to produce all kinds of crops that it consumes and the workers have to do a variety of chores besides cultivating of the land, by virture of the fact that specialization is absent. Between April and October, there are so many chores to be performed on the Korean farm: repairing the irrigation dikes and ducts, planting the seed, weeding, thinning, fertilizing, harvesting, gleaning, and cleaning the crop, etc., which are all labor intensive. Furthermore, other activities also compete for workers, such as tending cattle, cutting grasses for making fodder and fertilizer, frequent vending activities to the nearby towns, mending dikes after each flood, gather-

(19) Harvey Leibenstein, *Economic Backwardness and Economic Growth*, (New York, John Wiley & Sons, Science), Ch. 6.

ing firewood, occasional repairs to the farm house, annual changing of the thatched roofs, etc. None of these activities can easily be dispensed with, so that it is likely that the family is prennially in want of farm-hands. The law of diminishing returns operate very slowly under the circumstances. Thus, the degree of physical exertion experienced by the Korean farmers in a supposedly idyllic villages, would probably be much greater than that of the farmers in mechanized farms. Indeed, very few people are idle in the supposedly over-crowded villages, where a great many people ought to find nothing worth while to do.

Now, let us consider the marginal productivity of labor in the light of the best available statistical data. Crude and inadequate as they are, the data do seem to show that the marginal product of labor in the Korean agriculture in 1963 was positive, and it gives one confidence that the marginal product was greater than one-half of the average product of labor.

The data I use in the following discussion, which are summarized in Table 8, are contained in the 1964 issue of the "Report of the Farm Economy", published by the Ministry of Agriculture and Forestry. The report is based upon a random sample of 1,200 farms out of 80 farm districts, and it contains a variety of information regarding these farms——the size of the farm, the size of the family, the degree of education, the number of hours that the family devoted to farming, the estimate of implicit wage of the farm per hour, the indebtedness of the farm families, etc. Some of these informations are summarized in Table 7. The farm households are classified into five different categories according to the size of the farm. The smallest farms are those whose areas are less than 0.5 *chungbos*, and the largest farms over 2.0 *chungbos*. The average areas of cultivation per worker within each farm category are given in Row 1, the number of workers[20] per farm in Row 2, the total number of hours which the family workers devoted during the year in Row 4, and average and "earning" of these workers in Row 7. The last item— "the average earnings" would presumably refer to implicit wages of these workers, and therefore it may be called average value product of labor. Accurate informations regarding these matters are extremely hard to obtain, and the numerical

(20) The average number of workers per family in Table 7 would be different from male-equivalent labor force defined in the previous section.

TABLE 7

Average Product and the Marginal Product of Labor

	Farm size				
	Less than 0.5 *chungbos*	Over 0.5 *chungbos* but less than 1.0 *chungbo*	Over 1.0 *chungbo* but less than 1.5 *chungbos*	Over 1.5 *chungbos* but less than 2.0 *chungbos*	Over 2.0 *chungbos*
1. Area of cultivation per worker (in *Pyong*)	376.49	706.72	988.26	1.218.54	1,618.37
2. Average number of workers per family farm	2.62	3.06	3.81	4.20	4.54
3. Average total area of cultivation per family farm (1)×(2)	986.4	2,162.6	3,765.0	5,117.9	7,347.4
4. Total number of hours workers worked per farm	1,106.8	1,878.9	2,758.5	3,301.8	4,252.8
5. Ratio of man-hours to total area of cultivation (4)/(3)	1.122	0.869	0.733	0.645	0.579
6. Number of hours which the alternative methods of cultivation would require to cultivate a largest size farm (i.e. a 1618.37 *pyong* farm)	8,243.8 (=7,347.4 ×1.122)	6,384.9 (=7,347.4 ×0.869)	5,385.6 (=7,347.4 ×0.733)	4,739.1 (=7,347.4 ×0.645)	4,252.8 (=7,347.4 ×0.579)
7. Average value product of labor per hour(in *won*)	45	47	47	55	58
8. Total wage bill if alternative methods of cultivative methods of cultivation were applied to the largest farm (6)×(7) (in *won*)	370.971.0	300,090.3	253,123.2	260,650.5	246,662.4
9. Marginal value product of labor		38.1	47.0	−11.6	(28.8)

Sources: Figures in Rows 1, 2, 4, and 7 are taken from the "Report of the Farm Economy", Ministry of Agriculture and Forestry Seoul, 1965.

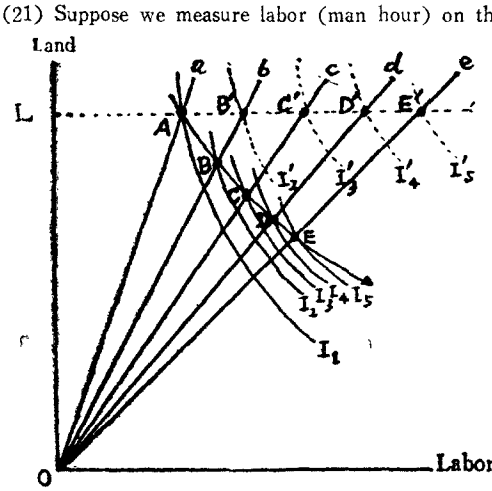
informations given by the "Report of the Farm Economy" may not be completely reliable.

Assuming that there are two kinds of inputs in agriculture, labor and land, we see that each of these farm households in different categories used different combinations of land and labor. For example, for the largest farms (with the average size of 1,618.37 *pyongs*) the number of total hours which the family workers devoted during the year was 4,252.8 hours, while the corresponding figure for the smallest farms (with the average size of 986.4 *pyongs*) was 1,106.8 hours. When the average total number of hours worked on each farm

is divided by the average total area of cultivation, we have labor-land ratios for these farms. This is given in Row 5 of the table; the labor-land ratio is lowest for the largest farms (0.579), and highest for the smallest ones (1.122), That is, the smaller (larger) the farms, the greater (smaller) is the degree of labor intensity. There are thus five different factor proportions, and let us call these *a*,*b*,*c*,*d*, and *e* in the descending order of labor intensity[21].

Now, suppose we apply the five different techniques, *a*, *b*, *c*, *d*, and *e* to a largest farm (with the size of 7,347.37 *pyongs* in average). What would be the change in total product? First, we find that when technique *b* is applied, the number of hours needed to cultivate the largest farm is 4,739.1 hours a year, and when technique *c* is applied, the corresponding number of hours becomes 5,385.6 hours, etc. (Row 6). The average value product, which is the money value of one hour of working on these different farms, is given in Row 7. (This is the estimate of the "Report"). The total revenue (product), which we shall get by applying these different techniques to a largest farm can be gotten by multiplying the average revenue product per hour of labor by the total number of hours which would have been devoted if each of the different techniques of production were used. This is given in Row 8. The marginal value product, which is the division of the change in the total revenue by the change in the number of hours devoted to the farming, is shown in

(21) Suppose we measure labor (man hour) on the *X*-axis, and Land (*pyong*) on Y-axis. Then, the rays *a*, *b*,... *e* stand for various factor combinations, e.g., the ray *e* is the labor land ratio of 1.122. and the ray *d* shows etc. I_1, I_2,... I_5 are isoproduct curves. The points *A*, *B*,... *E* show the actual combination of labor and land that are shown by Rows 3 and 4 of Table 7. In order to get the marginal product of labor, we have to obtain the different total product when various amounts of labor are applied to a given amount of land; Suppose method *b* is used for cultivating OL amount of land (say, the largest farm in our example) we are moving from *B* to *B'*, and the difference between I_1 and I'_2 is the change in total (revenue) product by increasing the quantity of labor, while the amount of land being held constant. Similarly, if technique *c*, is applied to cultvate OL land, one moves from *C* to *C'*, and the difference between I'_2 and I'_3 measures the change in total (revenue) product due to further increase in the quantity of labor by *B'C'*.



Row 9. Thus, it is seen that marginal revenue product between techniques *a* and *b* is ₩28.8, between *b* and *c* ₩-11.6, between *c* and *d* ₩ 47.0, and *d* and *e* ₩ 38.1.

One can immediately note that there are at least two points which make this calculation doubtful. First, the marginal product of labor between *a* and *b* should be expected to be larger than between *b* and *c*, and it should be expected to become progressively smaller as labor intensity increases, because of the law of diminishing returns. But in the above estimates, this is not so. The marginal product between *a* and *b* is smaller than that of between say *d* and *e*, i.e., the law of diminishing returns does not seem to operate. The second thing which defies our expectation is that the marginal product between *b* and *c* is negative, while the marginal product between *c* and *d* is as high as ₩47.0

The sort of "anomaly" that I have pointed out may be due to any number of reasons; it may be true that the application of other inputs like pesticides, fertilizers, may be more effective for the smaller farms than the larger farms, and that the farmers of the smaller farms work harder than those of the large farms, in view of the fact that the smaller farms are operated by owners themselves, while larger farms rely more on employees whose productivity is generally lower than self-employed farmers. Granting, however, that the rather "erratic" behavior of the marginal product curve should deserve heavy discount, one thing that does stand out is that the marginal product of labor in the Korean agriculture is far from being zero. The marginal value product of labor in the most crowded farms in our estimate in 1963 was ₩ 381.1, while the average value product of labor of all farms was ₩49.0.

If the marginal product of labor is positive and the so-called disguised unemployment, in the form of its usual interpretation, does not exist, it does not offer any comfort to the future of the Korean agriculture. It only means that the elasticity of the marginal product is very high, i.e., the diminishing return is only very slowly operating, for the productivity per worker is very low. That is to say, the reason why the marginal product of labor in agriculture is low is neither solely nor primaily due to the number of people but because the standard of technical knowledge is very low, and consequently so is the productivity of labor.

To summarize the above paragraphs, there are a large number of under-

employed (self-employed) farmers in Korea, due to some involutary income-sharing devices. The persistence of poverty (i.e., low productivity) in the agricultural sector is due to the fact that agricultural technology is very under-developed, rather than due to a large number of people in the agricultural sector. The low productivity in the agricultural sector is due, in turn, to primitive technology, and the lack of specialization caused by the limit of the market. The implications of this on policy matters are: The inherent difficulty which the Korean agriculture is facing arises only partly from the large number of people in the agricultural sector, but fundamentally from the fact that the agricultural technology is primitive, which limit specialization.

IV. The Trend of Productivity of Land and Labor

Having discussed the growth of production of agricultural products, let us consider in this section the productivity of factor inputs in agriculture, and try to identify the proportion of contribution which each factor of production made to the growth of agricultural output. Since, however, the crops have been subject to extreme year-to-year variations, I consider it appropriate (1) to eliminate from our consideration 1956 and 1964 which mark extreme variations in harvests, and (2) to divide 1953-63 period into three subperiods, 1953-55, 1957-60, and 1961-63, and analyze the trend of the productivity of the factors of production.

The analysis of the productivity of the land and labor is summarized in Tables 4-7. Row 1 records the average annual production of cereals. It is to be noted that 1961-63 period witnessed the increase of production of cereals by 18 % over the 1953-55 period. We are now interested in finding how much of this increase is attributable to increase in labor and land, and how much to technical improvement[22].

According to the production function such as the one I am considering, an increase in production depends on an increase in the quantity of the factors of production, and technical improvement. If one multiplies the increase in the quantity of labor and land (and other inputs) by the respective marginal

(22) Strictly speaking, what is commonly known as technical change is nothing but the introduction of new factor of production. On nebulousness of the concept of the "technical change", see Theodore W. Schultz, *Transforming Traditional Agriculture*, New Haven, 1964, pp. 135—139.

product of these inputs, one can get the proportion of increase in the total output ascribable to the increase in the quantity of the factors of production. The residual (if positive) can be attributable to technical improvement[23]. For our case, the increase in the quantity of factor inputs is unambiguous, but the estimate of the marginal products of these factor inputs is extremely difficult.

Suppose we assume rather arbitrarily that the marginal product of labor during the 1953-55 period was approximately one-half of the average product of labor during the same period, and that the marginal product of labor remains constant. We also assume that the marginal product of land is about two-thirds of the average product of land, and it is also constant during the period under study. These are, undoubtedly, heroic assumptions which would not stand closer scrutiny, but it is hoped that, in the absense of refined studies on these matters, the crude assumptions are that the marginal product of labor in the Korean agriculture seems, as we analyzed in the previous section, appreciably above one-half of the average product of labor, and that the diminishing returns seems to operate very slowly. The law of diminishing returns would operate not only with respect to labor but also with respect to land, and hence we assume that the marginal product of land is below the average product of land and that the former is about two-thirds of the latter.

On these crude assumptions, the "contribution" of land and labor inputs toward the increase in total output are shown in Table 8. Row 1 records the average annual production of cereals during the three sub-periods. It is seen that the 1961-63 period witnessed an 18 percent increase in cereals production over the 1953-55 period, 14.6 percent increase in the number of agricultural workers (Row 2) and approximately 5 percent increase in the area of farmland (Row 3). The average product of labor per thousand of workers per year during 1953—55 is 199,738 metric tons (Row 4), and the marginal product of labor is considered one-half of the average product during the same period (Row 5). Similarly, the average product per thousand *chungbos* of land and the marginal product of per thousand *chungbos* of land are given in Rows 6

(23) In fact, in studying the productivity trend this method is usually employed. For example, Moses Abramovitz, *Resources and Output Trends in the United States Since 1870*, Occasionl Paper 52 (National Bureau of Economic Research, 1956.) Another example of using this technique plus some more assumptions with respect to the productivity trend of the economy as a whole is Don Patinkin, *The Israel Economy: The First Decade*, (The Falk Project for Economic Research in Israel), Jerusalem, 1960, pp. 69—77.

TABLE 8

Contribution of Labor and Land Inputs in Total Production

	1953—55	1957—60	1961—63
(1) Average annual production of grains[1](index: 1953－55＝100)	3,895.0 (100.0)	4,166.6 (109.7)	4,629.5 (118.0)
(2) Average number of agricultural workers[2] (index: 1953－55＝100)	3,905.2 (100.0)	4,158.8 (106.5)	4.474.3 (114.6)
(3) Average agricultural areas[3] (index : 1953－55＝100)	1,977.9	2,029.8 (102.6)	2,075.6 (104.9)
(4) Average product of labor (1)/(2)	0.99738		
(5) Marginal product of labor	0.49869		
(6) Average product of land (1)/(3)	1.96924		
(7) Marginal product of land	1.31282		
(8) Increase in prdouction of grains over 1953—55[1]		271.9	734.5
(9) Increase in number of agricultual workers over 1953—55		253.6	569.1
(10) Increase in cultivated areas over 1953—55		51.9	97.7
(11) Contribution of labor input in total production (5)×(8) (percent in total)		126.5 (46.5)	283.8 (38.6)
(12) Contribution of land input in total production (7)×(9) (percent in total)		68.1 (25.0)	128.2 (17.5)
(13) Contribution of labor and land (11)+(12) (percent in total)		194.6 (71.5)	412.0 (56.1)
(14) Contribution of technical improvements (8)－(13) (per cent in total)		77.3 (28.5)	322.5 (43.9)

[1] in metric tons. Cf. Table 4, Col. 3.

[2] in thousands of male-equivalent workers. Cf. Table 1 Col. 4.

[3] in thousands of *Chungbos*. Cf. Table 3, Col. 3.

and 7 respectively. On these assumptions, the contribution of the increase of labor in total products was 46.5 percent during 1957-60 period, and 38.6 percent during 1961-63. The contribution of land, on the other hand, is shown to be 25.0 percent during 1957-60, and 17.5 percent during 1961-63 (Row 12). This means that technical improvement contributed toward the increase in total product by 28.5 percent during 1953-55 period and 43.9 percent during 1961-63 period.

These numerical presentations cannot serve as any precise measure as to the contribution of various inputs and technical improvement, but one thing that is clear from this illustration is that technical improvement was more important during the 1961—63 period than the 1957-60 period. One can conjecture that there are two reasons for this development: one is the improvement in the

terms of trade in favor of the agricultural product (see Table 5) during 1961-63, so that it must have provided a positive incentive to the farmers; and the other is there was greater government investment and loans for agricultural sector during the 1961—63 period than in earlier periods[24].

Moreover, as was already shown in Table 3, the area of double crops greatly increased during the period (by 135.8 thousand *chungbos*, as compared to 101.6 *chungbos* increase of the total cultivated land). This is the evidence of intensive cultivation, and this is largely responsible for the increase in the total grain production.

All in all, the conclusion seems clear; whatever increase in production has been due largely to the increase in the amount of inputs such as labor and land, rather than technical improvement, although in recent years, the contribution of technical improvement has become more important.

The implication of all this is that the Korean agriculture has to rely for its future course of development on increase in the per acre productivity of land and labor by improving the agricultural technology. Whether or not the agricultural technology would ever improve sufficiently enough to accelerate the growth of the economy is besides the issue; this is the only, if there is any, way to allow agriculture to grow on a sustained basis.

V. Economic Effects of Government Agricultural Policies

Having elaborated upon the proposition that the growth of production of cereals in the Korean agriculture for the last decade was due largely to an increase in the quantity of factor inputs, let us now briefly consider, in general terms, the kinds of economic effects which various and sundry agricultural policies of the government in the past are likely to have created, and thereby infer, in the light of the discussions in the previous sections, the appropriate direction the government policies should take in the future.

I would consider that the government agricultural policies can be classified into five kinds according to their probable economic effects; (1) Policies that

(24) It must be borne in mind that this whole estimate of contributions of inputs understates the contribution of *increase* of land input. As was already noted, it has been discovered that the cultivated area in 1964 was substantially larger than official figures.(Cf. footnote 3 above). This means that the *increase* in cultivated land during 1953-63 period may have been larger than the figure given in Table 6.

are designed to increase the quantity of the factors of production; (2) Policies that change the share of the farmers in national income; (3) Policies that are designed to stabilize the seasonal variation in prices of agricultural products; (4) Policies that are designed to change the production function in the agricultural sector; and (5) Other miscellaneous policies that are supposed to "modernize" traditional agriculture. Let us review these policies briefly in the following.

(a) Policies Designed to Increase the Quantity of the Factors of Production

Policies that encourage expansion of farmland—— selling of public domains, loans to the new cultivators, land reclamation programs, tax concessions etc.—— would belong to this category. As was argued in the previous sections, the increase in production of cereals for the last decade owes predominantly to an increase in the quantity of the factors of production, but the possibility of exploitation of "idle" land will diminish progressively in the future.

(b) Policies that Redistribute Wealth between the Agricultural Sector and the Non-agricultural Sector

A main economic effect of a few important government policies on agriculture—— such as agricultural loan programs through the National Agricultural Cooperatives, agricultural price policies, and the policy of levying land tax in kind—— is to redistribute wealth between the agricultural sector and the non-agricultural sector, although the declared objectives of these policies may be different. First, an expansion of agricultural loans through the National Agricultural Cooperatives out of a given amount of total government loans programs would redistribute wealth favorably to the farmers relative to the rest of the population. This is so because the main feature of government loans programs, whether through the Korean Reconstruction Bank, the Medium Industry Bank, or through the Agricultural Cooperatives, is the low rates of interest charged on the loans, and consequently, the loans involve subsidy to the loan recipients. It will be remembered that a substantial amount of agricultural loans turn out to be delinquent loads, and this shows that the effective rate of interest is even lower than the nominal rates of interest. Inasmuch as these loans do not change the availability of real resources in the agricultural sector (i.e. that they do not change production function), these loans cannot be expected to contribute very much to increase agricultural output. That is to

say, the main economic effect of the agricultural loans through the government agencies is wealth redistribution in favor of the agricultural sector, although there may be some *indirect* effect favorable to agricultural production.

Directly in contradiction to the wealth redistribution favorable to the agricultural sector is the policy to maintain low prices of agricultural products through imports of cereals and direct control of prices. The unfavorable effect on the agricultural sector, in terms of wealth redistribution, is obvious and does not require any elaboration. The price policy such as this would have two other important economic effects which may need a little discussion: they are (1) a reduction of investment (and therefore reduction of agricultural output in the long-run); and (2) a reduction of the *marketable surplus*[25] of the agricultural sector, and therefore a reduction of agricultural goods available to the non-agricultural population, out of a *given* amount of agricultural output.

One would say that the elasticity of the supply of cereals with respect to price is extremely low. This proposition would perhaps be valid, if one were to consider only the short-run, during which all cost of production is fixed. But from the long-run point of view the reduction in production of agricultural commodities will come about in a very subtle way. For one thing, investment in agriculture will decrease. The best human and material resources will get out of the agricultural sector. From the long-run standpoint, the unfavorable terms of trade for the agricultural products will surely decrease agricultural production.

Consider now the second effect.

It is conceivable that the price policies would decrease rather than increase the marketable surplus of agricultural commodities, given the total quantity of output. There is as yet no evidence as to whether the artificially low prices of agricultural prices will increase or decrease marketing of cereal by the farmers. From the theoretical point of view, one may say that if the *substitution effect* overweighs the *income effect* —if the increase in consumption of agricultural products *within* the agricultural sector due to the relative cheapness of agricultural commodities overweighs the possible increase in marketing of cereals (the decrease in consumption of agricultural output) because a unit of cereals commands

(25) For the concept of *marketable surplus*, see Ragnar Nurkse *Equilibrium and Growth in the World Economy*, Cambridge: Harvard University Press, 1962, p. 237.

less amount of non-agricultural goods— there will be an increase in consumption of agricultural goods within the agricultural sector and the amount of marketable surplus decreases. On the other hand, if the income effect overweighs the substitution effect, it is possible, though not probable in the long run, that the volume of the marketing of agricultural products by the farmers may increase rather than decrease.

Another policy that is related to this is the practice of collecting land taxes *in kind*. As long as the prices at which in-kind taxes are levied is equal to the market price, there would be basically no difference between paying of taxes in money and in-kind, except that the latter imposes additional costs to the tax-payers in the form of the cost of transportation of taxed cereals to the local government offices, and using of extra straw products for payment of taxes. However, the Korean practices in the past was to determine the prices of cereals as much lower prices than the market prices, so that the farmers were subject to heavier *actual* rate of taxes on land than *nominal* rate of taxes. In this way, the inflationary trend that was created elsewhere was thrust upon the agricultural sector. Needless to say, these practices are unfavorable to the farmers, and will, together with the low agricultural prices, outweigh whatever favorable income redistribution effect the agricultural loan programs would bring to the farmers.

(c) Policies That are Designed to Stablize Agricultural Prices.

The government "open" market operation of agricultural commodities, and the Rice Lien Loan Program belong to this category. The former is not entirely "open" market operation, for the government does not purchase, although it sells, cereals at the open market. The Rice Lien Loan Programs, conducted intermittently since 1957 is believed to have exerted some influence in stabilizing seasonal fluctuations of agricultural prices, but it has been operated in too small a scale to be fully effective. At any rate, it is clear that these policies would not by itself bring about a breakthrough in the Korean agriculture.

(d) Policies that are Designed to Bring about "Modernization" to the Agricultural Sector.

To this category belong miscellaneous programs, including policies on land tenure, scaling down of rent and various services that are supposed to be insti-

tuted in the agricultural cooperatives, such as mutual insurance programs and marketing of agricultural commodities. The effectiveness, and indeed, the desirability of these miscellaneous policies would require more detailed studies. But to the extent that these programs usually are irrelevant to an improvement in the quality of available resources, it is seriously doubtful that they deserve the amount of attention which seem to have been accorded to them in the past. In considering these programs, however, the policy would better be thought out in terms of the effects on emrgence of rural entrepreneurship, on specialization in saving and productive activities, rather than in terms of conforming to some notion of historical trend.

(e) Policies that are Designed to Change Production Function of Agriculture

Policies that can change production function directly belong to this category. ——Such programs as provision of education through local government units and agricultural cooperatives, research work on, and disemination of, new techniques of production through the Rural Development Office.

It is clear that the future of the Korean agriculture lies in successful application of these policies. Sensitive as the farmers are to economic gains, improvement in agricultural technology is hardly feasible without direct government participation. The roles which the govrnment played in technical improvement in agriculture has been extremely important even in the United States. Agriculture is an industry which need direct government effort much more badly than most other industries. Much greater effort should be made in research on the use of land, fertilizers, seeds, and soil improvement, etc., than has hitherto been made available. The loan programs through the National Agricultural Cooperatives could be reduced, and so can be the amount of attention that has been accorded to other policies that have been listed above.

VI. Concluding Remarks

I wish to make a couple of points in concluding this paper. The first of these is the conventional wisdom that industrialization, which often is regarded as synonymous with economic development, necessarily entails squeezing of the agricultural sector. According to this view, the greater hardship imposed upon the farmers relative to the rest of the population is unavoidable and even

desirable during the process of economic development.

The fact of the matter is that the agricultural sector is best squeezed when the rest of the economy does not consciously attempt to do so. The reason for this is that as the economy develops, the agricultural sector is apt to lose the best human and material resources to the rest of the economy, and will in return acquire from the rest of the economy the relatively inefficient human and material resources. This is the meaning of the squeeze of the agricultural sector, and it is compatible to the growth of both the agricultural sector and the non-agricultural sector. Furthermore the agricural sector will experience increasingly unfavorable terms of trade as it grows, for the relative income- and the price-elasticities of the demand for agricultural commodities might be smaller than those of demand for non-agricultural commodities. One has to wait for the agriculturel sector to grow before it can be squeezed.

The second relevant point is that many policies that were unfavorable in the past to the growth of agriculture seem to have been based on the assumption that the farmer will subsist no matter what, and that they are insensitive to economic incentives and disincentives. It is alleged that rural Korea is tradition-ridden and that the farmers keep on living their old style, even if they see economic advance in abandoning it. However. the farmers are just as sensitive to economic gains and losses as the rest of the population. They are surprisingly progressive, and are eager to make innovations and take initiatives. The force of "tradition", whatever is meant by this term, is very weak in the Korean countryside, if only because "tradition" is too costly to maintain. "Tradition" is an expensive commodity to consume, which the vast majority of the Korean farmers cannot afford. It is best maintained in a wealthy society, and not in a poverty stricken one. The implication of the above observation is that government policy should better be (1) those which improve directly productive techniques of the agricultural sector, by improving the quality of the available resorces that are used as factors of production, and (2) those which eliminate as much as possible those policies that would reduce incentive to produce.