AN ECONOMIC ANALYSIS OF FARMLAND LEASING SYSTEM IN KOREA

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I. Introduction

During the last decades, the structure of Korea agriculture has been drastically changed because of the influence of rapid economic growth.

The number of farms and the rural population have been sharply reduced as migration from rural to urban areas continues. A farm labor shortage has been serious. This is due primarily to rapid economic growth since the late 1970's that has brought forth urbanization and industrialization. From 1960 to 1985, the number of farms decreased by 18 percent, while the rural population declined 37.3 percent dropping from 58.3 percent of the total population in 1960 to 21.0 percent in 1985 (Table 1).

As a result, the tenant farming has become an increasing trend. According to the agricultural statistics, about 64.7 percent of total farms were identified as full or partial tenant farms (Table 2).

Current land law in Korea originates in the Land Reform Act which established "a land to tiller's principle" in 1949. Legally, farm size is limited to a 3 hectare ceiling and tenancy is prohibited. A conflict has arisen between the actual farming structure and the Land Reform Act in Korea. Accordingly, the legal provision limiting acreage and prohibiting tenancy have become controversial issue. The existing formal land tenure

TABLE 1 NUMBER OF FARMS AND FARM POPULATION TREND, 1960–85

Year	Number of farms	Farm population	Farm population to total population
	..... millions		(%)
1960	2.35	14.6	58.3
1965	2.51	15.8	55.2
1970	2.48	14.4	45.9
1975	2.38	13.2	38.2
1980	2.16	10.8	28.4
1984	1.97	9.0	22.2
1985	1.93	8.5	21.0

Source: MAF, *Statistical Yearbook of Agriculture and Forestry*, 1961, 1971 and 1986.

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TABLE 2 TREND IN TENANT FARMS

Year	Owner-cultivater	Owner-tenant farms	Full-tenant	Total	(Survey farms)
1974	68.4%	28.0%	3.6%	100.0	(2,425)
1975	65.6	30.4	4.0	100.0	(2,462)
1976	65.1	31.1	3.8	100.0	(2,472)
1977	57.4	36.1	6.5	100.0	(3,328)
1978	53.9	40.0	6.1	100.0	(3,305)
1979	55.2	39.5	5.3	100.0	(3,182)
1980	55.9	39.7	4.4	100.0	(3,283)
1981	53.1	42.5	4.4	100.0	(3,299)
1982	45.8	52.4	1.8	100.0	(3,318)
1983	40.2	56.7	2.8	100.0	(1,866)
1984	36.7	60.7	2.6	100.0	(1,900)
1985	35.3	62.7	2.0	100.0	(1,909)
1983–1974	29.9	34.7	1.6		

Source: MAF, *Report on the Result Farm Household Economy Survey*, 1975–86.

system is mostly inherited from the days of Farm Land Reform, which was an epoch-making event in the history of Korean Land System.

During these years, the gap between the reality of the rural economy and the rules and conditions originally adopted in the Reform Law is believed to be getting wider. Apart from the formal system, the customary tenure relations have been developed a new avenue. Often, it is claimed that the formal tenure laws are being ignored and also may not adequately meet the new tenure problems as economic growth and institutional changes take place. In light of the future economic development, in which more weight should be assigned to the role of agriculture, the existing land tenure system must be examined throughly.

The purpose of this study is to improve the farmland leasing system prohibited by the Land Reform Act through an characteristic analysis of farmland leasing practices. Despite of the prohibition of tenancy by the "Land Reform Act", the rented land amounts to 30.5 (653,920 ha) percent of total farmland. The tenant farming has also become an increasing trend, about 64.7 percent of total farms were identified as full or partial tenant farms.

Most farmlands are leased out fully or partially due to family labor shortage. Tenancy practices can also be created when amount of land supplied by migrating farmers cannot be purchased by farmers who remain in rural area. In addition, some urban non-farmers want to keep their land under tenancy because land is not only the property on which they can rely in the event of retire in urban living, but also for the speculative purpose in short period.

Therefore, the formal land tenure laws can not meet the new tenure problems as economic growth and institutional changes take place. In light of the future economic development, this study aims at finding more

concrete measures and rational farmland leasing system, including the ceiling of farmland holdings.

More specifically, the present research purports:

1. To identify the extent of tenancy and how and why it came out,
2. To identify and describe the forms of tenancy and types of leasing arrangement now emerging and the characteristics of these leasing arrangement since Land Reform,
3. To compare and evaluate the different tenure classes with regard to their efficiencies and farm size,
4. To compare tenancy pattern and its relative efficiency and estimate the optimum rental rate,
5. To suggest policy implications on the improvement of the current farmland leasing system in Korea.

The methods and approaches used in the present study are described below as the actual work proceeded. Having identified the significant problems and issues in farmland leasing system and tenure policies, the investigation of the facts, past and present, was preceded by collecting information on the problems. Through library research, the initial phase of research was devoted to collection of statistical data and legal materials on land reform and land tenure. Involved also was an intensive historical review of the Korean Land Systems from the Land Reform to recent years.

Another major operation of research was the analysis of the 1984 Farm Household Economic Survey Data which was furnished by the Ministry of Agriculture and Fisheries.

With extracted data from the original Daily Book and Survey Ledger covering the period from 1974 to 1985, an intensive investigation was made of economic efficiency between different tenure classes and different farm size. The method applied were both the traditional production efficiency measurements and the normalized profit function analysis.

II. Current Land Tenure System and Farmland Problems

The Land Reform Act promulgated in 1950 consisted of the following three guidelines; (1) government would purchase the farmland over the ceiling of 3 ha from land-lords and distribute it to the tenant farmers, (2) only farmers could own farmlands, and (3) the tenant system was institutionally prohibited.

As a result of the Land Reform Act, 583,000 ha accounting for about 28.2 percent of total farmland (2,071,000 ha in 1949), were distributed to 1,646,000 farmers accounting for 66.5% of total farm households (2,474,000 farmers in 1949). Consequently, most farmers were liberated from the semifeudalistic bridle of the land-lords, and thereby farmers could posses their own land.

The effect of land reform is not confined only to agricultural sector but extended to all segments of political economic and social fields.

Contrary to the effects of land reform, some Korean scholars argue that the land reform failed entirely simply because tenant farming was revived after land reform. Although the tenant farming system was abolished and also institutionally prohibited by the Land Reform Act in 1950, a considerable number of tenant farms were revived illegally as show in Table 3. In 1985, the area under tenancy was 653,920 ha which accounts for about 30.5 percent of the total farmland.

This area corresponds to about 112 percent of the 583,000 ha which were distributed to farmers under the Land Reform Act.

This argument arises mainly due to the confusion about institutional and economic characteristics of land reform relevant to the occurence of tenant system. Therefore, it is necessary to study in detail how the land problem has changed since land reform.

For conventional purposes, let us define the economic relationship between farmland and its ownership or tenancy as "the farmland problem". Then it can be observed that the characteristics of the farmland

TABLE 3 TREND OF TENANCY IN KOREA, 1945–85

Year	Tenant farm land				Type of tenure			
	Total farm land(A)	Tenant (B)	Percent (B/A)	Tilling farmers	Full owner	Part owner	Tenant	Classification of stages
	……1,000 ha…		(%)	1,000 households	…… % ……			
1945	2,207	1,470	66.0	2,019	14.1	40.1	45.8	
1950	(Land reform was conducted.)							
1960[1]	2,025	273	13.5	2,329	73.6	19.6	6.8	
1965[2]	2,256	370	16.4	2,507	69.5	23.5	7.0	1st Stage
1970[3]	2,298	408	17.6	2,483	66.5	23.8	9.7	
1971	2,271	400	17.6	2,482	—	—	—	
1975[4]	2,240	307	13.7	2,379	65.6	30.4	4.0	2nd Stage
1976[5]	2,338	316	14.1	2,336	65.1	31.1	3.8	
1977[5]	2,231	406	18.2	2,304	57.4	36.1	6.5	
8978[5]	2,222	440	19.8	2,224	53.9	40.0	6.1	3rd Stage
1980[5]	2,196	461	21.3	2,156	55.9	39.7	4.4	
1981[5]	2,188	488	22.3	2,030	53.1	42.5	4.4	
1982[5]	2,180	545	25.0	1,996	45.8	52.4	1.8	
1983[5]	2,167	581	26.8	2,000	40.2	56.7	2.8	
1984[5]	2,152	609	28.3	1,974	36.7	60.7	2.6	
1985[6]	2,144	654	30.5	1,926	35.3	62.7	2.0	

Source: 1) 3) 4) MAF, *Agricultural Census Survey*, 1964.
2) Korea Land Economics Research Center, *A Study of Land Tensure System in Korea*, 1966, p. 126.
5) 6) Calculated by the *Report Data on the Results Farm Household Economic Survey*, MAF, 1974–85.

problem have changed according to the development of the rural economy and the national economy.

The revival of tenant farming after land reform depended on economic conditions. During the 35 years since 1950, there have been three stages showing different characteristics of the farmland problem.

The first stage is characterized by the revival of tenancy in spite of the land reform. This phenomenon implies that the abolishment of the tenant system by law is one thing and the prevention of the revival of tenant farming another.

Until 1970, Korea was in the beginning stage of economic development, and so, the surplus farm labor could not be absorbed into the non-farm sector. The increase in the farm population added more pressure on the demand for land.

During this period, the Korean rural economy was in a phase of stagnation because of factors such as the extremely low and seasonally unstable prices of agricultural products, a lack of funds for supporting agriculture and the small farm size. Under these circumstances, farmers could not earn enough income to support even the subsistence living of their family and so, they had to sell even the land distributed to them under the land reform.

Meanwhile, the floating funds of some rich farmers and urban dwellers were concentrated on the purchase of farmland as a means of avoiding capital loss due to inflation and for speculative purposes. The farmlands purchased for this purpose were generally put under tenancy. On the other hand, those who sold their own farmlands had to remain as tenants in rural areas because there were very few job opportunities for them in the non-farm sector.

During the second stage, the area under tenancy and the number of tenant farmers decreased owing to improved rural economy.

With the successful completion of the industrialization program started in 1962, a large portion of the farm population could be absorbed into the non-farm sector. Therefore, the farm population and the number of farm households began to decrease in 1967, implying that the population pressure on land had been reduced accordingly.

Since 1970, the economic factors causing tenant farming have been eliminated as indicated earlier. However, a new type of farmland problem has recently surfaced.

With the rapid expansion of industry and urbanization, a great deal of farmland has been transferred to non-agricultural uses resulting in a considerable decrease in farmland since 1969. Furthermore, many urban dwellers purchase farmlands illegally for speculative purposes and put them under tenant farming until the land is developed for non-agricultural use. The price of farmland generally increases drastically when the land is developed for uses other than farming.

The decrease in farmland area and the drastic rise in the price of farmland are the main factors restricting the expansion of farm size by farms.

Based on these discussions, the tenant system can not be abolished by simply changing the social system through land reform. It is understandable that the elimination of the tenant system not only changes the social system but also leads to sound economic and agricultural development thereafter.

1. The Necessity of the New Farmland System

The three principles of the land reform as mentioned above are still effective in a legal sense but they have not been enforced in reality. The facts are certainly contrary to the Land Reform Act. In this connection, it should be considered that the above principles of the Land Reform Act, which was enacted 36 years ago, can hardly be applicable to the current economic condition any more. The main reasons why the Land Reform Act has not been enforced may be summarized as follows.

1) As agriculture is modernized, agricultural firms as well as farmers need to own farmland.

2) At the time of land reform, the techniques for agricultural production were in the very early stage of development. Therefore, farmers holding more than 2 ha of land could not operate with their family labor alone. Those farms holding more than 2 ha of land had to hire farm servants or put part of their farmland under tenants. Nowadays, the situation has been changed. With the introduction of agricultural mechanization, and the expansion of irrigation facilities and land consolidation, it is now possible to operate a farm of more than 3 ha of land with family labor alone.

Statistics indicate that about 36,000 farmers accounting for 1.5 percent of total farm households own more farmland than the 3 ha ceiling of land. This evidence is, however, not considered as a factor disturbing agricultural development under the conditions that reasonable capital accumulation is realized in the agricultural sector and farm machines are widely introduced in the rural area.

3) The regulations prohibiting the lease of farmland specify that a farmer can operate only those lands which he owns. But, the optimal size of farm operation is not determined by the land owned but by the family labor available.

In reality, there is a significant difference between the amount of land owned and the area in operation. For instance, when a farmer has surplus farmland beyond his capacity of utilization, he must sell the surplus land or lease it to tenants. On the other hand, when a farmer has surplus family labor he will try to increase the size of farm operation in order to obtain economics of scale by purchasing or renting new farmland. In the short run, it is easier to rent land than to purchase it.

Considering these factors, it may be concluded that the principles of land reform enacted 36 years ago can not be applied to the current economic conditions in Korea. Therefore, it is necessary to establish a farmland system suitable for the present conditions in Korea. Since 1958, Korean government has attempted sixthly to make new land laws to replace the Land Reform Act. However, many people, including some journalists, have worried about the revival of land-lords just like those that existed before land reform if the principles of land reform are mitigated. When the principles of land reform are mitigated, the question whether the tenant system will be revived is an important issue and therefore, needs to be studies extensively.

In my opinion, the present land-lords are different from those prior to land reform. Even if the principles of Land Reform Act is mitigated, there will be no revival of tenant system. Several factors support the above argument.

First, the results of a survey conducted in 1984 show that the average price of paddy field was 2,048.7 thousands won per 0.1 ha. On the other hand, rent for tenancy was 132.7 thousands won per 0.1 ha which is about 37.3 percent of total production on the same area.

Accordingly, the rate of return for the investment on farmland is only 6.5 percent which is lower than bank interest rate of 12.5 percent. This implies that there was no incentive to purchase farmland for rent.

Second, according to a survey on the characteristics of land-lords in 1985, about 48.6 percent of 4,506 land-lords surveyed were residing in urban area and the rest were in rural areas. The average size of farmland owned by land-lords was very small, ranging from 0.07 ha to 0.25 ha. Most of the land-lords residing in the urban areas had been farmers in the past and kept their farmland after they moved to the urban areas. Most of these small land-lords were salaried men or businessmen. Therefore, rent is minor source of income for these land-lords.

This evidence indicates that present land-lords are different from those prior to land reform. In other words, present land-lords hold relatively little land and put their land under tenancy as a means of supporting their livings while land-lords before the land reform were feudalistic large ones who collected a lot of rent from tenants.

Third, as the farm population decreases annually and job opportunities in non-farm sector increase, the terms of contracts between tenants and land-lords have changed favorably to tenants. At present, there is, of course, no feudalistic social relationship between tenants and land-lords.

Fourth, as shown in Table 4, the area of farmland under tenancy in medium and large sized farms is greater than that of small sized farms.

As shown in the above Table, there is a tendency that the area under tenancy is increased as the size of farm is increased. This is because land lease is a means of expanding the size of farm operation for obtaining

TABLE 4 PROPORTION OF FARMLAND UNDER TENANCY BY SIZE OF FARM, 1984

Size of farm	Total (A)	Owned land	Tenant land (B)	B/A
	ha			%
(ha)				
−0.5	0.31	0.24	0.07	22.6
0.5–1.0	0.76	0.55	0.21	27.6
1.0–1.5	1.25	0.87	0.38	30.4
1.5–2.0	1.74	1.25	0.49	28.2
2.0	2.55	1.85	0.70	27.5

Source: The Ministry of Agriculture and Fisheries.

economics of scale. It may be concluded that the present tenant farms can be regarded as lease farms which are essential and inevitable in a modern agriculture.

Based on the above evidence, it can be concluded that the economic mechanism causing the revival of the tenant system is eliminated with the help of economic development. Then, there will be no revival of feudalistic tenant system even if we enact a new land law which mitigates the strict regulations of the Land Reform Act. The enactment of this new land law can rather be a factor contributing to the development of agriculture in the future.

2. Problems of Upper Ceiling in Holdings

The Land Reform Law of 1950 restricted the maximum size of crop farms 3 ha of cropland. The application of this upper ceiling restriction is confined to general crop farms which produce annual crops, such as rice, barley, upland grain crops, vegetables, tobacco, and other annual industrial crops. The farms which produce perennials such as fruit trees, mulberry trees, and garden trees were excluded from the upper ceiling limit.

There were a number of reasons for the legal constraints on the upper ceiling. It was then thought that a system of owner operated family farms would be the most desirable tenure system for Korea. This necessitated the elimination of holdings larger than that which could be cultivated by family labor. The elimination of large land holding was also to eliminate both tenant farms and agricultural wage workers. Thus expropriated land was redistributed to landless farmers or to farmers whose family labor could cultivate more land. The upper ceiling in holdings was not only based on a pronounced equalitarian principle, but also political and social stabilization.

Thirteen five years have passed since the Land Reform during these years farm people have, in general, become far better educated than before, new farming techniques have been disseminated to farmers, the economic horizon of the peasant farmer has widened, the semi-subsistence

producers are becoming more competitive producers in both the domestic and foreign markets. With these changes and other changes taking place in non-agriculture sector of the economy, the three hectare upper ceiling limit is certainly a policy issue.

Recently, many people concerned with agricultural development have raised the "pros and cons" regarding the ceiling limit, some have advocated its complete abolishment; others proposed a readjustment to a new size of holdings; still others fovored the "status qus". It was argued that expansion of farming scale is necessary to economically use labor-saving farm machines.[1] This is believed to be a critical condition for modernizing Korea agriculture. In addition, it is insisted that the farm size limitations be removed in order to develop a self-supporting farming structure through scale expansion which would result in balanced growth between the agricultural sector and the non-agricultural sector.

The opposing argument is that if the land size ceiling were removed, then urban capital would purchase most farmland, creating extreme land concentration or a land aristocracy. Thus, this would lead to collapse of the small peasant-farming system, when the landless peasants become tenants, a feudal tenancy system would be revived or unemployment would spread in the rural area. The argument concludes that ultimately food production would be drastically reduced due to decreases in productivity. To what extent does the upper ceiling restrict farmers in achieving maximum efficiency in farm operations? What is the reality of rural economics relevant to the ceiling?

In the present phase of agriculture, the actual farming scale can not be restricted by setting an upper ceiling nor can it be expanded randomly by abolishing the ceiling. The analysis of the inner factors of agriculture, utilizing the class shift theory of farm households enables us to get a rational answer to the problem of farming scale change of farm households.

An analysis of the class shift trend of farm households after the Land Reform provides us with a clue to the solution of the legal upper ceiling problem. There are many indexes available to understand the differentiation of the farmer's class such as land area in possession, farming scale, the possessing pattern of farm land, capital structure, number of employees and amount of income. The most helpful and the most generally used index as statistical data is the number of farm households classified by the managing class of farm household.

Now, let me make a positive analysis on the relationship between the total number of farm households and the class shift in Korean agriculture.

[1] The peak of labor shortage problem in rice production reaches in the seasons of rice transplanting and harvesting. A research reports that 2.5 (3.5) hectares and 8.0 (6.8) hectares of land are required to use a rice-transplanting and a cutter, respectively, at least meeting a break-even point of benefit and cost, as cited by Agri. Mechanization Center, ORD. (KDI estimates in parentheses.)

TABLE 5 The Annual Shift of the No. of Farm Households Classified by the Farming Scale Since 1951

1000 (%) in Unit

By Year	Total farm households	Less than 1.0	0.1～0.3	0.3～0.5	0.5～1.0	1.0～2.0	2.0～3.0	Over 3.0 ha
1951	2,184(100.0)		933(42.7)		782(35.8)	373(17.1)	93(4.3)	3(0.1)
1952	2,234(〃)		1,006(45.0)		770(34.5)	364(16.3)	91(4.1)	3(0.1)
1953	2,250(〃)		1,011(44.9)		769(34.2)	371(16.5)	96(4.3)	3(0.1)
1954	2,234(〃)		992(44.4)		772(34.5)	373(16.7)	93(4.2)	4(0.2)
1955	2,218(〃)		420(18.9)	534(24.1)	690(31.1)	446(20.1)	122(5.5)	6(0.3)
1956	2,201(〃)		420(19.1)	523(23.8)	676(30.7)	449(20.4)	125(5.7)	8(0.3)
1957	2,211(〃)		422(19.1)	523(23.7)	672(30.4)	456(20.6)	130(5.9)	8(0.3)
1958	2,218(〃)		421(19.0)	515(23.2)	674(30.4)	463(20.9)	138(6.2)	7(0.3)
1959	2,267(〃)		430(19.0)	528(23.3)	688(30.3)	474(20.9)	140(6.2)	7(0.3)
1960	2,297(〃)		435(18.9)	517(22.5)	714(31.1)	482(21.0)	142(6.2)	7(0.3)
1961	2,327(〃)		440(18.9)	506(21.8)	741(31.8)	491(21.1)	143(6.1)	6(0.3)
1962	2,469(〃)		490(19.8)	523(21.2)	823(32.5)	505(22.5)	141(5.7)	7(0.3)
1963	2,416(〃)		490(20.3)	520(21.5)	761(31.5)	497(22.6)	139(5.7)	9(0.4)
1964	2,450(〃)		466(19.0)	513(20.9)	782(31.9)	525(21.4)	148(6.1)	16(0.7)
1965	2,507(〃)	70(2.8)	361(14.4)	470(18.7)	794(31.7)	643(25.6)	140(5.6)	29(1.2)
1966	2,540(〃)	73(2.9)	358(14.1)	464(18.3)	818(32.2)	656(25.8)	137(5.3)	35(1.4)
1967	2,587(〃)	95(3.7)	364(14.1)	460(17.8)	829(32.0)	665(25.7)	136(5.2)	39(1.5)
1968	2,521(〃)	57(2.3)	353(14.0)	448(17.7)	820(32.5)	670(26.6)	133(5.3)	41(1.6)
1969	2,487(〃)	54(2.2)	346(13.9)	442(17.8)	807(32.4)	669(26.9)	130(5.2)	39(1.6)

1970	2,443(〃)	52(2.1)	342(14.0)	433(17.7)	796(32.6)	668(27.0)	125(5.1)	37(1.5)
1971	2,398(〃)	50(2.1)	337(14.1)	423(17.6)	786(32.8)	645(26.9)	120(5.0)	36(1.5)
1972	2,367(〃)	49(2.1)	338(14.3)	415(17.5)	777(32.8)	636(26.9)	117(4.9)	35(1.5)
1973	2,366(〃)	53(2.2)	325(13.7)	417(17.6)	771(32.6)	645(27.3)	118(5.0)	37(1.6)
1974	2,269(〃)	10(0.1)	294(13.0)	368(16.2)	809(35.7)	632(27.9)	119(5.2)	37(1.6)
1975	2,285(〃)	2(0.2)	308(13.6)	381(16.7)	828(36.3)	608(26.6)	112(4.9)	36(1.7)
1976	2,230(〃)	5(0.2)	304(13.6)	380(17.0)	814(36.5)	590(26.5)	104(4.7)	33(1.5)
1977	2,190(〃)	4(0.2)	302(13.8)	380(17.4)	796(36.3)	576(26.3)	101(4.6)	31(1.4)
1978	2,140(〃)	1(0.1)	274(12.8)	356(16.6)	799(37.3)	582(27.2)	97(4.6)	30(1.4)
1979	2,080(〃)	2(0.1)	279(13.4)	363(17.5)	764(36.7)	555(26.7)	90(4.3)	27(1.3)
1980	2,040(〃)	5(0.2)	269(13.2)	351(17.2)	754(37.0)	550(27.0)	86(4.2)	25(1.2)
1981	1,999(〃)	8(0.4)	258(12.9)	339(17.0)	742(37.1)	545(27.3)	83(4.1)	24(1.2)
1982	1,955(〃)	9(0.5)	245(12.5)	323(16.5)	725(37.1)	547(28.0)	83(4.2)	23(1.2)
1983	1,948(〃)	9(0.5)	241(12.4)	321(16.5)	719(36.9)	552(28.3)	83(4.2)	23(1.2)
1984	1,922(〃)	9(0.5)	235(12.2)	312(16.2)	707(36.8)	552(28.7)	85(4.4)	23(1.2)

Source: MAF, *Statistical Year Book of Agri. Forestry & Fisheries*, 1951~85.

Note: 1) 1960, 1970 and 1980 year's data (Census years) are average data calculated by before and after of each year.

2) Excluded non-crop farm households from total farm households since 1968.

Table 5 shows the annual shift of the number of farm households classified by the farming scale since 1951, the following year of the Land Reform. There is considerable fluctuation in each time phase. But the total number of farm households which showed a sustained growth since 1951 began to decrease after reaching a peak in 1967 with a total of 2,587,000. Since that time, the concentration to medium sized farm has prevailed, with an ever decreasing number of farm households.

The number of large sized farms rose a little from 38,648 in 1967 to 40,626 in 1968. But since 1968, it has continuously decreased to a low of 22,800 in 1983. This trend of concentration to medium sized farms is probably due to the shrinking number of low class farm households. After 1968 the absolute majority of farm households began to decrease, as the small sized farmland owner who have meager financial resources flew to other industries. With the reduction of these small sized farm households, came a pressure from the resulting shortage of labor to increase wages. Therefore, the landlord class of large sized farms had no other choice but to reduce the land to the optimum scale for their owner-tenants by selling or putting out their extra land to lease. As a result, the number of farms larger than 3 ha has reduced.[2]

In view of this class shift, it was before 1967 when the number of large sized farms showed the inereasing trend that a legal upper ceiling was required. After that year, the upper ceiling itself was meaningless since the number of large sized farms decreased in the process of concentration to medium sized farm. Next, I'll discuss the differentiation of farmer's class classified by their social rank in terms of its relation with the size of arable land and the price of agricultural products. Since Korea has never adopted the policy of high agricultural product price on a long and sustained basis, it is difficult to define the reciprocity between the price level of agricultural product and the differentiation of the class structure of farmhouses. In review of the period from 1970 to 1976 when the so called high price policy for rice was said to be sustained, the number of large sized farmhouse decreased from 6.5% to 5.9%, while that of the medium sized farm of 1–2 ha land showed an increase from 25.8% to 29.8%. This clearly indicates that class differentiation had no connection with the high price policy for rice.[3]

Meanwhile the differentiation of farmhouse class structure considerably tilts to large sized farm in the case of the U.S., where the typically capitalistic farming structure is being supported by a strong policy adopted for high agricultural product price. Taking the 30 years from 1949–1978 for example, the number of farm households with 5,000–10,000 dollars of

[2] Kim Sung-Ho, Kim Woon-Keun et al., *A Study on Land Tenure System and Land Preservation*, KREI, pp. 41–73.

[3] Calculated by Data of the *Statistical Yearbook*, 1965–84, Ministry of Agri. & Forestry.

sales income of their agricultural product reduced from 15.0% to 10.5%. Those of less than 5,000 dollars plummeted from 78.0% to 44.4%, while those of more than 10,000 dollars marked a sharp increase from 9.0% to 45.1%.[4]

The above cases provide evidence the economic principle of class shift rather than the legal issue of upper ceilings is the variable which affects the farming scale, though it can not be applied indiscriminately since the tendency of the differentiation is merely a theoretical index.

Accordingly, in line with the growth of the capitalistic economy the class shift proceeds from an increase in the number of farm households (polar differentiation) toward a decrease (concentration to medium sized farm) and the agricultural mechanization is realized owing to the shortage of rural labor force.

And again the class shift moves toward a redifferentiation (again, polar differentiation). (Polar differentiation in this case is called redifferentiation as distinguished from the polar differentiation of the time when there is an increase in the total number of farm households.)

In the case of Japan, redifferentiation appeared in 1965 with an increase of those with more than 3 ha arable land. The legal upper ceiling was abolished in the 1970 Land law revision.

If the legal upper ceiling had remained intact at that time, the development in the management of large sized farms could not have been possible. In our case, we are on the brink of redifferentiation. The time when the legal upper ceiling was required had been the period from the time immediately after the Farmland Reform when large sized farms prospered with the help of farm servants, to 1967 when the total number of farming households were increasing. As the number of the large sized farm households are in a trend of continuously decreasing from 1968, when concentration to medium sized farm appeared, to the present, there is no realistic reason to maintain the legal upper ceiling.

Redifferentiation does not generate by itself, but comes gradually through the macroscopic process of a reorganization(industrial decentralization) of industrial structure→increase of off-farm income→farm mecha nization→redifferenciation. Only through this process can the income of farm households be increased together with industrial development, making it possible to realize balanced growth between agriculture and industry. Therefore, the matters regarding poor farmers caused by redifferentiation can be solved through the off-farm income they acquire.

The adoption of policy supporting large sized farm through the 1970 enactment of law on agricultural development in Japan was possible on the basis of the realistic assumption that the matters concerning poor

[4] Chang Dong-Sup, "Problems of Upper Ceiling in Holding and Enterprise Farms," *Though and Policy*. A quarterly Magazine *Kyung Hyung*, Vol. 12, 1985, p. 34.

farmers can be solved by the off-farm income.

In a country like Korea with mere 35% of off-farm income rate, immediate redifferenciation can not be expected as mechanization itself can not be possible. When redifferenciation is to appear, the matters concerning poor farmers would not be a cause for concern since the level of off-farm income will have already reached a substantial level by that time. In conclusion, whether the present concentration to medium sized farm would be continued in the days to come or be diverted into redifferenciation, the legal upper ceiling of farmland is practically meaningless.

Some people argue that without upper legal ceilings, land speculation by non-farmers can be touched off, but the farmland holding by non-farmers are not related to the matter of upper ceiling. It occurs since legal ownership has not been established to grant the legal right of possession of farmland exclusively to farmers.

III. An Analysis of Efficiency by Land Tenure Classes and Farm Size

1. Analytical Models

The measurement of Economic efficiency is an important problem for both the economic theorist and the economic policy maker. An recent approach to estimating relative economic efficiency is a profit function model. This mothod depends on the theoretical duality between the production function and profit function.

Lau and Yotopoulos (1971) first applied the Unit-Output-Price (UOP) or normalized profit function to agricultural production. The profit function characterizes a firm's maximized profit as a function of the price of output and variable inputs, and the quantities of the fixed inputs.

The profit function, however, requires good price data for inputs and outputs. The profit function approach will provide a reasonable test of relative economic efficiency only when this condition is met.

The assumption employed in the formulation of the profit function are: (a) firms are profit maximizing, (b) firms are price takers in both output and variable inputs markets, and (c) the production function is concave in the variable inputs.[5]

The concept of the profit function provides an alternative approach to the analysis of production. First, a brief exposition of the theory of profit function is presented demonstrating how the supply function and the

[5] This implies among other things that there exist decreasing returns to scale in the variable inputs taken altogether.

factor demand functions for the variable inputs of production may be readily derived from an arbitrary profit function. Second, the profit function and the factor demand functions are formulated within the Cobb-Douglas framework. Third, the implication of the hypothesis of constant returns in all factors on the profit function is examined and how the hypothesis can be tested in the Cobb-Douglas profit function case in explained. Fourthly, the profit and the factor demand functions are estimated jointly using structual techniques. Note that the estimates so obtained are more efficient than estimates obtained from either function alone. Estimates of the coefficiencies of the production function as well as labor demand and output supply elasticities with respect to the wage rate, the price of output, and the quantities of the fixed factors of production are derived in the last section. Also compared are the estimated production function parameters with those obtained by estimating the production function directly.

Consider a firm with a production function with the usual neoclassical properties

$$(1) \qquad Q = F(X_1, X_2, \cdots, X_m; Z_1, Z_2, \cdots, Z_n)$$

where Q is output, X_i represents variable inputs, and Z_i represents fixed inputs of production. The profit (defined as current revenues less current total variable costs) can be written.

$$(2) \qquad \pi = P \cdot F(X_1, X_2, \cdots, X_m; Z_1, Z_2, \cdots, Z_n) - \sum_{i=1}^{m} r_i' \cdot X_i$$

where π is profit, P is the unit price of output, and r_i' is the unit price of the ith variable input. The marginal productivity conditions for a profit—maximizing firm are:

$$(3) \qquad \frac{\partial \pi}{\partial X_i} = P \cdot \frac{\partial F(X; Z)}{\partial X_i} = r_i', \qquad (r = 1, \cdots, m)$$

By defining $r_i = r_i'/P$ as the normalized price of the ith input, equation (3) is written as

$$(4) \qquad \frac{\partial F}{\partial X_i} = r_i, \qquad (i = 1, \cdots, m)$$

By similar deflation (2) can be rewritten as (5) where $\bar{\pi}$ is defined as the "Unit-Output-Price" Profit, or UOP profit

$$(5) \qquad \frac{\pi}{P} = F(X_1, X_2, \cdots, X_m; Z_1, Z_2, \cdots, Z_n) - \sum_{i=1}^{m} \frac{r_i' x_i}{P}$$

By defining $\bar{\pi} \equiv \pi/P$, $r_i \equiv r_i'/P$ the normalized profit function is

$$(6) \qquad \bar{\pi} = F(X_1, X_2, \cdots, X_m; Z_1, Z_2, \cdots, Z_n) - \sum_{i=1}^{m} r_i X_i$$

The first order condition for

$$(7) \qquad \frac{\partial \bar{\pi}}{\partial X_i} = \frac{\partial Q}{\partial X_i} - r_i = 0$$

Equation (7) may be solved for the optimal quantities of variable inputs, denoted X_i^* 's, as functions of the normalized price of the variable inputs and of the quantities of the fixed inputs,

$$(8) \qquad \begin{aligned} X_i &= X_i^*(r_1, r_2, \cdots, r_m; Z_1, Z_2, \cdots, Z_n) \\ &= X_i^*\left(\frac{r_1'}{P}, \frac{r_2'}{P}, \cdots, \frac{r_m'}{P}; Z_1, Z_2, \cdots, Z_n\right) \end{aligned}$$

By substituting (8) into (2), profit function is obtained

$$(9) \qquad \begin{aligned} \pi &= P \cdot F(X_1, X_2, \cdots, X_m; Z_1, Z_2, \cdots, Z_n) - \sum_{i=1}^{m} r_i' X_i \\ \pi^* &= P \cdot F(X_1^*, X_2^*, \cdots, X_m^*; Z_1, Z_2, \cdots, Z_n) - \sum_{i=1}^{m} r_i' X_i^* \\ &= P \cdot [F(X_1^*, X_2^*, \cdots, X_m^*; Z_1, Z_2, \cdots, Z_n) - \sum_{i=1}^{m} \frac{r_i'}{p} X_i^*] \\ &= P \cdot [F(X_1^*, X_2^*, \cdots, X_m^*; Z_1, Z_2, \cdots, Z_n) - \sum_{i=1}^{m} r_i X_i^*] \\ &= P \cdot \bar{\pi}^* \end{aligned}$$

The profit function gives the maximized value of the profit for each set of values $[P, r_i', Z]$. Observe that the term within the large parenthesis on the right-hand side of (9) is a function only of r and z.

Hence, $\pi^* = P \cdot G^*(r_1, \cdots, r_m; Z_1, \cdots, Z_n)$

By substituting (8) into (6), the normalized profit function[6] is obtained.

$$(10) \qquad \begin{aligned} \bar{\pi}^* &= F(X_1^*, X_2^*, \cdots, X_m^*; Z_1, Z_2, \cdots, Z_n) - \sum_{i=1}^{m} r_i X_i^* \\ &= F[X_1^*(r_1, \cdots, r_m; Z_1, \cdots, Z_n) \cdots, X_m^*(r_1, \cdots, r_m; \\ &\qquad Z_1, \cdots Z_n)] - \sum_{i=1}^{m} r_i X_i^*(r_1, \cdots, r_m; Z_1, \cdots, Z_n) \end{aligned}$$

The UOP profit function from (10) is therefore given by

$$\bar{\pi}^* = G^*(r_1, r_2, \cdots, r_m; Z_1, Z_2, \cdots, Z_n)$$

On the basis of prior theoretical considerations it is known that the

[6] This is sometimes called the partial profit function because some inputs are held fixed.

UOP profit function is decreasing and convex in the normalized prices of variable inputs and increasing in quantities of fixed inputs. It follows also that the UOP profit function is increasing in the money price of the output.

A set of dual transformation relation connects the production function and the profit function.[7] The derived demand functions for variable inputs are given by the Shephard's Lemma. The derived demand function is given by:

From (10)

$$\begin{aligned}\frac{\partial \bar{\pi}^*}{\partial r_i} &= \left[\frac{\partial F}{\partial X_i} \cdot \frac{\partial X_i}{\partial r_i} + \cdots + \frac{\partial F}{\partial X_m^*} \cdot \frac{\partial X_m^*}{\partial r_i}\right] - X_i^* \\ &\quad - \left[r_i \frac{\partial X_1^*}{\partial r_i} + r_2 \frac{\partial X_2^*}{\partial r_i} + \cdots + r_m \frac{\partial X_m^*}{\partial r_i}\right] \\ &= \sum_{i=1}^{m} \frac{\partial F}{\partial X_j^*} \cdot \frac{\partial X_j^*}{\partial r_i} - X_i^* - \sum_{i=1}^{m} r_j \frac{\partial X_j^*}{\partial r_i} \\ &= \sum_{i=1}^{m} \left(\frac{\partial F}{\partial X_j^*} - r_j\right) \frac{\partial X_j^*}{\partial r_i} - X_i^* \\ &= -X_i^* \qquad (i = 1, 2, \cdots, m)\end{aligned}$$

$$(11) \qquad \therefore -\frac{\partial \bar{\pi}^*}{\partial r_i} = X_i^* \qquad (r = 1, 2, \cdots, m)$$

From (9), the Lemma also gives the supply function,

$$\begin{aligned}\pi^* &= P \cdot \bar{\pi}^* \\ \frac{\partial \pi^*}{\partial P} &= \bar{\pi}^* + P \cdot \frac{\partial \bar{\pi}^*}{\partial P} \\ &= \bar{\pi}^* + P \sum_{i=1}^{m} \frac{\partial \bar{\pi}^*}{\partial C_i} \cdot \frac{\partial C_i}{\partial P} \\ &= \bar{\pi}^* + P \sum_{i=1}^{m} \frac{\partial \bar{\pi}^*}{\partial C_i} \left(1 - \frac{1}{P} C_i\right)^{8)} \qquad \left(C_i = \frac{r_i}{P}\right) \\ &= \bar{\pi}^* - \sum_{i=1}^{m} \frac{\partial \bar{\pi}^*}{\partial C_i} C_i\end{aligned}$$

$$(12) \qquad \therefore q^* = \bar{\pi}^* = \sum_{i=1}^{m} \frac{\partial \bar{\pi}^*}{\partial C_i} C_i \qquad \left(q^* = \frac{\partial \pi^*}{\partial P}\right)$$

where q^* is the supply function.

At this point the advantages of working with the normalized profit function instead of the tradition production function should be emphasized.

First, through equation (11) and (12), the Shepard's Lemma makes it possible to derive the supply function, q^*, and the factor demand function, X_i^*'s, directly from an arbitrary normalized profit function, which is decreasing and convex in the normalized price of the variable inputs and

[7] These relations are given and proven in McFadden and Lau.

[8] Where $C_i = \frac{r_i}{p} \cdots (1)$, by differentiating (1), $\frac{\partial C_i}{\partial p} = \frac{r_i}{p^2} = \frac{r_i}{p} \cdot \frac{1}{p} = -\frac{1}{p} C_i$.

increasing in the fixed inputs, without an explicit specification of the corresponding production function (and hence without solving equation (4)).

This provides a great deal of flexibility in empirical analysis. Second, by starting from a profit function, it is assured by duality that the resulting system of supply and factor demand functions is obtainable from profit maximization of a firm with a production function Concave in the variable inputs subject to given fixed inputs and under competitive markets. Third, the profit function, the supply function, and the derived demand functions so obtained may be explicitly written as functions of variables that are normally considered to be determined independently of the firm's behavior.

Econometrically, this implies that these variables are exogenous variable. By estimating these functions directly the problem of simultaneous equations bias to the extent that it is present can be avoided.

From the point of view of empirical implementation, the normalized profit function (or alternatively, the supply function) and the factor demand functions should be estimated jointly, since there will be parameters common to both the normalized profit function and the derived demand functions. Hence, the restriction that the common parameters are equal should be imposed.

In addition, to take into account the possibility that the errors in different equations may be correlated, a method similar to that developed by Zellner should be employed. This would be further elaborated in the empirical analysis section.

To the above equation, we now proceed to specify the appropriate functional form and formulate operational basis for an empirical test of relative economic efficiency. A Cobb-Douglas production function with variable inputs and a fixed inputs is given by:

$$(13) \qquad q = A \prod_{i=1}^{m} X_i^{\alpha i} \cdot \prod_{i=1}^{n} Z_i^{\beta i}$$

where $u = \sum_{i=1}^{m} \alpha_i < 1$

The UOP profit function for this Cobb-Douglas profit function is given by:

$$(14) \qquad \pi^* = A^{1/(1-\mu)} (1 - \mu) \left[\prod_{i=1}^{m} (r_i/\alpha_i)^{-\alpha_i 1/(i-\mu))} \right] \cdot \left[\prod_{i=1}^{m} Z_i^{\beta_i (1/(1-\mu))} \right]$$

Taking natural logarithms of (14),

$$(15) \qquad \ln \pi^* = \ln A^* + \sum_{i=1}^{m} \alpha_i^* \ln r_i + \sum_{i=1}^{m} \beta_i^* \ln Z_i$$

where

$$A^* \equiv A^{1/(1-\mu)} (1 - \mu) \cdot \left[\prod_{i=1}^{m} \alpha_i^{\alpha_i (1/(1-\mu))} \right]$$

$$\alpha_i^* \equiv -\alpha_i^{1/(1-\mu)} < 0 \qquad (i = 1, \cdots, m)$$
$$\beta_i^* \equiv -\beta_i^{1/(1-\mu)} > 0 \qquad (i = 1, \cdots, m)$$

The derived demand function are given by (11), i.e.,

$$(16) \qquad X_i^* = -\frac{\partial \bar{\pi}^*}{\partial r_i} \qquad (i = 1, 2, \cdots, m)$$

Multiplying both sides of (16) by $-r_i/\bar{\pi}^*$

$$(17) \qquad -\frac{r_i X_i^*}{\bar{\pi}^*} = \frac{\partial \ln \bar{\pi}^*}{\partial \ln r_i} \qquad (r = 1, 2, \cdots, m)$$

which for the Cobb-Doglas profit function becomes

$$(18) \qquad -\frac{r_i X_i^*}{\bar{\pi}^*} = \alpha_i^* \qquad (r = 1, 2, \cdots, m)$$

Where $\bar{\pi}^*$ denotes the normalized profit, r_i the normalized price of variable input, and $\bar{Z}_i$ the fixed input all in physical unit.

In addition, we proceed to specify the relation between profit function and constant returns to scale.

Given a production function

$$Q = F(X_1, X_2, \cdots, X_m; \bar{Z}_1, \bar{Z}_2, \cdots, \bar{Z}_n)$$

which is homogeneous of degree K, then, from Euler's Theorem,

$$(19) \qquad \sum_{i=1}^{m} \frac{\partial F}{\partial X_i} X_i + \sum_{i=1}^{n} \frac{\partial F}{\partial \bar{Z}_i} \bar{Z}_i = KF$$

For a profit-maximizing firm,

$$\frac{\partial F}{\partial X_i} = r_i \qquad (r = 1, 2, \cdots, m)$$

from (11)

$$X_i^* = \frac{\partial \bar{\pi}^*}{\partial r_i} \qquad (r = 1, 2, \cdots, m)$$

from (12)

$$q^* = F = \bar{\pi}^* - \sum_{i=1}^{m} \frac{\partial \bar{\pi}^*}{\partial C_i} C_i;$$

and by differentiating (5),

$$\frac{\partial F}{\partial \bar{Z}_i} = \frac{\partial \bar{\pi}^*}{\partial \bar{Z}_i} \qquad (r = 1, 2, \cdots, n)$$

Substituting these results into (19) for the profit-maximizing firm gives

$$-\sum_{i=1}^{m} C_i \frac{\partial \bar{\pi}^*}{\partial C_i} + \sum_{i=1}^{n} \frac{\partial \bar{\pi}^*}{\partial \bar{Z}_i} \bar{Z}_i = K\left(\bar{\pi}^* - \sum_{i=1}^{m} \frac{\partial \bar{\pi}^*}{C_i} C_i\right) \text{ or}$$

$$(20) \qquad \frac{(K-1)}{K}\sum_{i=1}^{m}\frac{C_i\partial\bar{\pi}^*}{\partial C_i}+\frac{1}{K}\sum_{i=1}^{n}\frac{\partial\bar{\pi}^*}{\partial Z_i}Z_i=\bar{\pi}^*$$

In other words, $\bar{\pi}^*$ is an almost homogeneous function of degree $(k-1)/K$ and $1/K$ in variable input prices and quantities of fixed factors, respectively. The above condition is also sufficient for homogeneity of degree K of the production function as all the steps may be reversed. For the case of a Cobb-Douglas profit function, the condition reduces to

$$\frac{(K-1)}{K}\sum_{i=1}^{m}\alpha_i^*+\frac{1}{K}\sum_{i=1}^{n}\beta_i^*=1, \text{ or alternatively,}$$

$$\sum_{i=1}^{n}\beta_i^*=K-(K-1)\sum_{i=1}^{m}\alpha_i^*$$

Note that $\sum_{i=1}^{m}\alpha_i^*<0$ by the monotonicity conditions on the profit function. Hence, if $K>1$ (increasing return), $\sum_{i=1}^{n}=\beta_i^*>1$. If $K=1$ (constant returns), $\sum_{i=1}^{n}\beta_i^*=1$. If $K<1$ (decreasing returns), $\sum_{i=1}^{n}\beta_i^*<1$. A test of the hypothesis of constant returns in all inputs in the Cobb-Douglas case then becomes a test of the hypothesis $\sum_{i=1}^{n}\beta_i^*=1$, where the elasticities of the profit function with respect to the fixed factor of production.

Equation (15) and (18) are the estimating equations for the present study. Note that the α_i^*'s appears in both the UOP profit function and the ith factor demand function.

To compare relative economic efficiency among different tenure classes and different farm size, we may specify the UOP profit function model as

$$(21) \qquad \ln\bar{\pi}^*=\ln A^*=e\,D_2+\sum_{i=1}^{m}\alpha_i^*\ln C_i+\sum_{i=1}^{n}\beta_i^*\ln Z$$

$$(22) \qquad -\frac{C_iX_i^*}{\bar{\pi}^*}=\alpha_i^*\,D_i+\alpha_i^*\,D_2 \qquad (i=1,\cdots,m)$$

where DK denotes dummy variable for each farm size or different tenure classes and α_i^*K identifies different tenure classes or each group's α_i^* coefficient $(k=1,2)$.

2. Economic Efficiency by Land Tenure Classes and Farm Size

This section discusses the estimation of the profit function and the hypothesis tests which are related to the relative economic efficiency among different farm size and different farm tenure classes. Farms are ranked into four size classes according to total cultivated land area, as shown in Table 6, and defined below.

Data used for this analysis were drawn from 1984 cross-section farm

TABLE 6 SELECTED LAND TENURE CLASSES BY FARM GROUP, 1984

Land tenure classes	By farm size	Number of farms	%
	ha		
Owner-farms	Less than 1	307	(33.2)
	1.0 – 1.5	85	(9.2)
	1.5 – 2.0	21	(2.3)
	Over 2.0	16	(1.7)
	Sub-Total	429	(46.3)
Owner-tenant farm	Less than 1	260	(28.1)
	1.0 – 1.5	106	(11.4)
	1.5 – 2.0	31	(3.3)
	Over 2.0	8	(0.9)
	Sub-Total	405	(43.7)
Full-tenant farm	Less than 1	75	(8.1)
	1.0 – 1.5	10	(1.1)
	1.5 – 2.0	4	(0.4)
	Over 2.0	3	(0.3)
	Sub-Total	92	(9.9)
	Total	926	(100.0)

Source: Calculated by 1984's Data of *Reports on the Results Production Cost Survey of Agricultural Products.*

survey of rice production costs conducted by the Korean Ministry of Agriculture and Fisheries. The original data were collected by the daily logs, in which the farmer of the selected farms recorded every day's management activity. A total 2,000 farms were selected for this survey.

From the original data, farms in which rice production was the main productive activity or major income source were identified. Thus, three different kind of classes including owner farm, owner-tenant and full tenant, were considered for this analysis of relative economic efficiency. This was done to compare economic efficiency among different farm groups by land tenure classes. A total of 926 farms were selected for the estimation of the normalized profit function.

Farm size can be measured in several ways. In this study, farm group was measured by the entire land area operated by a farm.

Four farm group classifications were outlined.

a) Small farms: farms cultivating less than 1 ha of farmland
b) Small-medium farms: farms cultivating land area from 1 ha to 1.5 ha
c) Medium farms: farms cultivating land area from 1.5 ha to 2.0 ha
d) Large farms: farms cultivating more than 2 ha of farmland.

A. Model Specification

The equations estimating the normalized profit function and variable input demand function are specified below:

$$(1) \qquad \ln \pi^* = \ln A^* + \alpha^* \ln HW + \beta^* \ln L + \beta_2^* \ln K + \sum_{i=1}^{3} \delta_i D_i + \sum_{i=1}^{2} t_{i_2}^{n} T_i$$

$$(2) \qquad \frac{-Hw \cdot HwQ}{\bar{\pi}^*} = \alpha$$

where $\bar{\pi}^*$ = Normalized profit in Korean Won. Nominal profit is calculated by subtracting hired wage bill from total revenue. The normalized profit is obtained by dividing the nominal profit by unit-output price.[9]

$\delta 1$ = Dummy variable: 1 for small-medium farms; 0 otherwise

$\delta 2$ = Dummy variable: 1 for medium farms; 0 otherwise

$\delta 3$ = Dummy variable: 1 for large farms; 0 otherwise

$\delta 1\ \delta 2\ \delta 3$ = Dummy variable: 0 for small farm

t_1 = Dummy variable: 1 for owner farms; 0 otherwise

t_2 = Dummy variable: 1 for full tenant; 0 otherwise

$t_1 t_2$ = Dummy variable: 0 for owner-tenant

HW = the hourly wage rate of hired labor (man-equivalent) divided by unit-output price

HwQ = The man equivalent hired labor input in hours

L = The physical paddy land units measured as pyung

K = The imputed capital interests in Korean Won for the fixed and flow capital used in producing rice

HQ = The man equivalent hired labor input in hours

In this analysis, hired labor is regarded as a variable input. Many other studies have treated family labor as a variable input. However, the case of Korean family farms seems different because of the serious labor shortages in rural areas. Family labor should be fully utilized regardless of its opportunity cost. This would be particularly applicable as long as farmers try to maximize short-run profits. Thus, in this studies I have treated family labor as a capital variable.

In the above profit function, wage rate is specified as a price variable for hired labor. There are other variable inputs such as fertilizers and pesticides. However, their prices are not specified as price variables in the profit function because the prices of fertilizers and other chemicals are mostly controlled by government and uniform to every farm in Korea. thus, these variables are indirectly included in capital variable, K. Fixed inputs specified include land and capital.

B. Estimation and Hypothesis Test

Profit maximization should precede to the normalized profit function and the variable input demand function. Zellner's unrelated regression method estimates the normalized profit function and the variable input demand function at the same time.[10] The more common method known

[9] The unit-output-price is obtained by dividing total revenue by total physical output. The unit-output-price is measured in Korean Won per kilogram of produced rice.

[10] Johnston. J. Econometric Methods, 2nd ed., McGraw-Hill, Inc., 1972, pp. 293–240.

as "Ordinary Least Squares (OLS)" might also be used. But this method requires separate estimation of each equation. It can not however provide efficient estimate because the error term of each resulting estimated equation has a correlation respectively.

In line with this analysis, this study has attempted to estimate and compare both the OLS and the Zellner's. The result is well indicated in Table 7 and 8. The first step in estimating the profit function and the variable input demand function is to determine whether the normalized profit function is a decreasing and convex function to *Hw* and at the same time test whether the normalized profit function can meet the profit maximization.

α^* in the profit function on Table 7 and 8 are all negative figures, which indicates that α^* is a decreasing function to *Hw*. To prove that the profit function is a convex function to *Hw*, it is necessary to confirm that the Hessian matrix of π to *Hw* becomes positive definite.[11] This is con-

TABLE 7 JOINT ESTIMATION OF THE NORMALIZED PROFIT FUNCTION AND FACTOR SHARE EQUATIONS FOR VARIABLE INPUTS, 1984 (Restriction: $\alpha^* = \alpha$)

The Normalized Profit Function

Classification	Owner-farm estimated coefficient		Owner-tenant estimated coefficient		Tenants estimated coefficient	
Parameter	OLS[1]	Zellner's[2]	OLS	Zellner's	OLS	Zellner's
lnA	1.23*	1.29*	5.24*	5.28*	3.47*	3.50*
	(4.73)	(5.48)	(14.52)	(15.24)	(3.06)	(3.24)
$\delta 1$	−0.01	0.006	0.35*	0.37*	0.42*	0.45*
	(−0.48)	(0.24)	(10.39)	(11.43)	(3.78)	(3.68)
$\delta 2$	0.05	0.03	0.5*	0.60*	0.51*	0.60*
	(0.97)	(0.76)	(9.50)	(10.80)	(2.74)	(3.27)
$\delta 2$	0.01	0.06	0.96*	1.05*	0.67*	0.83*
	(0.09)	(1.12)	(9.58)	(10.89)	(2.87)	(3.60)
α^*	−0.02	−0.06*	0.02	−0.06*	−0.34*	−0.07*
	(−0.54)	(28.47)	(0.34)	(−29.77)	(−1.54)	(−13.29)
$\beta 1$	0.95*	0.93*	0.09*	0.08*	—	—
	(25.3)	(27.56)	(4.50)	(4.18)		
$\beta 2$	0.04**	0.05*	0.27*	0.27*	0.50*	0.47*
	(1.77)	(2.39)	(7.74)	(8.51)	(5.01)	(4.83)
	Demand function for variable input					
α	−0.06*	−0.06*	−0.057*	−0.06*	−0.068*	−0.07
	(−27.69)	(−28.68)	(−28.92)	(−30.01)	(−13.28)	(−13.76)

Note: 1) Ordinary Least Squares.
2) Joint Estimation.
3) Numbers in parenthesis are t-ratio.
4) * Significant at the 1% level.
** Sigyıucant at the 5% level.

[11] Law, Lawrencce J., "Applications of Profit Functions" in Mebyn Fuss and Daniel

TABLE 8 JOINT ESTIMATION OF THE NORMALIZED PROFIT FUNCTION AND FACTOR SHARE EQUATIONS FOR VARIABLE INPUTS, 1984 (Restriction: $\alpha^* = \alpha, \beta_1 + \beta_2 = 1$)

The Normalized Profit Function

Classification	Owner-farm estimated coefficient		Owner-Tenant estimated coefficient		Tenants estimated coefficient	
Parameter	OLS[1]	Zellner's[2]	OLS	Zellner's	OLS	Zellner's
ln A	1.23	1.12	5.24	−1.46	3.47	3.50
	(4.73)	(15.12)	(14.51)	(−18.10)	(3.06)	(3.24)
$\delta 1$	−0.013	−0.008	0.35	0.03	0.42	0.45
	(−0.48)	(−0.46)	(10.39)	(0.99)	(3.38)	(3.68)
$\delta 2$	0.05	0.01	0.55	−0.16	0.51	0.60
	(0.97)	(0.34)	(9.50)	(−1.45)	(2.74)	(3.27)
$\delta 3$	0.01	0.03	0.96	0.05	0.67	0.83
	(0.09)	(0.08)	(9.58)	(0.65)	(2.87)	(3.60)
α^*	−0.02	−0.06	0.02	−0.06	−0.34	−0.07
	(−0.54)	(−28.49)	(0.34)	(−29.16)	(−1.54)	(−13.29)
$\beta 1$	0.95	0.95t	0.09	0.20	—	0.53
	(25.3)	(47.69)	(4.50)	(10.8)		(5.34)
$\beta 2$	0.04	0.05	0.27	0.80	0.50	0.47
	(1.77)	(2.46)	(7.74)	(44.28)	(−5.01)	(4.83)
Demand function for variable input (Labor)						
α	−0.06	−0.06	−0.057	−0.06	−0.07	−0.07
	(−27.69)	(−28.70)	(−28.92)	(−29.39)	(−13.28)	(−13.76)

Note: 1) Ordinary Least Squares.
2) Joint Estimation.
3) Numbers in parenthesis are t-ratio.
4) * Significance at the 1% level.
** Significance at the 5% level.

firmed by using an estimation function of owner-operated farms calculated using Zellner's method. Namely,

$$\bar{\pi}^* HwHw = \frac{\partial^2 \bar{\pi}^*}{\partial Hw^2} = \frac{\partial^*}{Hw^2} - \frac{\partial \bar{\pi}^*}{Hw^2} = \alpha(\alpha - 1)\frac{\bar{\pi}^*}{Hw^2}$$

$$= -0.06(-1.06)\frac{\bar{\pi}^*}{Hw^2} > 0$$

The above equation proves that the Hessian matrix of to Hw becomes positive definite. This leads on the conclusion that $\bar{\pi}^*$ function has convexity to Hw. Following is the quation to test the hypothesis about the profit maximization.

Ho: $\alpha^* = \alpha$,

$F(1,1770) = 0.1424 < F\ 0.05\ (1,1770) = 3.84$

(Significance level: 0.71)

McFadden, eds., *Production Economics: A Dual Approach to Theory and Applications.* Vol. 1, North-Holland Pub. Co.: Amsterdam, NY, Oxford, 1978, pp. 133–216.

As is shown above, Ho hasn't been rejected at the significance level of 5%. This means that the farm households surveyed satisfy the profit maximization conditions as far as labor is concerned. The employment of the profit function has satisfied the basic requirements for estimating the rice production function and the variable input demand function with respect to farming types. Second, the test has been made of the hypothesis of constant return to sacle by the coefficiency of the fixed input of the profit function. Namely,

$$\text{Ho: } \beta_1(L) + \beta_2(K) = 1.0$$
$$F(1,1770) = 386.8586 > F\ 0.05\ (1,1770) = 3.84$$
(Significance level: 0.0001)

The profit function does not work as a constant return to scale to fixed input as hypothesis Ho has been rejected at a statistical significance level of 5%. This means that under this restrictive conditions the basic requirements for estimating the profit function and the production function with respect to type of farming, using profit function, are not satisfied.

Table 7 and 8 are the estimated equation of the profit function obtained by adopting two different restrictive conditions (the rejected form and the opposite form). First, the hypothesis test that the normalized profit function is a decreasing functions and is convex to *Hw*, and satisfies the profit maximization condition was conducted. The result was used in the application of an economic theory for deriving an estimation of labor demand elasticity, productivity supply elasticity, the price of products and the amount of fixed input for production in association with wage.

C. Results of the Analysis

Table 9 shows the elasticity of rice production function with respect to farmland tenure type. The elasticity has been indirectly obtained by using the normalized profit functions in Table 7 and 8. Parameter on the production function is derived from the profit function according to equation (17) and (18). Its restrictive conditions are profit maximization ($\alpha^* = \alpha$) and constant return to scale ($\beta_1 + \beta_2 = 1$).

Table 9 shows the elasticity of the production function derived from

TABLE 9 Elasticities of Rice Production Function Using the Normalized Profit Function by Land Tenure Type

Parameter	Restrictive condition ($\alpha^* = \alpha$)			Restrictive condition ($\alpha^* = \alpha$, $\beta_1 + \beta_2 = 1$)		
	Owner farm	Owner tenant	Tenant farm	Owner farm	Owner tenant	Tenant farm
Labor (*Hw*)	0.06	0.06	0.07	0.06	0.06	0.06
Land (*L*)	0.90	0.80	—	0.90	0.20	0.50
Capital (*K*)	0.05	0.25	0.44	0.05	0.75	0.44

the normalized profit function. The owner-operated farms have the highest elasticity at 0.90. Next is labor at 0.06, and capital is the lowest at 0.05 based on the assumption that labor (hired), land and capital are independent variables. When we consider owner-tenant farms, the elasticity of capital is followed by that of land and labor. In the case of tenant farms, land has the highest elasticity at 0.50 followed by that of capital at 0.44 and that of labor at 0.06.

In addition, the comparison of efficiency considering farmland tenure type and the size of the farm has been made according to the size of the intercept and the slope assuming that the profit maximization conditions, $\alpha^* = \alpha$ is a restrictive one. The tenant farms are the most efficient land tenure type with regard to the size of intercept. It is followed by the owner-tenant farms and the owner-cultivated farms. In case of farm size, households of less than 1.0 ha are the most efficient, followed by those of 1.5–2.0 ha and 1.0–1.5 ha. The least efficient are those of more than 2.0 ha.

This study leads to the conclusion that there is no ecocomy of scale in our farm households. And it appears that the opinion that the owner-operated farms are more efficient than the leased farms has been reversed. In view of the fact that the area of the rented land shall continue to increase in the future this analysis shall be a great help to the improvement of the farmland leasing system.

A comparison of the amount of profits when labor was hired has also been made. Owner-tenant farms are the most efficient, with the second being owner-operated farms, followed by tenant farms. By size, households of more than 2.0 ha are the most efficient, followed by those of 1.0–1.5 ha, 1.5–2.0 ha. Those of less than 1.0 ha are the least. Considering land utilization, owner-operated farms are the most efficient; owner-tenant land is of equal efficiency to rented land. By size, the most efficient are farm households of less than 1.0 ha followed in order by those of 1.5–2.0 ha and 1.0–2.5 ha. The least efficient are households of more than 2.0 ha. In terms of capital, tenant farm is the most efficient followed by owner-tenant farms and owner-cultivated farms. Considering farm size of capital, farm-households of less than 1.0 ha are the most efficient. Next are farms of more than 2.0 ha, 1.0–1.5 ha with those of 1.5–2.0 ha last.

This study has also attempted to make a comparison between the efficiency in accordance with farmland tenure type and the size of farms based on the assumption that constant return to scale ($\beta_1 + \beta_2 = 1$) is the restrictive condition to profit maximization condition ($\alpha^* = \alpha$) and "fixed input".

The efficiency by land tneure type according to the intercept appears that the rented farms are the highest followed in order by owner-operated farms and owner-tenant farms. By the size of the farms, farm households of 1.5–2.0 ha are the most efficient, followed by those of 1.0–1.5 ha, and those of more than 2.0 ha second and third respectively, followed last by

those of less than 1.0 ha.

In the case of using hired labor the order is owner-operated farms, the owner-tenant farms, and rented land. By size, farm households of 1.0–1.5 ha are the most efficient, and those of more than 2.0 ha are second and those of 1.5–2.0 ha are third. Last are households of less than 1.0 ha. By land tenure type, owner-operated farms enjoy the highest efficiency when the owner-tenant farms and rented land show equal efficiency. By size of farms, the efficiency is greatest for farm households of less than 1.0 ha and decreases in order for households of more than 2.0 ha, 1.0–1.5 ha and 1.5–2.0 ha.

The results of above analysis have shown distinct differences in economic and technical efficiency between land tenure type and between sizes of farms.

In particular when profit maximization ($\alpha^* = \alpha$) is assumed to be a restrictive condition, the most efficient land tenure type is rented farms followed in turn by owner-tenant farms and owner-operated farms. Considering the size of farms those of less than 1.0 ha are the most efficient followed in order by those of 1.5–2.0 ha, 1.0–1.5 ha and those of more than 2.0 ha.

The analysis of the relative efficiency of labor (hired) capital and land is similar in most cases. In this regard, it is safe to say that there is no economy of scale in our farm households. The study also shows that owner-tenant farms and rented farms are no less efficient than owner-operated farms are. In view of the fact that rented areas will continue to increase in the years to come, the policy-making authorities should seriously consider these results when institutionalizing the land leasing system.

IV. The Customary Rental Rate and Optimum Rental Rate

Today, most tenant farm households are inevitally leasing their farmland with high rental rates so as to cope with the problem of their farming scale shrinking in size. These rental payments result in an erosion of tenant-farmer income which leads to lower productivity. This factors serve as serious constraints in the formation of agricultural capital.

Rental rate is generally thought to be of two types; single crop and double crop. Rental rate of single crop is 37.3% and 33% in double crop.

The Japanese current standard rental rate (fixed rent) is calculated by a provincial agriculture committee according to crop-types and land grades. They have been guiding the farmers to mutually agree upon within a range of approximately 30% which is the standard amount of arranged rental rate. In the years before 1970, a uniform upper limit system prevailed, but from the time when leasing was encouraged in the wake of farmland price hike, a standard rental rate system based on mutual agree-

ment was adopted so as to promote farmland mobility through recognizing, to some extent, the interest of the leassor.

Korea has so far primarily attempted to arrange optimum rental rate by arbitrating the two side,[12] lessee and lessor. The rental rate should be computed in accordance with the concept of rent domain. One of the methods calculating theoretically optimum rate is to vest "valance of land net receipts after producer's margin" into land (rental rate).[13]

Another view is that the net receipts of land (object of calculation) should be computed as follows; subtracting taxes and public charges from net margin of land owned by the marginal class and then dividing it by the interest rate. This is based on Recardo's "Theory of Differential Rent" which states that farm products price is determined at maximum production cost of marginal farmland with the worst condition of location. The general tendency today is for level of price for farm products to be determined at average production cost level due to the government's tight control policy. Based on the above mentioned review, this study is to reckon optimum rental rate in line with both criteria of average rice yield per 10a and of marginal rice yield as the first step to estimate it (Table 11) presents calculated figures based on the "Results from the Survey of Farm Household Economy" (1984), the computing formular introduced here to get the figures are follows.

The gross receipts (1) is an aggregation of main products and by-products. In the case of main products, the figure for rice yield (per 10a) was resulted from taking the average of three years' figures after excluding the lowest figure (1980) and the highest (1984) of rice output per 10a from the period between 1980 and 1984. It is based on the data in the "Report on the Results of Production Cost Survey of Agricultural Products". The basic marginal rice yield is assumed to be "Mean minus Standard Deviation" for convenience" sake (in case of Japan, it is 16). As rice does normal distribution, farm households whose rice yield per 10a are higher than "Mean minus Standard Deviation" accounts for 84.15% of total. Therefore, if production cost is guaranted at the level of marginal rice yield per 10a, 84.15% of rice growing farm households can get a guaranteed production cost. But this study assume that the marginal farm households is over 80% of total. The marginal rice yield per 10a resulted from this figure is as follows:

1) $410.3\text{kg} - (0.8415 \times 80.75\text{kg}) = 342.5\text{kg}$
2) Standard Deviation $= 410.3\text{kg} \times 0.1968$ (Coefficient Variation)
   $= 80.75\text{kg}$
3) Coefficient Variation 0.1968 was estimated by adopting the average Coefficient Variation figures of 1982, 1983 and 1984.

[12] Young-Jin Kim, *A Study on Land Tenure System in Korea*, KREI, 1982, p. 100.
[13] Kar Ji I, *Land Policy and Agriculture*, Inedhukari Association, 1979, pp. 199–200.

TABLE 10 ESTIMATED OPTIMUM RENTAL RATE PER 10a, 1985

Assumption	Marginal rice yield per 10a	Average rice yield Per 10a
	Won	Won
1. Gross Receipt (2 + 3)	272,340	321,198
2. Main Products (410.3kg per 10a for Rice Yield)	(246,814)	(295,672)
3. By-products (59.5kg (Average products) per 10a)	(25,526)	(25,526)
4. Production Cost	190,357	190,357
5. Agricultural Management Expenditure	(55,991)	(55,991)
6. Hired Labor Wage	(17,828)	(17,828)
7. Family Labor Wage	(91,926)	(91,929)
8. Capital Service	(14,568)	(14,568)
9. Taxes & public Charges + Other Charges	(10,044)	(10,044)
10. Net Income (1 - 4)	81,983	130,841
11. Farm Manager Returns	36,583	36,583
12. Land Net Income (10 - 11)	45,400	94,258
13. Tenant Rental Rate (12 - 1)	16.7%	29.3%

Note: 1) Hired Labor Wage: $10.4^{hrs} \times 1{,}198^{won}$ (Male) + $6.2^{hrs} \times 866^{won}$ (Female) = $17{,}828^{won}$

2) Family Service ('84 Rice Production Cost Survey Data); $(49.1 + 24.5^{hrs}) \times 1249^{won} = 91{,}926^{won}$

3) Capital Service
Fixed Capital Service $6{,}447^{won}$ + Liquid Capital Service $5{,}579^{won} \times$ {15,183 (Estimated Liquid Capital Input in 1985) / 103,863 ('84 actual Liquid Capital Input)} = $14{,}568^{won}$

4) Taxas & Public Charges and Other Charges: $10{,}044^{won}$

5) Agri. Manager Returns; Production Cost $\times$ 1−0.8388/0.8388 = $36{,}583^{won}$

* 0.8388; Rate of Cost of Sales to Net Sales (Calculated by *Financial Statements Analysis for 1985*, The Bank of Korea, p. 94.

– The estimated value of the main products was computed by appling the government purchase price of rice, 57,650 Won per 80kg bag (based on 1984's grade B)

– In calculating by-products output, the same method as in main products was used. It was calculated on the assumption that average products is 595kg and the estimated product price per kg is 42.9 Won (using mean value of the data from January to April 1985 prepared by the National Agriculture Cooperative Federation).

– Hired labor wage was calculated by appling total labor input hours and the decreasing rate of labor input hours between 1983 and 1984 (Table 11). Because the farming scale of sample farm households for survey were adjusted uptoward to over 1,500 pyung after 1983, there is a possibility that it is underestimated from the actual state.

As calculated previously, 29.3% of rental rates for paddies as a basis for average rice production, and 16.7% as a criterion for marginal rice production are much lower compared to the customary rental rate of

TABLE 11 PROCESS OF CALCULATION IN LABOR INPUT, 1985

Classification	Sex	Labor input hours (1982)	1983—1984 Decreasing rate	Estimated 1984's labor input	Agri. labor wage (Won/hrs)	Mining & manufacturing wage (Won/hrs)
		hrs	%	hrs		won
Family	Male	50.7	−3.1	49.1	—	1,249
Labor	Female	24.9	−1.5	24.5	—	1,249
Hired	Male	12.3	−15.2	10.4	1,198	1,249
Labor	Female	6.6	−6.7	6.2	866	—
Total		94.5		90.2		

37.3%. Given the facts that it would continue to increase in the years ahead and tenancy would be permitted by law, a determination of optimum rental rate is of utmost importance. If rental rates for paddies are controlled within such a range between 16.7% and 29.3%, the 3,484 billion Won of rent currently flowing into the hands of non-farmers would be reduced by half, which in turn might greatly help farmers increase their agricultural funds. The control of rent would naturally result in a reduction of farmland held by non-farmers. But establishment of the optimum rental rate as a system requires a couple of considerations:

First, determination of ceiling by law such as the "Maximum Rental Rate Controlling Act" during the U.S. Military government. The upper limit rate then was one third of output. Second, determination of a standard rate like the Japanese standard rental rate system and guidance for the involved in contract to agree upon the range within 30%. Japan adopted also "Maximum Rental Rate System" in the beginning of adopting the farmland act, but later it chose the current standard system to meet the necessity of managing land more mobility along with offering incentives for lessors. A farmland committee in each Eup and Myun is entitled to control the rental rate through a lease contract report system. It seems, however, that the ceiling system would be more convenient in the beginning of extablishment of the law. At the same time, a fixed rent system could also be working. The rent can be resulted from appling legal upper limit rental rate to standard output by crop on a regional basis. Farmers will, however, suffer damage if there is a poor harvest under this system. In Japan, it is systematized that farmers could demand a reduction in rent to the lessor if reduction in output of paddy and uplands exceeded over 25% and 15% respectively. In this respect, Korea also should enact it as a legislation. Article 24 in the Japanese farmland act stipulates in detail the claiming procedure in time for such situation.

V. Summary and Conclusions

The Land Reform Act promulgated in 1950 consisted of the following

three guidelines; (1) legally, farm size is limited to a 3 hectare ceiling, (2) only farmers could own farmlands, and (3) the tenant system was institutionary prohibited.

Accordingly, the legal provision limiting acreage and prhibiting tenancy have become controversial issues. Despite of the prohibition of tenancy by the "Land Reform Act", the rented land amounts to 30.5% of total farmland. The tenant farming has also become an increasing trend, about 59.8 percent of total farms were identified as full or partial tenant farms.

Therefore, the formal land tenure laws can not meet the new tenure problems as economic growth and institutional changes take place. In light of the future economic development, this study aims at finding more concrete measures and rational farmland leasing system, relating with the ceiling of farmland holdings. Thus, the main purpose of this study is to improve the farmland leasing system through an analysis of the change of tenancy practice since 1945, economic efficiency between land tenure classes and farm size, estimation of the optimum rental rate. The methods and approaches used in the present study are described as the actual work proceeded. Through library research, the initial phase of research was devoted to collection of statistical data and legal materials on land reform, land tenure and tenancy. Another major operation of research was the analysis of the 1985 Farm Household Economic Survey Data of MAF.

The conclusion of this study may be summarized as follows:

(1) The revival of tenant farming after land reform depended on economic conditions. During the 35 years since 1950, there have been three stages showing different characteristics of the farmland problem.

The first stage is characterized by the revival of tenancy in spite of the land reform. During this period, the Korean rural economy was in a phase of stagnation because of factors such as the extremely low and seasonally unstable prices of agricultural products, a lack of funds for supporting agriculture and the small farm size. Under these circumstance, farmers could not earn enough income to support even the subsistence living of their family and so, they had to sell even the land distributed to them under the land reform.

Meanwhile, the floating funds of some rich farmers and urban dwellers were concentrated on the purchase of farmland as means of avoiding capital loss due to inflation and for speculative purposes. The farmland purchased for this purpose were generally put under tenancy. On the other hand, those who sold their own farmlands had to remain as tenants in rural areas because there were very few job opportunities for them in the non-farm sector.

During the second stage, the area under tenancy and the number of tenant farmers decreased owing to improved rural economy. With the successful completion of the industrialization, a large portion of the farm

population could be absorbed into the non-farm sector.

With the rapid expansion of industry and urbanization since 1970, a great deal of farmland has been transferred to non-agricultural uses resulting in a considerable decrease in farmland. Furthermore, many urban dwellers purchase farmlands illegally for speculative purposes and put them under tenant farming until the land is developed for non-agricultural use.

The decrease in farmland area and the drastic rise in the price of farmland are the main factors restricting the expansion of farm size by farmers. Thus, the elimination of the tenant system depends on the changes of the social system and sound economic and agricultural development thereafter.

(2) The Land Reform Law of 1950 restricted the maximum size of crop farms 3 hectares of cropland. There were a number of reasons for the legal constraints on the upper ceiling. It was then thought that a system of owner operated family farms would be the most desirable tenure system for Korea. This necessitated the elimination of holdings larger than that which could be cultivated by family labor. Thus upper ceiling in holdings was not only based on a pronounced equalitarian principle, but also political and social stabilization. Thirteen five years have passed since the Land Reform during these years new farming techniques have been disseminated to farmers, the semi-subsistence producers are becoming more competitive producers in both the domestic and foreign markets. With these changes and others changes taking place in non-agriculture sector of the economy, the three hectare upper ceiling limit is certainly a policy issue.

Recently, many people concerned with agricultural development have raised the "pros and cons" regarding the ceiling limit, some have advocated its complete abolishment; others proposed a readjustment to a new size of holdings; still others favored the "status guo".

(3) It is necessary that the expansion of farming scale to economically use labor-saving farm machines. This is believed to be a critical condition for modernizing Korea agriculture. Thus the farm size limitations should be removed in order to develop a self-supporting farming structure through scale expansion which would result in balanced growth between the agricultural sector and the non-agricultural sector. If so, to what extent does the upper ceiling restrict farmers in achieving maximum efficiency in farm operations.

The actual farming scale can not be restricted by setting an upper ceiling nor can be expanded randomly by abolishing the ceiling. As analysis of the class shift trend of farm households after the Land Reform provides us with a clue to the solution of the legal upper ceiling problem. The annual shift of the number of farm households was classified by the farming scale since 1951, the following year of the Land Reform. There is considerable fluctuation in each time phase. But the total number of farm households which showed the increasing trend since 1951 began to decrease after

reaching a peak in 1967. Since that time, the concentration to medium sized farm has prevailed, with an ever decreasing number of farm households. After 1968 the absolute majority of farm households began to decrease, as the small sized farmland owner who have meager financial resources flew to other industries. With the reduction of these small-sized farm households, came a pressure from the resulting shortage of labor to increase wage. As a result, the number of farms larger than 3 ha has reduced. In view of this class shift, it was before 1967 when the number of large sized farms showed the increasing trend that a legal upper ceiling was required. After that year, the upper ceiling itself was meaningless since the number of large sized farms decreased.

Accordingly, in line with the growth of the capitalistic economy, the class shift of farm households moves through the macroscopic process of a reorganization of industrial structure. Only through this process can the income of farm households be increased together with industrial development, making it possible to realize balanced growth between agriculture and industry.

(4) Using the parameter estimates of the normalized restricted-profit function, we may derive the indirect estimates of the production elasticities of the Cobb-Douglas production function that underlies the normalized restricted-profit function. In case of the owner-operated farm, the land elasticity obtained from our indirect estimation of the production function appears to be 0.90, and respectively 0.06 or 0.05 in labor and capital. In case of the owner-tenant farm, the capital elasticity appears to be higher than land and labor. The land and capital elasticities appear to be 0.50 and 0.44 in the tenant farm. The labor elasticity appears to be 0.06, which is too low.

The relative efficiency of land tenure and farm size classes was analyzed by estimating a profit function model using 1984 cross-section data on rice production cost.

The results indicated that the economic efficiency of the owner-tenant farm and tenant farms are no less efficient than owner-operated farms are. The owner-tenant farm appears to be equally as economically efficient as the tenant farm.

While, the economic efficiency of medium farms cultivating between 1 to 2 hectares was relatively high than that of other farm size in rice production in 1984.

(5) The optimal rate of rent we estimated was found to fall within such a range between 16.7% and 29.3% in the case of rice paddy. This is much lower than the actual high rent of 37.3%. If this optimal rate is maintained, a more efficient utilization of farmland is possible for tenants in conditions that are more favorable than in the case of farmland purchase. As well, the capital formation of farm households can be successfully achieved, since the financial burden of high rents for tenants is considerably

reduced.

(6) Through the above review, we can conclude that the improvement of the farmland leasing system should be treated in terms of a more comprehensive farmland policy including the upper ceiling of land holdings. And also, we have to clear the way for the expansion of owner-operated land plus rented land through lease.

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