

Patterns of Agricultural Emigration and Multiple-Crop Farming^a in Taiwan

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The population of Taiwan is characterized by great mobility. Large-scale migration is taking place from rural agrarian sectors to urban industrial centers as the result of rapid industrial development which agricultural development cannot keep pace with. This horizontal mobility has caused changes in many respects that are of a socio-economic and psychological nature. One of the widely mentioned problems, perhaps the most important one, is the shortage of farm labor that discourages the labor-intensive farming system as it used to be. In the 10-year period of 1961-1970, about 957,000 persons emigrated farms where the growth rate of the multiple cropping index had been declining since 1961 at an increasing pace.

The purpose of this paper is to examine trends of agricultural emigration and multiple cropping, characteristics and contribution of agricultural migrants and relationship between agricultural migration and the multiple cropping system. It is hoped that some implications might be identified for the future development of Taiwan and other countries.

I. Trends of Agricultural Emigration

One of the earlier studies estimated the amount of migration from 1947 to 1967^{1/}. It shows that, except 1948, 1951, 1960 and 1967, the migration went from the rural agrarian sector to the urban industrial sector.

a. Revised based on paper presented at seminar on multiple-crop diversification in Taiwan and its relevance to southeast Asian countries, October 29 - November 4, 1973, Taipei, Taiwan, Republic of China.

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^{1/} Tong-Ming Lee, "A Projection on Agricultural Population Changes in the Process of Industrialization in Taiwan" Quarterly Journal of Taiwan Land Credit. no. 3, Vol. 7, pp. 11-29.

The inflow of people into the agricultural sector in 1948 and 1951 may be due to the implementation of the land reform program which started with 37.5% farm rent limitation in 1949, sale of public lands in 1951, and the Land-to-the-Tiller program in 1953. Some landlords who has been living in urban areas returned to the villages to complete whatever procedure might be required concerning their ownership of lands under the new regulations. This study also reveals a striking difference of agricultural emigration before and after 1952.

Based on expected agricultural population as a percentage of the total population, the present writers have estimated the agricultural emigration and the rate of agricultural migration from 1952 to 1975, as shown in Table 1. It shows emigration from rural areas for all the years except 1960, 1965 and 1967. We know well enough that not all migrants took pains to report their movements every time they went from one place for another. Bearing this fact and certain others in mind, one may interpret the large number of migrants to the farms in 1960, 1965 and 1967 as a sort of "feedback" caused by previous excessive emigration. It may even be conjectured that this immigration was the result of successful agricultural improvement.

Table 1 gives the annual estimated numbers and rates of agricultural emigration from 1952 to 1975. The agricultural emigration shown there is calculated by subtracting actual population from the expected agricultural population of the year. The expected agricultural population is estimated by multiplying the total population of the year with the percentage of agricultural population of the previous year. For example, the expected agricultural population of 1971 (6,068,000) is obtained by multiplying total population of 1971 (14,835,000) with the percentage of agricultural population of 1970 (40.9%). Subtracting the actual agricultural population (5,959,000) from the expected agricultural population (6,068,000), we have the estimated agricultural emigration (109,000) for 1971. This calculation needs two assumption: (1) that the natural increase rate of the agricultural population is similar to that of the total population, and (2) the percentage of agricultural population to the total population

of any given year is similar to that of the previous one.

It will be seen from Table 1 that agricultural emigration began to increase in 1952, reached a peak in 1964, and declined in the next three years. From 1968 to 1970 it was again on the increase but once more dropped in 1971. In 1970, the rate of agricultural emigration was about 5%, but fell down to 1.83% in 1971 and increased by 5.59% in 1975.

As not all agricultural population is engaged in farming, presumably part of the emigrants is non-farm labor. What proportion of the agricultural emigrants belongs to farm labor has been one of the important questions raised among laymen and scholars alike.

Table 1. Estimate of Agricultural Emigration by Percentage of Agricultural Population to the Total Population (1952-1975)

Year	Total pop. (1,000)	Agr. pop. (1,000)	% Agr. pop.	Expected agr. pop. (1,000)	Estimated agr. emigration (1,000) e = (d-b)	Rate of agr. migration $e \div b \times 100$ f
	a	b	c*	d	e = (d-b)	f
1952	8,128	4,257	52.4	-	-	-
1953	8,438	4,382	51.9	4,422	40	0.9
1954	8,749	4,489	51.3	4,540	51	1.1
1955	9,078	4,603	50.7	4,657	54	1.2
1956	9,390	4,699	50.0	4,760	61	1.3
1957	9,690	4,790	49.4	4,845	55	1.14
1958	10,039	4,881	48.6	4,959	78	1.60
1959	10,431	4,975	47.7	5,069	94	1.89
1960	10,792	5,373	49.8	5,148	-223	-4.19
1961	11,149	5,467	49.0	5,552	85	1.56
1962	11,512	5,531	48.0	5,640	109	1.97
1963	11,884	5,611	47.2	5,704	93	1.66
1964	12,257	5,649	46.1	5,785	136	2.41
1965	12,628	5,739	45.4	5,733	-6	-0.10
1966	12,993	5,806	44.7	5,808	2	0.03
1967	13,297	5,949	44.7	5,944	-5	-0.08
1968	13,650	5,999	43.9	6,102	103	1.72
1969	14,335	6,152	42.9	6,293	141	2.29
1970	14,676	5,997	40.9	6,296	299	4.99
1971	14,835	5,959	39.7	6,068	109	1.83
1972	15,289	5,947	38.9	6,070	123	2.07
1973	15,565	5,868	37.7	6,055	187	3.19
1974	15,852	5,802	36.6	5,976	174	3.00
1975	16,150	5,598	34.7	5,911	313	5.59

* Taiwan Statistical Data Book, CIECD, Executive Yuan, Republic of China, 1972.

Assuming that the proportion of agricultural labor to agricultural emigration is equivalent to the proportion of all the people in the 15-64 age bracket to the total population as shown in column b of Table 2, we can estimate the outflow of agricultural labor as shown on column c of the same table.

Table 2. The Estimated Numbers and Rates of Emigrating Agricultural Labor from 1952 to 1971

Year	Estimated Agricultural emigration (1000) a	Estimated % of agr. labor in emigrating agr. pop. b	Estimated emigrating agr. labor (1000) a x b = x (%)
1952	-	55.3	-
1953	40	55.0	22.0
1954	51	54.6	27.85
1955	54	54.3	29.32
1956	61	53.9	32.88
1957	55	53.5	29.43
1958	78	53.5	41.73
1959	94	53.6	50.38
1960	-225	53.2	-119.7
1961	85	52.6	44.71
1962	109	52.4	57.12
1963	93	52.4	48.73
1964	136	52.6	71.54
1965	-6	53.0	-3.18
1966	2	53.7	1.07
1967	-5	54.4	-2.72
1968	103	55.1	56.75
1969	141	56.1	79.10
1970	299	58.2	174.02
1971	109	57.8	63.00
1972	123	58.6	72.08
1973	187	59.3	110.89
1974	174	60.1	104.57

Source: Taiwan Demographic Fact Book and Taiwan Agricultural Year Book in Various Years

In the above table the proportion of emigrating agricultural labor force in the emigrating agricultural population might have been underestimated because not all emigrants could have brought their dependents with them when they migrated. This may also affect the estimated number of emigrating agricultural labor which may be smaller than the emigrating labor. Table 2 shows a net emigration of agricultural labor for most of the years; there were especially large emigrations since 1968.

II. Migration Pattern and Multiple Cropping Index

Agricultural emigrants can be classified into commuters, seasonal workers and permanent employees. In the early days, except a small number of permanent employees, the majority of those taking up non-farm work would still engage in farming. But as a result of rapid industrial development, the emigrants can hardly spare part of their time to help their parents on the farm. A survey indicates that only 1.9% of 860 male migrants and 1.5% of 1,223 female migrants still engage in agriculture after they have left the farm.^{2/}

The relative weight of three classes of emigrants has changed significantly in different stages of agricultural development in Taiwan. In the early 1960's, seasonal workers accounted for 57%, commuters 26% and permanent employees 17% of the total migrants. In the late 1960's, seasonal workers dropped to 26%, commuters shot up to 48% and permanent employees increased to 26%. The sharp decline in the percentage of seasonal workers indicated the shortage of farm labor during harvesting and planting seasons. Because of the small operation unit farm machines have not been largely used in Taiwan. This explains reason that even before emigration took place farm families felt labor shortage at harvesting and planting seasons but labor surplus during the rest of year. Now, decrease in seasonal workers means taking out the most needed part of farm labor that may cause change of cropping system. That is the pattern of migration may reflect to some extent different conditions of population-

^{2/} T. L. Lin and H. H. Chen, "Rural Labor Mobility in Taiwan", Agricultural Economics, Biannual publication, the Research Institute of Agricultural Economics, National Chung Hsing University, Taichung, Taiwan, China, June, 1970, p. 135.

agriculture structure different patterns of communication between farm families and the outside and locations of industrial development. Multiple cropping system is taken as one important variable to examine its relation with migration.

In order to examine if there is any significant relationship between patterns of migration and multiple cropping, three variables on migration and six variables on multiple cropping were derived from a study conducted by the Department of Agricultural Extension, National Taiwan University. Three migration variables are amount of emigration of each farm family, types of migrants proportion of migrant as of total family members, and above mentioned three types of migrant where the six multiple cropping variables are kinds of crop of farm family, unit farm acreage, multiple crop index of individual farm, men labores in each farm family and labor-land ratio (men/ha) of each family. Using these three migration variables and six multiple cropping variables, the relationship is examined at family level. Data was collected from 300 sampled farm families interviewed in July 1973.

Based on data collected from this survey, several hypotheses were set up to examine relationship of mentioned two set of variables. However, only one hypothesis indicating a significant relation between multiple cropping index and three migrant types will be discussed in the following section.

In Table 3, farm families are distributed according to type of migrant of an individual family has and his cropping index. Families with migrants of commuting have relatively high proportion in high multiple cropping index categories while families with migrants of permanent employees have relatively high proportion in low multiple cropping index. With an X^2 value of 25, the association between multiple cropping index and migration pattern reaches 0.05 level of significance. This association between migrant types and multiple cropping index at farm family level implies two important meanings: Types of farm migrant in an individual family is largely determined by a family's customary use of family labors. For example, in a family employing labor intensive farming may provide some pressure to

those who intend to migrate of asking them to be commuters. Of Course, motives of migration can not be simply examined from original society without considering pull factors from terminal society. Besides, the degree of strength of a primally relation in farm family may also cast some different extent of impact upon selecting one type of migration; on the other hand, farm families with commute migrant may still be able to cultivate intensively that results in high multiple cropping index. Where farm families with permanent migrant may have to operate farm extensively that results in low multiple cropping index.

Since migration is a matter of an individual choice, no one can stop it as far as there is more "pull forces" received by farmers. Therefore, it appeals that there is not much we can do about first situation whether to be commuter or permanent employee. However, it might be useful if could identify factors of determining such a choice, such as local job

Table 3. A Comparison of Migration Pattern and Multiple Cropping Index of Farm Families in Taiwan

Multiple Cropping Index	All migrants Are Commuters		All Migrants Are Part Commuters & Part Permanent Employees		All migrants Are Permanent Employees	
	Number	%	Number	%	Number	%
120 and below	5	14.3	0	0	5	5.7
120-140	0	0	1	4.5	13	14.8
140-160	0	0	1	4.5	7	8.0
160-180	3	8.6	6	27.3	10	11.4
180-200	11	31.4	4	18.2	24	27.3
200-220	6	17.1	6	27.3	7	8.0
220-240	2	5.7	1	4.5	5	5.7
240 and above	8	22.9	3	13.6	17	19.3
Total	35	100.0	22	100.0	88	100.0

$$X^2 = 24.9960 \quad \text{d.f.} = 14.00 \quad \text{PRB} = 0.035^*$$

Source: Department of Agricultural Extension, National Taiwan University, July 1973.

opportunities, family cohesiveness and existing agricultural system, etc. For policy implication, the second situation may deserve more attention from the view point of present status of agricultural development in Taiwan. That is, if multiple cropping system is the best alternative to Taiwan agriculture, then what strategies can be employed to aid farm families with seasonal workers or permanent to cultivate more intensively? Or, from resource use point view, those families with few labors remained may have to be discouraged from farming, so that those remained farm families may have opportunities of expanding their operational unit by taking some land from those families with many permanent employees' migrant.

Besides the above mentioned relationship between multiple cropping and migrant types, following observations are made from the same source of data: (1) no certain relationship can be traced between the number of emigrants in a farm family and the kind of crop, the kind of agricultural enterprise, the area of cultivated land, the multiple cropping index and the man-land ratio, (2) no significant relationship between migrant-total family member ratio and kinds of agricultural enterprise existed, (3) types of migrant do not have specific relationship with kind of crop agricultural enterprise and area of cultivated land, (4) no significant relationship existed between men-labor ratio and multiple cropping index.

Because the multiple cropping index in a special region can reflect the degree of population pressure on cultivated land and also the level of technique of land use, it may have close relationship with migration motivation. A hypothesis can be stated as an area with high multiple cropping index is more likely to create high out-migration. Specifically, in a place with enough or surplus farm labor this hypothesis may imply correctly. However, in a place with labor shortage such as a new developed region, because of need of more labors to increase level of intensive farming, the result of high multiple cropping index may cause large amount of immigration instead of outmigration.

Some important relationships between multiple cropping index and migration rate can be observed from Table 4. To begin with Taitung, east coast of the island, relative low multiple cropping index is shown

with relative high immigration for most of the years studied except in 1970. The low multiple cropping index in this area imply its relatively low pressures of population on cultivated land and low level of land use technique that can absorb people from other areas where the population density is relatively high and land is intensively cultivated. Penghu or Pescadoes is shown with both relative higher multiple cropping index and relative higher emigration rate than other areas in the early years. This statistics reveals a tendency that population migrated from a place with high population density over cultivated land to other places with low population density over cultivated land. However, in the pastwar period of Penghu, the multiple cropping index has not been only lower than other regions, but also lower than its own indexes in pre-war period. Yet the emigration tendency remains same in post-war period as its pre-war period. In other words, both low multiple cropping index and high emigration rate existed in post-war period of Penghu. This fact may be interpreted partly as the result of high emigration caused labor shortage and man power drain that drew back agricultural development. Another reason, probably the most important one, may be due to the rapid industrial development and urbanization on Taiwan island that attract people from Pescadoes with limited resources and unpleasant weather. In this connection, previous stated hypothesis between high multiple cropping index and high emigration rate or low multiple cropping index and high immigration rate may have to be modified by saying the above mentioned relationship is up to change depend on its potentiality of future development in the area and outside. In the case of Penghu, though has low multiple cropping index, will not attract in-migration in the future because of lack of natural resources for further development. Some regional variations on the relationship between multiple cropping index and migration rate can be traced as: (1) Among all other regions with an upward trend in multiple cropping index are shown negative migration rates in most years from 1905 to 1960 and 1965, only Taipei and Kaohsiung two regions were shown relatively high immigration caused mainly by rapid development of indus-

Table 4. Total Net Migration Rate and Multiple Cropping Index in 7 Regions of Taiwan

Year	Province		Taipei		Tayuan		Taichung		Tainan		Kaoshiung		Taitung		Penghu	
	MCI	MR	MCI	**	MR	MCI	MR	MCI	MR	MCI	MR	MCI	MR	MCI	MR	MCI
1906	102.99	13.50	148.53	1.81	132.04	2.52	140.78	3.87	70.20	8.96	90.14	0.45	33.95	-7.65	157.97	
1910	109.31	-2.62	146.64	-5.55	137.15	1.54	128.03	4.33	79.74	8.11	101.60	15.86	101.19	-15.84	140.63	
1915	121.71	17.70	157.96	0.82	139.65	-3.48	135.16	-5.00	89.46	-3.87	116.67	8.48	83.41	-20.28	145.22	
1920	116.99	48.81	146.62	-59.61	125.87	8.73	126.00	-15.21	91.70	40.42	113.68	61.95	78.66	-21.38	-	
1925	125.74	11.34	161.07	-6.67	143.15	6.48	139.48	11.34	97.94	6.91	112.17	50.20	97.37	-	-	
1930	125.76	7.33	162.05	-12.27	145.02	2.46	136.84	1.72	102.37	10.87	112.87	37.94	95.46	-25.60	148.98	
1935	137.35	-0.37	166.16	-20.77	154.46	-0.34	149.56	-0.10	118.55	6.81	120.44	28.93	105.55	-16.56	149.03	
1940	136.70	7.21	157.55	-3.48	148.36	3.53	147.66	0.65	119.49	24.16	130.48	46.73	125.79	-30.41	148.49	
1945	110.89	73.02	132.77	32.71	128.42	32.64	129.65	29.24	97.22	59.69	87.88	84.46	103.17	-2.97	128.99	
1950	170.40	-14.26	172.24	-21.60	154.98	-13.27	198.08	-15.14	161.76	10.68	170.73	11.90	157.72	-46.84	146.60	
1955	171.20	14.99	169.42	-3.13	148.89	-6.57	195.44	-9.42	167.01	2.44	178.35	21.61	161.08	-16.92	148.02	
1960	183.50	14.95	174.62	-3.82	182.29	-5.36	209.93	-5.64	171.74	5.62	193.51	3.42	157.31	-3.74	132.29	
1965	189.30	16.86	171.23	-4.31	182.01	-2.21	215.03	-4.75	179.57	5.43	205.04	0.82	171.33	-20.08	125.76	
1970	182.70	14.78	170.97	-0.41	181.49	-2.40	201.01	-11.24	177.00	7.72	196.50	-15.32	150.77	-39.44	131.60	

* MR: Migration Rate

** MCI: Multiple Cropping Index

Source: Taiwan Census Data, Taiwan Demographic Fact Book and Taiwan Agricultural Year Book in Related Years.

trialization and urbanization. (2) Taoyun, Taichung and Tainan were three areas with high emigration caused by farm labor surplus as well as high multiple cropping index. These three areas have been notorious for agricultural production. Because of their accessment to nearby industrial sections like kaohsiung in the south and Taipei in the north, great number of farm population has been pulled out. (3) Decline of multiple cropping index in different areas at different time may reflect patterns of MCI-MR association. For example, in the situation of emigration rate multiple cropping index was shown decline for Penghu since 1955, for Taoyun since 1960, for Taichung and Tainan since 1965.

III. Characteristics of Farm Migrants and Their Occupational Attainments

1. Characteristics of Farm Migrants

Previous studies of migration in Taiwan have defined characteristics of migrants in terms of age, sex, education, etc. On the aspect of age, it has been identified as most of migrants belong to age range of 15 to 44. The one conducted by JCRR in 1968 has pointed out 87% of migrants studied falls into this age range. Specifically, 1.1% of sample studied belongs to age 14 or less, 16% belongs to 15-19 age cohort, 12.4% to 20-24 age cohort, 24.2% to 25-29 age cohort, 15.3% to 30-34, 10.8% to 35-39 and 8.2% to 40-44 age cohort^{3/}. Data from another study conducted by CIECD in 1968 show the average age of immigrants of Taipei City is 30.95 in 1958, 31.59 in 1960, 33.07 in 1962, 29.55 in 1964 and 27.65 in 1966.

A case study indicates 52% of migrants studied left farm at the age of 15 to 19, 24% at the age of 20-24^{4/}. That means more than three-fourths of the agricultural migrants are farm youth of age below 24 that

3/ IBID p. 132

4/ T. C. Huang, "Migration and Job Achievement of Rural population in Taiwan - A Case Study on Shiao Hsin Yin Village", Department of Agricultural Extension, National Taiwan University, June 1967, p. 8.

can be classified as active farm labor forces.

Studies conducted in the U.S. have often suggested that education is a determinant of emigration. That is the more educated ones are more likely to migrate. This proposition holds true only in the early stage of rural migration in Taiwan. For example, the 1968 JCRR's study shows that 23.86% of 7,642 emigrants had no education, 61.50% had elementary school education, 7.73% had junior high school education, 6.28% had senior high school education and only 0.58% graduated from college. It is clear by now the educational level of migrants is varied considerably according to the age of sample studied. A study made by the present authors finds among 129 migrants of age 15-29, 26% of them completed education 6 years or less, 25% completed education 7 to 11 years and 19% completed education beyond 12 years. The tendency at the present stage of development is that rural youth are all in great mobility regardless of educational level obtained. Therefore, it seems not meaningful only examine the percentage of educational level of migrants without considering the proportion of migrants of different education from population of each respective educational level.

Because the amount of agricultural population who receives college education is very small, we can not afford to take out large proportion of college graduates from rural area.

Based on data from 1970 agricultural census, different educational level of farm household population and farm household population employed outside of home are listed on Table 5. Dividing the former from the latter, we can get proportion of farm household population employed outside of home from farm household population by different education. The result reveals that 19% of agricultural college graduates, 9% of agricultural middle school graduates, 17% of non-agricultural college graduates, 11% of non-agricultural middle school graduates and only 5% of primary school graduates employed outside of home. We can conclude from these statistics as saying proportionally, more high educated agricultural population than low educated agricultural population employed outside of farm.

As the nature of rural migration took out capable youth and young females from rural, it results in an increase of the relative number of persons in the higher age groups and a decrease in the relative number in the lower age groups. This fact reveals a tendency that more small farms will be in the hands of the late Middle-aged or elderly operators who have some years of activity remaining before retirement or death. Under foreseeable future few of these are likely to sell their lands out. This problem gives few opportunities for others to enlarge operation scale. Although in aggregate more male than female migrate out from rural, the young females migrate more than young males. This is because many female employments do not require higher education. Secondly, the turn over rate of female employment is rather higher of male's. For example applying intercensus survival ratio technique, net migration by age and sex of Taiwan Region of 1956-1966 is calculated below:

Table 5. Farm Household Population and Farm Household Population Employed Outside of Home by Educational Attainment

Educational Attainment	Agricultural School		Non-Agricultural School		
	College/ University	Middle School	College/ University	Middle School	Primary School
Farm Household Population by Educational Attainment (1)	2,348	47,449	20,055	311,081	2,005,268
Farm Household (2) Pop. Employed Outside of Home by Edu. Attainment	449	4,449	3,425	3,425	104,208
% (2)/(1) x 100	19.12	9.38	17.08	10.78	5.20

Source: The Report of 1970 Agricultural Census of Taiwan -Fukien Dist. of the Republic of China, Vol. II Book, p. 125 & p. 185.

Table 6. Sex Ratio of Emigrants in Different Age Groups of Tainan Region

<u>Age</u>	<u>Male/Female Migration Ratio</u>
10-14	1.02
15-19	1.08
20-24	0.39
25-29	0.55
30-34	0.90
35-39	3.04
40-44	1.69
45-49	2.52
50-54	1.84
55-59	0.51

Source: T. S. Wu, Rural Migration and Changes of Agricultural Population, 1972, p. 38.

The fact that females are more migratory in the age group of 20-24 in which marriageable age falls on, explains the difficulty for rural boys to find marriage mates. From sociopsychological point of view, this may be one of the main reason that cause rural boys to give up heritable land property and farming job.

2. Geographic Destinations and Occupational Attainments

The great mobility of rural people is connected with the relative low rate of landownership, the low income, the insecurity of that income, and less recreational opportunities. This notion occurs because rural people think that their minimum needs can not be met by the existing conditions within their society. Certain members decide to move out of it and going to a destination where they receive conditions more adequate to satisfy their unsolved minimum needs. As in many other countries, destinations of rural emigration are usually directed toward urban in-

dustrial sectors.

A case study referring migration in a rural village before 1961 indicates that 58% of 71 migrants moved to metropolitan sector out of the prefecture, 18% moved to other townships within the county and 10% moved to other villages within the township^{5/}. A recent case study on migration of a village nearby Taichung City has found 57% of 162 outmigrants moved to the nearest city of Taichung, 36% moved to other cities and urban towns, 6% moved to rural towns and 1% did not mention their destinations^{6/}. Taipei (Taipei City and Taipei county) and Kaohsiung, the two largest cities in Taiwan, one located at north and the other at south, become the two most popular destinations for rural migrants. Average annual net migration rate shown in Table 7 illustrate the direction of migration very well. For example the annual average migration rate between 1960-1969 for Taipei County is 20.2, Taipei City 16.5, and Kaohsiung City is 24.6. Between 1970-74 is 27.9, 13.2 and 19.4.

Data from another study conducted by the Department of Agricultural Extension at National Taiwan University in 1972 Points out occupational attainments among 207 rural youth migrants are 32% of mechanical workers, 17% of electricians, 8% of drivers, 7% of small restaurant employees, 5% of small business employees, 4% of civil service, 4% of store clerks, 2% each of handicraft workers, carpenters, tailors, plastic workers, textile workers, medical doctors, cement workers and welders and 1% each of painters, manual workers, cane workers, package workers and transportation workers.

Besides education and age, job opportunities are also varied according to sex difference. Male migrants mainly choose low skill levels of mechanical and electronical jobs and small business while female migrants mainly choose cloth maker, clerks, barbers and waitress^{7/}. Job chosen

5/ IBID p. 13.

6/ R. C. Sy "A Case Study of Migration of Ho Village-Examined by Individual Migration Theory and Ecological Migration Theory". Tonghai University, Taichung, 1973, Table 6.

7/ T. S. Wu, "Rural Youth Migration and Their occupational Achievement" the Bulletin of the Institute of Ethnology Academic Sinca, No. 29, Spring 1970, p. 282.

Table 7. Annual Average Migration Rate by Administrative Division 1960-1969 and 1970-1974

Administrative Division	End Pop. of 1964	In migration 1960 - 1969		Out migration 1960 - 1969		Net Rural Mig.	1960-69	1970-74	
		Male	Female	Male	Female		Annual Average Mig. Rate (1,000)	Annual Average Mig. Rate (1,000)	
City									
Taipei	1,085,103	475,169	422,271	392,804	325,216	179,420	16.5	13.2	
Keelung	268,817	82,289	66,320	77,385	61,789	9,426	3.5	-4.6	
Taichung	348,762	119,596	112,233	102,722	92,051	37,056	10.6	19.9	
Tainan	386,960	109,289	101,499	97,902	89,078	23,808	6.1	1.8	
Kaohsiung	566,471	238,065	215,584	170,002	143,945	139,702	24.6	19.4	
County									
Taipei	897,034	333,376	336,398	288,269	249,636	181,869	20.2	27.9	
Ilan	372,548	43,618	30,884	60,040	47,581	-33,119	-8.8	-10.8	
Taoyuan	566,297	110,437	105,468	106,029	96,326	13,550	2.3	10.5	
Hsinchu	515,897	76,080	64,121	95,227	81,973	-36,999	-7.1	-7.6	
Miaoli	472,674	55,220	52,089	76,572	78,995	-48,258	-10.2	-12.5	
Taichung	672,349	112,539	105,744	131,231	128,403	-41,351	-6.1	-4.4	
Changhwa	960,017	103,563	88,007	149,282	138,446	-96,158	-10.0	-10.4	
Nantou	457,049	61,997	53,611	72,925	70,523	-27,840	-6.0	-13.9	
Yunlin	734,867	61,588	55,793	97,207	99,262	-79,088	-10.7	-18.7	
Chiayi	777,718	80,088	73,666	119,693	114,626	-80,565	-10.3	-19.1	
Tainan	855,985	112,081	99,490	156,587	148,350	-93,366	-10.9	-18.2	
Kaohsiung	693,680	108,875	101,952	123,401	117,717	-30,291	-4.3	4.5	
Pingtung	724,871	79,125	68,263	95,528	90,355	-38,495	-5.3	-9.9	

- Source: 1. Taiwan Demography Monthly, Vol. 5, No. 2, Department of Civil Affairs, Taiwan Provincial Government.
2. Since 1968 4 townships of Taipei County and Yangmingshan District are included into Taipei City.
3. For comparison Yangmingshan District is also separately calculated.

among commuters, seasonal workers and longterm employees are also different from one another. Jobs chosen by commuters are local factory workers, public officers, school teachers, office workers and handicraft workers. Seasonal Workers' main choose are housekeepers or househelpers, carpenters and plasters. Major jobs secured by long-term employees are factory workers, clerks and office workers, public officers and teachers^{8/}.

IV. Roles and Contributions of Farm Migrants on Multiple Crop Farming

Roles played by migrant before their departure from farm are varied considerably according to their age and education. Those migrants age below 14 can play a very minor role or supplementary to their parents' or brothers' daily farm work. Rural youngsters almost can not make any contribution to the intensive farming. Those farm youth with only elementary school education at age of around 14 can't find a job with good pay. They usually, if not always, can hardly save money for their own use or send home for their parents who remain on farms. They are generally employed as an apprenticeship student in some low skilled shops. Very often their parents have to pay tuitions for them at the early stage of migration.

Migrants of age between 15 and 40 usually can play more important roles on the farm. To manipulate multiple cropping system, we do need this age group of farm youth and young adults. Those young migrants below age 25 usually left behind farm lands on the hands of their parents of age around 50 or elder brothers who still can handle farming. To those farm migrants beyond age 30, they have problem in making a proper arrangement to maintain a good productivity of the land. The best solution is to entrust land to close friends or to a joint cultivation group. The worse solution is to ask their aged parents to take care which results in low productivity of land. For policy implication, migrants should be encouraged to sell out land or entrust to some friends or joint cultivation team with the purpose of maintaining land productivity.

^{8/} IBID pp. 135 - 139.

Different types of migrants contribute differently to their farms due to distance of migration and the kinds of job they engage. As commuters leave home in the morning and come back in the evening, they are more accessed to farm operation. For seasonal workers leave home for certain period and only come home at harvesting and planting seasons for short period of stay. Where permanent employees can hardly find time to leave their jobs for home. They only go home at new year or on some festivals. Their contributions to farm operation, if any, are the least one among three types of migrant.

Two kinds of commuters can be identified on the nature of job they engage: labor commuter and office work commuters. Accordingly, each of them contribute differently to farm operations. By its definition, labor commuters are employed at factories, construction companies and sugar corporation's farms either located at country sides or cities. Office work commuters are mostly working at township office, farmers' association, sugar corporation's local office and public schools. These two kinds of commuters contribute differently according to their times and knowledges: (1) Labor commuters work on farms during their off days as full time farmers do. But office work commuters do not work on farms as often as labor commuters. However, they contribute more in decision making as farm managers do. (2) As pointed earlier, office work commuters work either directly or indirectly in agricultural agencies, they can take this advantage in gathering most up-to-date information regarding credit service, agricultural innovation and marketing opportunities. Both kind of commuters engage in farming continuously. The multiple cropping system and other intensified farming devices advocated by government are in fact largely developed through those "mobile-agents". We may hypothesize that multiple cropping index is not decreased because of some member of farm family becomes commute migrants but may be rather increased because of their contributions as an agricultural extension agents.

Seasonal migrants can be also classified into two categories: seasonal migrants work in non-farm sector and seasonal migrants work in farm sector out of home areas. In the early days, most of seasonal farm migrants belong to the second one. Before or after harvest season or plant season begins in

one sector of farm area, young strong farmers migrate to an area where harvest or plant seasons start earlier or later: For rice crop, normally, they migrate from south to central or from central to north. For sugar cane, seasonal migrants move from west coast to inner area where sugar cane are grown more. As the rapid increment of factories since 1960's, the most of seasonal migrants poured into factories where they work indoors and regularly. As the result, more seasonal migrants work in farm become seasonal migrants work in non-farm. And because factory work require labor regularly and stable, those seasonal migrants are finally absorbed by factories as permanent employees. Trend seems to be more permanent employees and less seasonal migrants labors in the future. This fact explains the difficulty of getting seasonal workers as of "power tiller plowing team" to plow land.

Long term migrants usually have more stable and better income than other types of migrant. They contribute in terms of sending money back home rather than through labor participation on farm. The amount of money contributed by long-term migrant to home and farm is largely determined by their income levels and their relations with family members. The author has interviewed some unmarried house construction workers, barbers and factory workers about the amount of money they can send home monthly. The amount is somewhere from several hundreds to 1,500 dollars that is about one third to one half of their monthly income. Unmarried young migrants are more willing to send money home because they feel they have to take care of their parents left behind. Once migrants themselves or their brothers at home get married, chances of sending money are low. From farm operation point of view, the contribution made by long term migrants is very much determined by migrants marital status. Although it has been accepted based on filial piety point of view, parents can expect economic help and care from children, by and large this kind of pressure that exercise upon migrated sons or daughters is diminishing. For policy implication, appropriate government aid strategies should be provided for those aged farmers left behind by their children. Social security and other social welfare should be implemented for aged farmers. On the other hand adult extension education program should be strengthened toward those farmers. Still most important thing is to develop more future young farmers through rural youth educational program through agricul-

tural vocational school and 4H Club work. Regulations should be implemented to help those young farmers to obtain enough land either through public lands or from those aged farmers left behind by their migrated children.

V. Relationship of Agricultural Emigration and Multiple Cropping Index

1. Stages of Agricultural Emigration Rate and Multiple Cropping Index

In section 1, we have examined agricultural emigration rate from 1947 to 1974. The amount of emigration was obtained by subtracting actual population from expected agricultural population of the year. As the expected agricultural population was estimated by multiplying total population of the year with percent of agricultural population of the previous year, no special consideration is taken rechanges happened within agricultural population. In other words, the estimation is made by assuming (1) same growth rate for agricultural population and total population and (2) percentage of agricultural population as of total population of one particular year is equal to the previous one. We realize there might be some limitations under this assumption.

The yearly, 5-year average and 5-year moving average rates of emigration are presented on column 1, 2 and 3, while the yearly, 5-year average and 5-year moving average growth rates of multiple cropping index are listed on column 4, 5 and 6 of Table 8. Examine yearly rate of agricultural emigration, negative emigration rates are shown for 1947, 1948, 1950, 1960, 1965 and 1967. That means in those six years immigration of non-agricultural to agricultural occurred. It is understandable to see immigration occurred in 1947, 1948 and 1950 because at the end of 2nd world war almost no industry existed in urban sector that force people to return or go to agriculture. However, it is not quite logical to see positive emigration of 5.80 in 1949 that both before and after this year, immigration flow occurred. The negative emigration or immigration for 1960, 1965 and 1967 are also in contrary to the fact that emigration flow has occurred as the result of industrial development since 1960's. These yearly variations on agricultural emigration had been interpreted in section 1. Keeping these suspicions in mind we have to be cautious about making interpretation year by year.

Looking yearly growth rate of multiple cropping index. The 1st striking growth rate is the 21.42 for 1947. As yearly growth rate is calculated by comparing this year with the previous one, therefore this large growth rate really only imply that multiple cropping index of 1947 is largely increased in compare with the one of 1946. Stated differently, agricultural development was largely recovered after the war. After 1950, multiple cropping index has been remained without much variations until 1961 and particularly 1969. That means between 1950 and 1960, the multiple cropping index in Taiwan is considerably stable with few years' exception.

On Colum 3 and Colum 6 in Table 8, 5-year moving average rate of agricultural emigration and 5-year moving average growth rate of multiple cropping index are presented. These two sets of rates show more smooth trends of agricultural emigration and growth of multiple cropping index during past two and half decades by canceling yearly variation. However, from these presentations both agricultural emigration rate and growth of multiple cropping index can not be very clearly visualized at different time stage.

Clearer pictures can be obtained by examining 5-year average rate of two measurements. (1) From long range point of view, agricultural emigration rate has been kept same between 1947 - 1955. It shows decline of emigration or increase of immigration for period of 1956 - 1960. The emigration rate began to increase from 1961 up to 1970 with a climax at 1970. After 1970, although emigration has been still going on, however the amount of migration is less than before due to too much out flow happened in the previous years. (2) Five-year average growth rate of multiple cropping index shows that multiple cropping index has been showing an increment tendency since the end of world war II up to 1960 and began to show a decreasing tendency after 1961. After 1966, negative growth rate has been shown with an increasing tendency. (3) Glancing both 5-year average measurements, we can divide agricultural development into two large development stages: one representing agricultural golden age between 1947 - 1960, another implying agricultural slowdown after 1961. Three substages are identified within agricultural golden age of 1947 - 1960 according to Table 8. Also three

Table 8. Comparison of Rate of Agricultural Emigration and Growth Rate of Multiple Cropping Index

Year	Rate of Agricultural Emigration			Growth Rate of Multiple Cropping Index		
	Yearly	5-year Average	5-year Moving Av.	Yearly	5-year Average	5-year Moving Average
1947	-0.67	0.89	0.72	21.42	9.87	7.82
1948	-0.77			8.96		
1949	5.80			6.60		
1950	-0.80			2.50		
1951	0.05			-0.39		
1952	1.01	0.86	0.86	1.27	0.10	0.10
1953	0.91			0.35		
1954	1.14			0.75		
1955	1.17			-1.50		
1956	1.30			2.51		
1957	1.14	0.35	0.35	1.99	1.40	0.88
1958	1.60			0.50		
1959	1.89			0.89		
1960	-4.19			1.10		
1961	1.56			1.25		
1962	1.97	1.50	1.50	-0.27	0.63	0.71
1963	1.66			-0.32		
1964	2.41			1.79		
1965	-0.10			0.69		
1966	0.03			0.37		
1967	-0.08	2.19	1.79	-1.37	-0.70	0.39
1968	1.72			0.43		
1969	2.29			-2.07		
1970	4.99			-0.87		
1971	1.83			-1.86		
1972	2.07	1.95	2.87	-2.12	1.99	-0.52
1973	3.19			-0.46		
1974	3.00	2.52	3.02	2.69	-0.44	

sub-stages are listed within slowdown period after 1961. A brief interpretation is accounted with an intention of differentiating stages of agricultural development in Taiwan. (4) In the first three stages, 1947-1950, 1951-1955 and 1956-1960 out flow of agricultural population is low and with a decreasing tendency where the multiple cropping index is rather high with an increasing tendency. During the 3rd stage the period of 1956 to 1960 may be called the climax of agricultural development with lowest emigration rate and highest growth rate of multiple cropping index. We have reason to believe that new agriculture technologies were largely implemented by farmers under the encouragements from local agricultural extension workers. (5) During the 1st two stage, 1947 - 1950 and 1951 - 1955, relative increment of growth rate of multiple cropping is perhaps due to the result of land reform program that stimulates incentives of farmers who used to be tenants. (6) During the 4th and 5th stages, 1961-1965 and 1966-1970, larger scale of emigration has taken place and multiple cropping index suddenly decreased. As the result of industrial development in urban sectors took out agricultural population that resulted in the decline of multiple cropping index. Certainly there are some other factors that contribute to such a decline in multiple cropping index. (7) There seems to be a negative correlation existed between agricultural emigration and multiple cropping index. Extending this hypothesis for future trend in Taiwan, it looks like the multiple cropping index can be increased because the emigration is decreasing. However, this proposition is true only if we have good quality of labor forces remain in farms. This condition suggests that both quantity and quality of agricultural population should be considered in explaining agricultural development as multiple cropping index.

The foregoing discussion of agricultural migration and multiple cropping index at different period may be summarized as follows.

2. Multiple Crop Farming Behavior Under Farm Labor Surplus and Shortage Periods

As emigration took out young and active farm labors from individual farms, and it does not pay off to rely upon hired labors, individual farm

Development Stages of Multiple Cropping Farming and Agricultural Migration

<u>Stage</u>	<u>Period</u>	<u>Development status</u>	<u>Characteristics of Agr. Migration</u>
1	1941-1950	Recovering	Low out-migration, high multiple cropping index.
2	1951-1955	Increasing Development	Low out-migration, high multiple cropping index.
3	1956-1960	Full Development	Very low out-migration, high multiple cropping index.
4	1961-1965	Decreasing Development	High out-migration, low multiple cropping index.
5	1966-1970	Withdrawl	Very high out-migration, negative multiple cropping index.
6	after 1971	Recovering?	High out-migration, negative multiple cropping index.

family began to modify crop systems so that can let labor demand adjust to changes of labor supply. Speaking for the whole island, farm shortage might be occurred since 1966 when multiple cropping index started to drop down.

Although changes in multiple cropping system may be varied considerably from region to region, yet some of the common features can be summerized as follows: discourage expending operational size by selling or entrusting part of lands to friends, decreasing crop acreage that need intensivelabor input, adopting new crops and new cropping system which require labor less, outting working hour down by employing farm machines for cultivation, Planting, harvesting and transportation, employing new techniques or cropping system that need less labor.

Crops like rice and sweat potato require more intensive labor have been dropped by those farm families encountering labor shortage caused by emigration. Both, rice and sweet potato require much labor in planting, harvesting, drying and storage and shown decrease in crop acreage since 1968. The harvest acreage of sweet potato was decreased from 240,316 ha. in 1968 to 156,705 ha. in 1975. Peanuts need more labor at harvesting are

also shown decrease in acreage since 1965. The harvest acreage was 103,621 ha. in 1965 or 418% of harvested acreage in 1941, decreased to 64,121 ha. in 1975 or 259% of harvested acreage of 1941. Soybeans, another kind of crop needs much time to collect seeds also began to decrease acreage since 1963. It has been decreased from 53,924 ha. in 1963 to 41,417 ha. in 1975. Another significant change is on jute production. During labor surplus period, jute grower can easily ask neighbors to help in splitting off textile from jute stem by giving them stems as rewards. Today very few neighbors will do this kind of work with such kind of rewards. Jute harvested area was sharply decreased from 7,030 ha. in 1969 to 221 ha. in 1975. Above mentioned crops in general not only require more labors but also require continuous care that require full time farmers to stay on farms.

On the contrary, fruits lands and fish ponds have been expanded very fast in recent years as the result of great number of farm population migrated out. Both fruits and fish raising need more time at the beginning but not much at the rest of growing period. Farmers not only can use the rest of their time to engage in other business but do not have to worry about hiring labors.

So far we have discussed the result of labor shortage caused farm families to reduce crops acreage that require high input of labor. Some farm families changed intensive farming to extensive one without changing crops. That means they cultivate crop more roughly than they did before. For example, some farmers only practice two times of weeding in paddy field instead of four times as it used to be. Another example in sugar cane growing is less inclined to strip off leaves from stems as often as in the old days. One of the most striking advocacy is to seed planting into paddy field instead of through nursery bed. These kinds of change in farming behavior will not only cause reduction in agricultural production but, also bring down the villagers' moral toward farming.

Changes of farming behavior from intensive one to extensive one has clearly resulted in decreasing per unit production and multiple cropping index. Comparing crop yield of 1967 and 1975, we notice that unit production like upland rice, sweet potato and peanut has been decreased. The

decline of unit production of these crops could be also affected by unfavorable change in natural environments or other reasons. But it undoubtedly has been affected by change of farming behavior from labor-intensive input to labor-extensive input.

Table 9. Unit Production of Upland Rice, Sweet Potato and Peanut of 1967 - 1975

Year	Yield per ha (kg/ha.)		
	Upland Rice	Sweet Potato	Peanut
1967	1,450	15,734	1,399
1968	1,534	14,335	1,117
1969	1,379	15,906	1,103
1970	1,360	15,044	1,397
1971	1,331	15,053	1,130
1972	1,562	13,901	1,233
1973	1,701	15,959	1,351
1974	1,787	15,476	1,458
1975	1,590	15,337	1,427

Source: Taiwan Agricultural Year Book, 1972 Edition, Department of Agricultural and Forestry, Provincial Government of Taiwan, July 1972, pp. 79-124.

VI. Conclusion and Implications

The main objective of this paper is to examine the relationship between agricultural emigration and multiple cropping system in Taiwan. This paper started by presenting the trend of agricultural emigration. In this part both the number and rate of emigrating agricultural population as well as labor have been discussed. In the second part, some relationships between migration pattern and cropping index have been discussed on three aspects:

(1) The relative low and stable emigration from the agricultural sector in the early period after the end of the second World War had not made the multiple cropping index to decrease, but the rapid emigration in the recent period has made the multiple cropping index to decrease since 1966. (2) In examining the relationship between agricultural emigration and multiple cropping index in different regions, the relative low multiple cropping index regions have had a relative high capacity of absorbing agricultural labor from other regions, where as the relative high multiple cropping index regions have been shown with labor emigrating. This fact was quite clear during the pre-industrialization period but become irregular during the high industrialization and urbanization stages. (3) In comparing the migration pattern with the multiple cropping index at the farm household level, commuting migrant is the one migration pattern which associated with high multiple cropping index. This implies either that commuters can contribute more labor to farming than other kinds of migrants or because farm household in seeking high multiple crop farming need more part time labor from emigrating members than other types of farm households do. After this part of presentation, the characteristics of farm emigrants and their occupation attainment, the role and contribution of farm migration on multiple crop farming, trends of migration rate and multiple cropping index were presented in Parts III, IV and V, respectively.

Since the agricultural structure in south Asian countries are quite similar to Taiwan's situation, they might follow Taiwan's experience on emigration and farming as the result of developing industry in urban areas. It is certainly not all experiences in Taiwan agriculture and overall socio-economic development are useful to south Asian countries. However, they may pick up those are useful and also learn from the unexpected occurrences in Taiwan's development process. As it was stated before, no strategies and preparations were planned before the industry took out farm labors. This caused labor shortage in farm families that result in decline of multiple crop index or other intensive farming measurements.

In order to avoid the maladjustment between agricultural emigration and multiple crop farming which Taiwan experienced, these countries are suggested to establish the following development policies or strategies: (1) to direct agricultural emigration toward the commuting pattern through establishing factories in the countryside instead of centered at urban sector. (2) to promote agricultural mechanization from the early stage of agricultural labor outmigration taken place. (3) To plan agricultural emigration toward a slower rate or more optimum rate by increasing agricultural price to attract farm population to remain on farming.

「台灣農業人口外移型態與複種作物經營」

吳聰賢 ※ 蔡宏進 ※※

中 文 摘 要

本省由於工業快速發展，而農業發展較落後的緣故，造成鄉村農業地區的人口大規模地移往都市工業中心。這種水平的移動引起多方面的改變，其中最廣泛被提到的，即農場勞力的短缺。因此集約勞力經營無法像以往般地受到鼓勵。

本研究的主要目的在探討台灣農業人口外移與複種作物制度之關係。文中首先指出本省農業人口外移趨勢：此一部份論及農業人口、農業勞力的外移量與外移率。第二部份說明遷移型態和作物指數之關係；本部份分三方面討論：(1)二次大戰後初期，農業人口較少外流且較穩定，尚未造成複種指數的下降；至一九六六年後，外移率開始促使複種指數下降。(2)觀察不同區域農業人口外移與複種指數的關係。複種指數較低地區具有吸收其他地區農業勞力之能力；反之，複種指數較高地區，農業勞力顯現外移情形。這種現象發生在工業化之前時期，但在高度工業化和都市化時期，此現象却變得不規則。(3)在農家層次上，比較遷移型態和複種指數關係。通勤的遷移者，這種遷移型態和高的複種指數有關，亦即此種遷移者比其他遷移者（永久性遷移者及季節性遷移者）貢獻更多的勞力在農業經營上，或者可以說高複種指數作物經營的農家比其他農家需要更多家中遷移分子的部分勞力。另外在第三、四、五節分別討論遷移者的特性和職業的獲得，遷移者在複種作物經營上扮演的角色和貢獻，及遷移率與複種指數的趨勢。

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