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Number 56

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Thailand:
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FACULTY OF ECONOMICS

มหาวิทยาลัยธรรมศาสตร์
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THAILAND:

REGIONAL MIGRATION AND DEVELOPMENT, A REGRESSION ANALYSIS[1/]

by

Rachaniwan Thavornjit

Since Thailand's Third National Economic and Social Development Plan (1972-1976) has placed a greater emphasis on the decentralisation of government administration and other planned economic activities, a good understanding of migration patterns among different localities becomes a necessary prerequisite for effective regional planning; this is especially true in the areas of education, employment, housing and general infrastructure. A growing concern with the 'migration factor' has become evident among planners and researchers in several recent studies. Using 1960 Census data, Suchart Prasithrathsin (1968) identified patterns of migration within the Kingdom of Thailand and demonstrated a positive correlation between population density, inmigration by males, and the level of tertiary employment among the economically active population aged 11-65 years. In a more recent study, based on 1970 Census data and using a gravity model S. Garnjana-Goonchorn (1975) found that inmigration to the Bangkok Metropolitan Area[2/] from other provinces was positively correlated with the size of population in the places of origin, but negatively correlated with the distance between

those provinces and Bangkok. Other statistically significant correlates of migration included average monthly earnings and employment opportunities. As might be expected, the study showed that high monthly earnings and low unemployment in any community attracted more migrants. The educated were more sensitive to these differentials and able to move quickly to the areas where facilities and amenities were relatively more abundant. Textor (1961) and Meinkoth (1962) conducted separate surveys on migration from the Northeast and concluded that outmigration from that region was temporary in nature and mostly confined to labourers. The reasons given for outmigration were inadequate cash income, a lack of employment opportunities in the region, and large family size. The particular emphases of such surveys no doubt influence the nature of the results, and one must be wary of generalising from them to a wider population, even at one point in time.

Among these studies, relatively little emphasis has been placed on the socioeconomic aspects of migration at the regional level, an emphasis which is considered vitally important to national planning. It is the purpose of this paper to statistically analyse the regional impact of migration in relation to earnings differentials, education and land utilization. Regression analysis permits the influence of the specified factors on migration to be quantified, although it is clearly recognised that this approach is 'macro' and abstract, as distinct from approaches using 'micro' data, collected on the

behaviour of individual migrants and from which somewhat different interpretations may be derived.

Conceptual framework

Several types of migration models have been developed in recent years. The most well-known ones are the gravity model, the neoclassical model, the push-pull model; and the intervening opportunities model -- all of which differ in the explanatory variables related to migration. For instance, the gravity model focuses on two important factors, namely, the 'mass' (population size) variable and the 'friction of distance' (Richardson, 1967). It is argued that migration will respond positively to a less populated area and inversely to the distance between the two areas. Stouffer however, emphasised that migration is directly related to job opportunities available in the destination and inversely related to the intervening distance between the areas of origin and destination (Isard, 1960). On the other hand, the neo-classical model treats migration as the result of labour market adjustments in terms of wage differentials and unemployment in different areas (Richardson, 1967). Migration is likely to increase in an area where wages are relatively high or where unemployment is relatively low. This model focuses mainly on the analysis of economic factors in migration. Finally, the push-pull model depicts migration as the reaction to 'favourable' or 'unfavourable' general conditions between areas of origin and destination. Traditionally,

the 'push' factors refer to unfavourable conditions such as poor soil, poverty in the area and so on. The 'pull' factors, on the other hand, include the attractions of better job opportunities and the 'bright lights' of the city. Selection among these models depends largely on the purpose of each study, but usually a combination of models is employed so that most of the major explanatory variables will be included and a more thorough explanation may be obtained. As this study concentrates mainly on the economic aspects of migration, it is based on the neo-classical approach with some modification in variable specification for the particular regression analysis.

Data availability and reliability[3/]

Normally, time series data would be most appropriate for this kind of analysis, but due to the incomplete nature of the data available at the time of preparing the study, a cross-sectional approach with 1968 data has been used instead. This set of data provides adequate information on migration covering 44 of the provinces in Thailand (see Table 1). Migration rates, the number of migrants leaving or entering per 100 of a province's total population, were then derived by estimating the number of migrants as the residual between the change in total population, and the net natural change in the local population (births minus deaths). These data were obtained from the population registration figures in the respective areas with some adjustments for possible under-or over-enumeration, as the registration data are recognised to be incomplete and not entirely accurate.[4/] However,

(Table 1 about here)

TABLE 1: Thailand: List of the 44 Sample Provinces in Five Regions

I. Metropolitan Area

Bangkok-Thon Buri

II. Central Region

Chon Buri
Chachoengsao
Prachinburi
Trat
Phetchaburi
Ratchaburi
Kanchanaburi
Suphanburi
Nakhon Pathom

III. North Region

Phitsanulok
Phetchabun
Sukhothai
Tak
Nakhon Sawan
Phichit
Kamphaengphet
Uttaradit
Lampang
Chiang Rai
Chiang Mai
Lumphun
Phrae

IV. Northeast Region

Nakhon Ratchasima
Buriram
Ubon Ratchathani
Sisakhet
Chaiyaphum
Khon Kaen
Udon Thani
Kalasin
Sakon Nakhon

V. South Region

Songkhla
Satun
Nakhon Si Thammarat
Trang
Phatthalung
Yala
Pattani
Narathiwat
Ranong
Phuket
Phangnga
Chumphon

while census data typically would be used to study population trends, for reasons that are not altogether clear, and are doutbless complex, the population growth reported in the 1970 Census was lower than that suggested by the registration data for the same 1960-70 period. For the purposes of this study, 1970 registration data have been preferred, and the trend line between the 1960 Census figures for a province and the 1970 registration data has been used as a proxy of the true population trend, and appropriate adjustments made to the population totals of the provinces concerned.[5/] Further, the vital statistics for each province were also adjusted by using the estimated rates of under-enumeration for births and deaths.[6/] Within the fairly severe constraints imposed by these necessary adjustments to the population totals and birth and death statistics for each province, estimates were made of migration, the dependent variable, and the results are tabulated in (Appendix) Table 5, column 1.

Five main independent variables have been utilised in this study: earnings differentials, the ratio of population per unit of arable land, the change in urban population (1960-1968), the number of students above the upper primary levels relative to the province's population, and the ratio of registered motor vehicles to the population (see Table 2). These variables, and the nature of their expected influence on the dependent variable, are briefly discussed below.

Four measures of income differentials are employed in the analysis (denoted as X_1, X_2, X_3 and X_4). These measure the ratio of

(Table 2 about here)

TABLE 2: Thailand: Definitions of Variables for Regression Analysis, 1968

Dependent Variable:

Y	=	Ratio of net inmigrants (or outmigrants) in the province to the total province population

Independent Variables:

X_1	=	Ratio of province earnings to the national earnings, excluding Bangkok-Thon Buri
X_2	=	Ratio of province earnings to the national earnings, including Bangkok-Thon Buri
X_3	=	Ratio of province earnings to the regional earnings, excluding Bangkok-Thon Buri
X_4	=	Ratio of province earnings to the regional earnings, including Bangkok-Thon Buri
X_5	=	Ratio of persons to one unit (rai) of arable land
X_6	=	Ratio of the proportion of the urban (municipal) population to total province population in 1968 to the proportion in 1960
X_7	=	Ratio of students in the upper primary level or above to total province population
X_8	=	Ratio of motor vehicle registrations to total province population

Note: 1 rai = 0.16 hectares (0.4 acres)

province incomes relative to the national average and to the regional average. Since the Metropolitan Area (Bangkok-Thon Buri) greatly affects these averages, alternative measures were calculated excluding Bangkok-Thon Buri. It was anticipated that these variables would have a positive correlation with the dependent variable as higher wages would attract migrants and lower wages stimulate outmigration. It should be noted that the data on wages were derived from the census of industrial establishments and can only be thought of as surrogate for the potential earnings of migrants who often leave this sector and go back to agricultural occupations. The weighted regional and national average earnings are presented in Table 3, and variables X_1 through X_4 as defined in Table 2 are presented in (Appendix) Table 5, as are the other variables which are discussed below.

It was hypothesised that relatively high population pressure per unit of arable land would encourage outmigration. Data on the intensity of population pressure on arable land were used to derive index (X_5); there was no standardisation by age on the proportion economically active. An attempt to study the effect of the urbanisation process on migration flows was carried out by introducing variable (X_6) as a measure of the change in the proportion of municipal (a surrogate for 'urban') population to total province population between 1960 and 1968. It was assumed that the process of urban growth would attract migrants from provinces with a falling or stationary level of urbanisation.

(Table 3 about here)

TABLE 3: Thailand: The Weighted Regional and National Average Earnings, 1968, in Baht per Month

Nation/Region	Weighted Average Monthly Earnings
National Average:	
(1) Including Bangkok	785.81
(2) Excluding Bangkok	534.13
Regions:	
Metropolitan Area	948.26
Central Region (including the Metropolitan Area)	898.40
Central Region (excluding the Metropolitan Area)	546.69
North Region	485.14
Northeast Region	489.85
South Region	621.92

Source: Department of Labour, Ministry of Interior, The Labour Force Survey (1969); Department of Labour, Ministry of Interior, Labour Statistics and Employment Market Information (April 1968).

Note : US$1 = ฿20.80.

Since education can be considered as a factor affecting employment opportunities, it was hypothesised that the higher the level of education of migrants, the more likely they were to migrate in search of better job opportunities elsewhere. As the first four years of primary school are compulsory throughout the country, an index with some variability across provinces was constructed by taking the ratio of population with upper primary level or more education to the total province population (X_7). It should be noted that data are not available to standardise education level by age except at the national level.

The final variable included is a proxy for accessibility and the existence of higher status areas hypothesised as attractive to migrants. A high ratio of registered vehicles in an area implies relatively good road accessibility, shorter travel times, easier commuting, and a somewhat higher socioeconomic status. The number of motor vehicles may also indicate a higher average income level which in turn tends to create a higher demand in the service industry sector; migrants from rural areas may be attracted by such a 'pull' factor in terms of job opportunities. It is hypothesised that this index would have a positive association with migration also.

Results of regression analysis

The best-fit regression equation found for the impact of net migration is shown in the following equation. Standard errors of the coefficients are given below the coefficient estimates:

$$Y = 1.0324 - .0103X_4 - .0155X_6 - .6268X_7 + .8748X_8$$

$$(.0084) \quad (.0106) \quad (.2961) \quad (.3451)$$

$$(R^2 = .229)$$

where Y = estimated migration ratio

X_4 = the ratio of province earnings to the regional earnings including Bangkok-Thon Buri

X_6 = the ratio of the proportion of municipal population to total province population in 1968 to the proportion in 1960

X_7 = the ratio of students in upper primary education level or above to total province population

X_8 = the ratio of motor vehicle registrations to total province population.

The procedure used in deriving this equation was based on the forward selection technique to obtain the best-fit regression equation from a group of potential explanatory variables. It should be noted, however, that a modification had been made to the standard application of the forward selection procedure in order to make the estimation more practical. There were four income variables, X_1, X_2, X_3 and X_4. The standard forward selection procedure was used to determine which one among these four variables should be selected and this was done on the basis of the highest simple correlation coefficient between potential independent variables and the dependent variable. Next, the first order regression was employed to screen out the influence of the remaining variables to be incorporated into the equation on the basis of an iteration procedure to identify the highest partial correlation,

while fixing the values of other potential explanatory variables. The best combination of these variables was found to be the one shown in the above equation without X_5.

The F-test for the significance of the latest variable introduced was performed at each step and the process was terminated when the most recently entered variable became insignificant. The procedure here differed from the standard methodology in two ways. Firstly, it was not possible to carry out the procedure with traditional confidence levels based on the partial F-tests at 95% or 99%. In deriving the equation, the first variable to enter was the urbanisation variable, the second was the accessibility-high income variable, the third was the education variable, and the fourth was the earnings index. While the partial F value for the first variable (X_6) was 2.8, for the second variable (X_8) was 2.2, for the third variable (X_7) was 4.5 and for the fourth variable (X_4) was 2.5, the critical value for the F-test at 90% confidence level is approximately 2.8. Since the population per rai of arable land variable (X_5) performed so poorly, it was dropped from further consideration. And similarly the first (X_6) and third (X_4) variables are rejected on the grounds that their presence had not only insignificantly improved the explanation of the variation in the dependent variable at the 90% confidence level, but also lowered the correlation of the rest of the variables to a level below the traditional level of confidence.[7/]

The procedure here also differs from classical forward selection in that not one but four alternative definitions of the earnings differentials variable were considered. However, the one which displayed the highest partial correlation with the dependent variable, after taking account of the influence of the other three variables, was selected. Mathematically, this is equivalent to finding the correlation between the residuals from the regression $Y = f(X_6, X_7, X_8)$ and the residuals between the four regression $X_i = f(X_6, X_7, X_8)$ where $i = 1, 2, 3, 4$. The variable with the highest partial correlation was X_4.

Considering the incomplete set of provinces and the inadequate data available, the regression equation above is quite acceptable although some of its statistical properties do not seem to be satisfactory. At the present state of knowledge of econometrics, the definite properties of a small sample regression analysis are not fully understood. Not much can be said on this point, but what is much more important is the directional relationship of the variables involved. The regression equation is significant at the 90% confidence level. Furthermore, the t-test shows that we can reject the null hypothesis with respect to the accessibility-high income variable (X_8) and the education variable (X_7) at the 95% confidence level. The significant positive coefficient attached to (X_8) supports the hypothesis that factors associated with high vehicle registrations, possibly including a higher demand for labour intensive services and

the presence of other basic facilities, encourage inmigration. The negative coefficient for the educational advantages is suggestive regarding the opportunities and benefits of outmigration.

The rate of change in urbanisation and the earnings variables are both insignificant and have 'unexpected' signs. Some explanations can be suggested. An inverse relationship between the urbanisation process and migration may indicate that people like to move away from big cities such as Bangkok-Thon Buri to the nearby semi-urban towns to avoid city congestion or hectic life or because of other unspecified reasons. This finding is supported by Romm's discussion of the rapid population growth of the 'semi-urban' areas (Romm, 1972).[8/]

The contribution of the earnings differential is somewhat disappointing since this was hypothesised as a decisive factor in the determination of migration patterns. The most logical explanation for the result may be given in terms of data validity. The narrowness of the wage survey and, in particular, its heavy concentration only on industrial enterprises, may not actually indicate the real earnings differentials among different regions of localities. It can also be expected that the nominal earnings differential is by no means the only factor in the migration decision of individuals. Probably the relative real value, taking into account the cost of living, would be more appropriate to use in this kind of analysis.

Another factor that may influence the process of migration is the population/arable land ratio. Large areas of agricultural

holdings exist in the uplands of the Northeast, for example, but many of the farmers migrate to seek at least temporary jobs elsewhere because the poor soil quality and lack of irrigation limit productivity. The farmers tend to be unskilled or semi-skilled, and many return from industrial and service sector employment in the Bangkok region to the Northeast for harvesting and other seasonal activities. In addition, access to land is unequally distributed, and it is the poor farmer with least skills and least resources who most feels the 'push' from the land. But having said this, the variable used here may be too gross or abstract to be sensitive to inter-provincial variations, particularly in the short term.

In summary, this study has taken a 'macro' approach to the problem of migration. It does not consider the characteristics of actual migrants, such as age, sex, occupation and education which have been the focus of previous chapters, but it does provide a broad description of the migration process among different regions in Thailand. The paper has utilised data which admittedly are proxies for some of the factors hypothesised as being associated with regional migration, and there is the further drawback of necessary adjustments to even basic population totals and vital statistics. These data inadequacies are formidable and counsel strongly against too detailed an interpretation of results. The 'explained variance' of the regression analysis may be statistically significant but it is nevertheless at a very low level and it must be concluded that more specific, less abstract variables of higher reliability would be needed to provide more than the

general conclusions arrived at here. There is evidence that 'pull' factors such as those tapped by the accessibility-high income variable are positively associated with migration, whereas pressure on arable land is influential to a lesser degree. The inadequacy of some of the data prevented a fully satisfactory analysis and a further investigation into the detailed effects of wage differentials and population pressure is necessary to clarify the real role of these factors in migration; this could be pursued both by 'macro' econometric analysis of an improved and more recent data set, and by specially designed sample surveys focused on these and related variables at the 'micro', behavioural level. To complete the picture, there is also a need for a study of the regional and individual factors underlying the imgration streams linking the capital district and the rest of the country.

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NOTES

1/ This paper is extracted from the author's unpublished M.A. thesis (Rachaniwan Thavornjit, 1973). Useful comments on the research reported here were received from Trent Bertrand, Jay Salkin, Bevars Mabry and Sathit Uthaisri.

2/ The Bangkok Metropolitan Area was defined as including Bangkok, Thon Buri, Nonthaburi and Samut Prakan.

3/ Data sources are discussed and evaluated in the author's unpublished M.A. thesis (Rachaniwan Thavornjit, 1973), but briefly these included: Department of Labour, Ministry of Interior, Labour Statistics and Market Information of 8 Regions (44 changwad series), April 1968; The Labour Force Survey, December 1969; Department of Agricultural Economics, Ministry of Agriculture, Land Utilization in 1971; National Statistical Office, Office of the Prime Minister, Changwad Statistical Yearbook, 1966; Department of Local Administration, Ministry of Interior, Population Registration 1968; Department of Education, Ministry of Education, Final Report: Students and Teachers Survey 1968; National Statistical Office, Office of the Prime Minister The Statistical Yearbook 1970-1971.

4/ A number of criticisms have been made of the accuracy and completeness of the registration data, alleging an absence of quality control in data collection. In addition, errors can easily occur during the process of administering registration, particularly in rural areas where the vital events are recorded in sequence from a district reporting to a province and subsequently to the central government. Lack of personnel in registering and filing is another factor leading to the inaccuracy of the existing data.

Also, it is believed that most temporary migrants do not register unless a legal document showing a transfer of residence is required, for instance, for attending school or seeking institutional employment. As it appears that a transfer is recorded only under compulsory pressure rather than on a voluntary basis, it is likely that only the permanent migrants will register rather than seasonal or temporary migrants. It should be noted also that the recording of people under a conscription scheme is included in the population data as well, although it is not relevant for migration estimates. Thus, the use of the indirect population data such as the registration records must be treated with caution.

Despite the shortcomings of the registration data, the system of annual reporting is valuable since the registration data are continuous, and indirectly provide an insight into annual changes in population, net natural increase and migration for each province throughout the Kingdom. In this respect, the registration system is complementary to the periodical Population Census which is only undertaken at ten-year intervals.

5/ Adjustment of R, the registered population of a province, was achieved as follows for t, the period 1960-70:

$$R_{adjusted} = R_{(actual,\ t)} + (C_{60}(1+r_c)^t - R_{60}(1+r_r)^t)$$

where $(C_{60}(1+r_c)^t - R_{60}(1+r_r)^t)$ is the adjustment factor,

C_{60} - is the 1960 census population for the province

r_c - is the exponential growth rate for the trend between 1960 census and 1970 registration population for the province, and

r_r - is the growth rate of actual registration population over the period 1960-1970 using the same function.

6/ The Supplementary Survey on Population Change (1964-67) indicated the under-enumeration of the registration data. A comparison of birth and death rates from the survey of Population Change and the official registration data disclosed that about 15 percent of births and 30 percent of deaths were not registered during the period of July 1964 - June 1965. Various reasons were cited, for example improper filing, and a failure to report the events both by households and by officers in charge.

In order to adjust the vital statistics data, the rates of under-registration between the survey results and the official statistics from the Ministry of Public Health were estimated. Due to a lack of monthly official vital statistics on the province and regional levels, these data cannot be adjusted on a monthly basis in order to derive an enumeration period comparable to that covered by the survey. At best, the average value for 1964-1965 vital statistics data can be used as a proxy for the period under consideration. And since details of the under-registration rate were not available at the province level the regional estimates of the difference between the Supplementary Population Change crude birth and death rates and those recorded in the official vital statistics were the only reasonable adjustment factors to be used. One final word of caution is that this adjustment is based on the assumption that the rate of under-enumeration is unlikely to change over time, and such estimates only indicate the magnitude, not the direction, of migration streams. The adjustment factors are shown in (Appendix) Table 4, and a fuller explanation is given elsewhere by the writer (Rachaniwan Thavornjit, 1973:63ff). A comparison of the results in (Appendix Table 5 with migration estimates from the 1970 census is proposed in due course.

7/ The F value was 2.25 while partial correlation of X_5 was 0.1794 which was considered very low and statistically insignificant.

Also in the equation, the value of R^2 is very low mainly because cross-section data were used and macro data such as these may conceal important factors that determine the migration process rather than those mentioned above. This emphasises the need for analysis also being conducted at the 'micro' level.

8/ Romm (1972:9) defines 'semi-urban areas' as zones of settlement that have been organised into Sanitary Districts; relative growth rates are: whole Kingdom, 3.1 percent per annum, rural areas 2.4 percent, combined urban and semi-urban areas 7.5 percent; about 18 percent of the 1960-70 population growth was absorbed by urban areas, 27 percent by semi-urban areas, and 55 percent by rural areas.

REFERENCES

1. Garnjana-Goonchorn, Savitri, Internal Migration into Bangkok Metropolitan Area, Ph.D. Dissertation, University of Pittsburg, 1974.

2. International Development Research Center Cooperative Regional Development Project, Urbanization of the Bangkok Region Thailand, Vol. II (Preliminary Report) Social and Demographic Aspects: Internal Migration, Prepared by Thai University Research Associates. Bangkok, Thailand, September 1973.

3. Isard, W., Methods of Regional Analysis: An Introduction to Regional Science. The M.I.T. Press, 1960.

4. Meinkoth, Marian R., "Migration in Thailand with Particular Reference to the Northeast". Reprinted from Economic and Business Bulletin No. 14, June 1962.

5. Prasithrathsin, Suchart, A Study of Internal Migration in Thailand by Using 1960 Census Data. Unpublished M.A. Thesis, Department of Sociology and Anthropology, Brown University 1968.

6. Richardson, H.W., Regional Economics, Weidenfield & Nicolson, 1969.

7. Romm, Jeff, Urbanization in Thailand. International Urbanization Survey. The Ford Foundation 1972.

8. Textor, Robert B., From Peasant to Pedicab Driver. Cultural Report Series No. 9, Yale University, New Haven, Conn. 1961.

9. Thavornjit, Rachaniwan, Patterns and Consequences of Regional Migration in Thailand. M.A. Thesis, Thammasat University, Bangkok, Thailand, 1973.

(APPENDIX) TABLE 4: Thailand: Comparison of Crude Birth Rates and Crude Death Rates between Regions, 1964-1965, and Adjustment Factors for the Estimation of Migration

Data Sources	Whole Kingdom	North	North-east	Central	South
Crude Birth Rates					
Survey 1964-65	41.8	43.7	43.5	49.7	40.6
Public Health Statistics 1964	38.5	38.5	38.8	39.4	35.1
Public Health Statistics 1965	37.5	34.9	38.4	39.2	35.3
Average Vital Statistics 1964-65	38.0	36.7	38.6	39.3	35.2
Adjustment Factor	1.100	1.190	1.127	1.010	1.153
Crude Death Rates					
Survey 1964-65	10.9	12.4	11.4	10.4	8.6
Public Health Statistics 1964	7.9	8.0	9.4	6.9	6.3
Public Health Statistics 1965	7.3	7.3	8.4	6.6	5.8
Average Vital Statistics 1964-65	7.6	7.6	8.9	6.7	6.5
Adjustment Factor	1.395	1.632	1.280	1.552	1.323

Source: National Statistics Office, Office of Prime Minister, Report on Survey of Population Change 1964-67 (Series L-SUR No. 3-69).

(APPENDIX) TABLE 5: Thailand: Values of Dependent and Independent Variables, 1968, for Regression Analysis.

Regions and Provinces	Dependent Variable: Net Migration	Independent Variables							
		X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
I. Metropolitan Area									
Bangkok-Thon Buri	+0.0727	1.7753	1.2067	1.7345	1.0505	5.8019	1.0431	.0876	.0534
II. Central Region									
Chon Buri	+0.0720	1.2335	0.8384	1.2052	0.7334	0.5873	0.6274	.0396	.0322
Chachoengsao	-0.0039	0.8901	0.6050	0.8696	0.5292	0.2817	0.7576	.0388	.0069
Prachinburi	+0.0069	1.4339	0.8077	1.4009	0.8525	0.2430	0.9632	.0230	.0059
Trat	+0.0059	1.0020	0.6811	0.9790	0.5957	0.2332	1.4512	.0280	.0198
Phetchaburi	+0.0030	1.0180	0.6919	0.9946	0.6052	0.3654	0.9246	.0366	.0175
Ratchaburi	+0.0001	0.9521	0.6472	0.9303	0.5661	0.5312	1.1573	.0372	.0214
Kanchanaburi	+0.0285	0.7789	0.5294	0.7610	0.4631	0.3588	0.9117	.0244	.0277
Suphanburi	+0.0138	0.8469	0.5757	0.8257	0.5035	0.3262	1.0005	.0212	.0143
Nakhon Pathom	-0.0053	0.9332	0.6344	0.9779	0.5549	0.3727	1.0365	.0350	.0202
III. North Region									
Phitsanulok	-0.0051	0.7978	0.5423	0.8783	0.8783	0.2822	0.9721	.0250	.0094
Petchabun	+0.0104	1.3247	0.9004	1.4585	1.4585	0.2432	0.7973	.0142	.0044
Sukhothai	-0.0035	0.7943	0.5399	0.8745	0.8745	0.3004	1.1513	.0189	.0060
Tak	-0.0007	1.2073	0.8206	1.3291	1.3291	0.8080	0.6145	.0224	.0096
Nakhon Sawan	-0.0096	0.9979	0.6783	1.0987	1.0987	0.2796	1.0771	.0262	.0118
Phichit	+0.0192	1.0624	0.7221	1.1697	1.1697	0.1821	1.0759	.0198	.0066
Kamphaengphet	-0.0280	0.7304	0.4965	0.8042	0.8042	0.2584	0.9516	.0108	.0068
Uttaradit	-0.0067	1.1263	0.0756	1.2401	1.2401	0.3282	1.0938	.0244	.0048
Lampang	-0.0039	0.9965	0.6674	1.0971	1.0971	0.6654	0.9238	.0281	.0121
Chiang Rai	-0.0010	0.7060	0.4799	0.7773	0.7773	0.6963	1.1726	.0153	.0042
Chiang Mai	+0.0021	1.0136	0.6890	1.1159	1.1159	0.9023	1.0572	.0303	.0190

TABLE 5 continued

Regions and Provinces	Dependent Variable: Net Migration	Independent Variables							
		X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
III. North Region contd.									
Lumphun	-0.0061	0.6723	0.4570	0.7402	0.7402	1.0309	0.8962	.0251	.0111
Phrae	-0.0036	0.4881	0.3318	0.5374	0.5374	1.0798	0.8689	.0302	.0123
IV. Northeast Region									
Nakhon Ratchasima	-0.0040	0.7676	0.5217	0.8370	0.8370	0.2872	1.3872	.0201	.0062
Buriram	-0.0022	0.9075	0.6168	0.9890	0.9890	0.2820	1.0925	.0116	.0021
Ubon Ratchathani	-0.0047	1.0118	0.6877	1.1033	1.1033	0.2134	1.3075	.0174	.0052
Sisakhet	-0.0021	0.6533	0.4441	0.7063	0.7063	0.3861	0.9494	.0122	.0009
Chaiyaphum	-0.0057	0.7739	0.5286	0.8439	0.8439	0.2627	1.1262	.0145	.0034
Khon Kaen	-0.0036	0.9076	0.6167	0.9897	0.9897	0.3235	1.2326	.0175	.0072
Udon Thani	-0.0047	1.3246	0.9004	1.4443	1.4443	0.1990	1.3258	.0155	.0077
Kalasin	-0.0079	1.2069	0.8204	1.2229	1.2229	0.3688	1.0386	.0159	.0015
Sakon Nakhon	-0.0037	1.3295	0.9037	1.4496	1.4496	0.2270	0.9196	.0150	.0042
V. South Region									
Songkhla	-0.0076	1.1578	0.7870	0.9944	0.9944	0.3826	1.1449	.0416	.0177
Satun	+0.0343	1.0862	0.7383	0.9329	0.9329	0.5297	1.4003	.0276	.0122
Nakhon Si Thammarat	-0.0146	1.1609	0.7891	0.9970	0.9970	0.3553	1.5614	.0362	.0069
Trang	-0.0064	1.1568	0.7863	0.9935	0.9935	0.2626	0.8400	.0352	.0278
Phathalung	-0.0074	0.8823	0.5997	0.7578	0.7578	0.3368	1.0112	.0295	.0079
Yala	-0.0047	1.2110	0.8231	1.0401	1.0401	0.2545	1.2566	.0365	.0248
Pattani	-0.0072	1.1670	0.7932	1.0023	1.0023	0.5826	0.8688	.0259	.0141
Narathiwat	-0.0064	1.0218	0.6945	0.8775	0.8775	0.5650	1.1020	.0236	.0156
Ranong	-0.0042	1.1984	0.8145	1.0202	1.0202	0.3361	1.0565	.0464	.0386
Phuket	0.0009	1.2185	0.8282	1.0465	1.0465	0.8478	0.9546	.0801	.0664
Phangnga	-0.0053	1.2186	0.8283	1.0466	1.0466	0.2744	0.9092	.0379	.0222
Chumpon	-0.0013	0.9923	0.6733	0.8507	0.8507	0.3688	0.7744	.0434	.0136

Note: For definitions of variables, see Table 2.

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Oey Astra Meesook

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Oey Astra Meesook
Faculty of Economics
Thammasat University
Bangkok 2, Thailand

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The author is with the Faculty of Economics, Thammasat University. The research reported in this paper was carried out while she was a Research Fellow at the National Bureau of Economic Research from October, 1975 to September, 1976.

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The Generation of Income in the Household Sector in Thailand

Oey Astra Meesook

This paper analyses the process of income generation in the household sector in Thailand. It examines the labor force participation of household members and the incomes earned by them. Total household income is the sum of the incomes of all household members.

Without detailed data at the level of the individual, classified by household, it would be impossible to carry out such an analysis. This study is meant to offer additional information to that given in official publications which, of necessity, deal only with aggregates. It uses the original data tapes of the Socio-economic Survey, 1968-9, conducted by the National Statistical Office of Thailand.[1/] Although the sampling for the survey was done on the basis of households, information was in fact collected for each household member.[2/] Thus it is possible to see what the composition of total household income is.[3/]

The Model for Income Generation

Let there be N individuals in a household, and let each household member be indexed by i, i = 1,2,.....,N. Then if Y_i is the income of household member i, and Y_T is total household income, we have

$$Y_T = \sum_i Y_i \qquad \text{(i)}$$

The income of household member i, Y_i, is a function of his labor force participation, P_i, and his characteristics summarized by X_i.

$$Y_i = Y_i(P_i, X_i) \qquad i = 1,2,.....,N \qquad \text{(ii)}$$

The characteristics of individual i, denoted by X_i, include many different factors, for example, his age, sex, level of educational attainment and so on.

The labor force participation of an individual is a function both of X_i, his personal characteristics, and of various household characteristics, Z_i.

$$P_i = P_i(X_i, Z_i) \qquad i = 1,2,.....,N \qquad \text{(iii)}$$

An example of a household characteristic is the presence or absence of young children in the household which may be expected to affect the labor force participation decision of the adult members.

Equations (ii) and (iii) together show that a household member's income is a function of both his personal characteristics and those of the household as a whole. One problem which needs to be considered is the fact that many household members who participate in the labor force do so as unpaid family workers. They do not receive any cash remuneration for their work, but since total household income can be expected to be higher when they work than when they do not, this should be taken into account in the income-generating equations.

Labor Force Participation

Whether or not a person participates in the labor force depends on both supply and demand considerations, that is, on the opportunity open

to him for work and also his own willingness or necessity to work.[4/]

Two different types of factors are important in determining the supply of work opportunities facing an individual. The first involves those factors which affect the supply of jobs in the whole economy. At times of rapid growth, an economy would naturally be in a position to absorb more workers. In times of recession and stagnation the job market shrinks. Thus the participation of any single individual in the labor force is affected in a general way by the overall economic situation. Within the economy itself, it is possible to find different situations in different parts of it. For example, the urban sector may be buoyant while the rural sector stagnates. In general, therefore, the work opportunities facing each potential entrant into the labor market are influenced by the economic environment in which he finds himself.

The second type of factors affecting supply opportunities is specific to each individual. Employers demand labor of different kinds by different extents. There are many personal characteristics which differentiate individuals, for example, age, sex, and level of educational attainment. To the extent that such characteristics affect the desirability of an individual in the eyes of his prospective employer, they have an effect on his labor force participation through the supply of job opportunities which faces him.

In terms of demand considerations, factors which influence the decision of individuals to seek employment can be classified as specific to the person himself or to the household as a whole.[5/] Personal attributes

of an individual, such as age, sex and level of educational attainment, affect his desire to work as well as his opportunity to work. In addition, household characteristics also influence the demand for work of individuals. In this connection, we must first make the distinction between heads of household and other household members. For definitional reasons, the labor force participation rate of household heads in the Socio-economic Survey, 1968-9, is 100%, since the head of the household was defined as 'a person who was generally recognized as head by other members of the household. Usually he was responsible for the welfare of other members.'[6/] In terms of a cross-sectional analysis, therefore, it is necessary to separate out household heads. Even though the choice of a new household head may be influenced by the personal characteristics of individuals, their relationships with each other in the household, as well as their labor force status at the time this choice has to be made, in a cross-section of households the designation of head has already been made. Heads of household are thus a distinct group all participating in the labor force, compared with individuals fifteen and older who are not heads of household whose average labor force participation rate is 74%.

Among nonheads, the household characteristics which are expected to influence labor force participation are:

(i) Number of adults (persons between 15 and 64 years of age): This in effect represents the available supply of potential workers.

(ii) Presence of children: The presence of children, especially young children, requires that there be one or more adults at home to take

care of them. However, the presence of very young children may be mitigated by that of older children who are able to help in taking care of them. The presence of children is more likely to affect female than male participation, since females have traditionally assumed the responsibility of child rearing. As an alternative one could use the number, instead of the presence, of young children.

(iii) Income of household head: Since the household head always works, we may consider the labor force participation decision of the household as taking place in two stages. The household head has the responsibility of taking care of the other members. If the head dies or is no longer able to work, then some other member has to take over as head, and will also assume this responsibility. The labor force participation decision of other members depends, therefore, on how adequately the household head is able to provide for this household members. The less adequate the head's income, the more incentive for other household members to work and earn additional income. A measure of the adequacy of the head's income must of course take into account the size and composition of the household. In this study we use the income of the head divided by the household size as the measure of the material well-being of the household in the absence of other workers besides the head.

This formulation of the labor force participation decision, in which the participation of the household head and that of other household members are considered separately, and in which the outcome of

the first decision in terms of income influences the second, seems less ambiguous than that involving 'other family income' of Bowen and Finegan.[7/]

(iv) Convenience of work; Finally, we should not overlook the question of the convenience with which household members may participate in the labor force. This is especially important for decisions to work part-time, such as in the case of women with young children. There are certain work arrangements which do not force individuals to make a clear-cut choice between work and staying at home, since the two are not completely separated. In such cases, working does not mean giving up child rearing and other household-related activities altogether, nor does it involve time and costs in getting to the place of work. The work is in or near the home, the 'employer' is flexible about working hours and the individual can switch between work and the home many times during the course of the day if necessary. There are many instances in which this kind of work is available to household members. Typically the enterprise involved belongs to the household itself and thus the household head and the employer are one and the same person. The family farm is an example of such an enterprise, in which household members 'pitch in' with farm work and are able to combine this with taking care of the home. The phenomenon is not restricted to the rural sector by any means. In a shop-house in the city, the household owns and operates a shop or a restaurant and has living quarters upstairs or at the back. Helping to run the

family store or wait at tables in the family restaurant is quite compatible with looking after the home and clearly involves considerably less effort and cost than seeking outside employment.

The prevalence of the family farm and family enterprise, as indicated by the large number of unpaid family workers in the labor force, means that, at least for these households, many of their members do not or cannot, consider wage employment as an alternative. However, that part of the labor force which operates in the monetized sector of the economy does respond to money wages. For them the analysis should include their expected wage rate as a determinant of labor force participation, but this has not been done here.

In the estimation of the labor force participation equations, only household members who are not heads are included. Individuals are classified both by their personal and household characteristics. Personal characteristics are age, level of educational attainment and sex, while household characteristics are the presence of children, number of adults, income of household head per household member, existence of a family enterprise, sector of the household head and area of residence.[8/] The joint classification of individuals by these characteristics yields 2,849 nonempty cells altogether and for each of these the labor force participation rate is the proportion of all individuals who report one or more occupation.[9/] The nonempty cells are used as observations in the regression equations. The dependent variable is the cell labor force participation rate. The independent variables are dummy variables corresponding to the category in each

classification which defines the cell. The regressions are weighted by the size of the underlying population. Separate regression estimates were obtained for males and females, and each of these was separated into urban and rural areas.[10/] The results are shown in Tables 1 and 2.[11/]

The personal and household characteristics included in the regression equation all have their effects on the labor force participation rates of household members when all other characteristics are held constant. The youngest age group, consisting of 10-14 year olds, have the lowest rate of participation. The rate rises with age and reaches a peak among those in their thirties and declines steadily thereafter.

The relationship between education and labor force participation is not straightforward. The participation rate is higher for individuals with one to nine years of schooling than for either those with no schooling at all or for those with more than nine years. Thus for the majority of people, who typically have no more than four years of formal education, it is the case that schooling is associated with higher participation, whereas at high levels of schooling the participation rate falls off sharply, being comparable to that of the uneducated group in urban areas and even lower in rural areas. This differs markedly from results obtained for the U.S. in which there is a clear positive relationship between schooling and the labor force participation rate for both males and females.[12/]

As far as household characteristics are concerned, the presence of children under seven, the typical school-entering age, is to lower the probability that a woman will be in the labor force by 6 percentage points,

both in urban and rural areas. It is somewhat surprising that this effect is not weaker in the rural areas where the compatibility between farm and home work might be expected to show children to be a relatively mild deterrent to labor force participation.

To test the hypothesis that household members respond to the level of adequacy of the head's income in providing for the household's material needs, dummy variables are entered in the regression which classify households into three groups corresponding to different levels of the head's income per household member.

It is found that the probability that a household member works is increased significantly, by 6 percentage points for both males and females in urban areas and for males in rural areas, and by 5 percentage points for females in rural areas, for households in the worst-off group in which income per household member would be under 1,000 baht per year if the household head were the only one in the labor force, when compared with the base group in the 1,000-2,000 baht range. For households in the best-off group in which the head's income per member is at least 2,000 baht a year, the probability of a member working is lower by 2 percentage points for males and 3 percentage points for females. Thus economic necessity is an important factor affecting the level of labor force participation of household members.

In formation is not available on whether the household operates a family enterprise or not. We expect labor force participation to be encouraged where there is one. However, a reasonable proxy for a family enterprise is when the household head is self-employed, since then he can potentially run

an enterprise in which his household members can work. The group of households in which the head is self-employed overstates the number of family enterprises to the extent that not all self-employed household heads operate family enterprises, but understates it to the extent that a family enterprise may be run by a nonhead member of the household. If it is the case that in most cases family enterprises are run by household heads, then this proxy variable would overstate the number of enterprises. The finding that the probability of participating in the labor force is increased in most cases would therefore give the bottom limit of the encouraging effect of family enterprises. In urban areas, male participation is increased by 3 percentage points and female participation by 8 percentage points. It is initially surprising that the effect is smaller in rural areas and, moreover, that male participation is lower when the head is self-employed. The explanation is probably that in the equation for rural areas there is collinearity between the family enterprise and sector variables, since, for most of the agricultural households, the head is self-employed. The dummy variable for nonagriculture already includes the effect of the head not being self-employed, and therefore the magnitudes of the family-enterprise coefficients are not comparable between the urban and rural equations.

For both urban and rural areas, and for both males and females, labor force participation is higher for agricultural households, defined according to the economic sector of the household head. The effect is very large, amounting to 13 percentage points in the case of urban males, 18 percentage points for urban females and rural males, and 17 percentage

points for rural females, although part of the effect in the rural equation may be due to the family enterprise.

Table 3 gives the labor force participation rates for males and females with no education, in households with no children, three adults, with the income of head per household member between 1,000 and 2,000 baht per year and the head not self-employed. The table attempts to compare participation rates by sex and location of residence. Thus we take the more common sector in each case: nonagriculture in urban areas and agriculture in rural areas. Characteristics other than sex and location of residence are, however, held constant.

Within a given area of residence, male participation rates are higher than those for females, with the exception of those under 20 in both areas, and of those fifty and older in rural area. Thus in the school-attending ages, more females than males participate in the labor force, as well as in the older age groups in rural areas. In urban areas, for those over twenty years of age,male participation exceeds that for females by increasing amounts with age, starting with 14 percentage points in the 20-29 age group, reaching a peak difference of 26 percentage points in the 50-59 age group and with the differential falling off to 14 percentage points for the 60 and older group. In rural areas, male participation exceeds female only in the 20-49 age range, with the differential being much narrower than in urban areas, of the order of between 8 and 12 percentage points.

For both males and females, and for all age groups, with the exception of males 50 and older, rural participation rates are higher than urban ones. On the whole the urban-rural differences in participation rates are greater for women than for men.

Household - related variables as well as personal characteristics are thus seen to be important in the explanation of the labor force participation behavior of household members in Thailand.

Choice of Economic Sector of Household Members

Among household members who enter the labor force, not all of them by any means do so in the same economic sector as their head of household. Quite a number of them shift sectors and therefore we should see if any pattern can be discerned.

Table 4 gives the proportion of household members who participate in the labor force in the same economic sector as their household head. Only two economic sectors are considered, agriculture and nonagriculture. The figures are broken down for males and females, and by urban and rural area of residence.

The probability of being in the same sector as the household head varies by sex, area of residence, as well as the head's sector. A few conclusions can be drawn. First, while in the urban areas it is more likely for house hold members to be in the head'a sector if this is nonagriculture rather than agriculture, the opposite is true in rural

areas. Thus in urban areas we find that 97% of male and 98% of female members with heads in nonagriculture also work in this sector, and only 49% of male and 69% of female members work in agriculture among those with heads in agriculture. In rural areas, 86% of male and 93% of female members work in agriculture if their heads do so, compared with 60% which follow their heads in nonagriculture. Second, the probability of a switch from agriculture to nonagriculture is much higher in urban than rural areas, while a switch from nonagriculture to agriculture is more likely in rural than urban areas. In fact, the probability of a houselold member being found in agriculture when his head is in nonagriculture is extremely low. Third, men are much more likely to switch out of agriculture than women. The probability of a male household member being in the nonagricultural sector, given that the household head is in agriculture, is 51% as compared with 31% for females in urban areas, and 14% as compared with 7% for females in rural areas. Thus male household members appear to be able to move out of the agricultural sector more easily than female ones.

It would be problematic, however, to interpret these probabilities as the transition probabilities between sectors for household members, given the economic sector of the household head. Such an interpretation would lead one to expect higher probabilities of moving out of agriculture among the young and among the more educated. But, except for rural males, this is not the case. Statistically speaking, the hypothesis that the probability of being in the same sector as the household head does not

very by the age and education level of the individual cannot be rejected for rural females or for the urban population. The explanation for this is that what we observe in only that part of the transition matrix involving sectoral transfers within either urban or rural areas. But by for the most important part of the complete matrix involves rural to urban migration as the mechanism through which individuals move out of the agricultural sector. Taking a cross-sectional view of households such as we are doing here completely misses out on the migratory dimension; individuals who have migrated are not shown with their parents' economic sector. The individuals who can be expected to be most mobile in terms of geographical relocation, the young and better-educated, and who have already made their move, are not represented in our table of probabilities as movers. We only capture such individuals as change economic sectors without migrating.

Unpaid Family Workers

Individuals working in family enterprises may or may not be paid in cash for their efforts. Presumably this depends on the practice of the household in question. Certainly the level of well-being of all household members is directly linked to how many of them work. In the family enterprise situation, individuals do not necessarily take into consideration the wage rate facing them if they were to offer their labor services in the market. Because of various considerations, including domestic obligations, many individuals may not even consider the possibility of outside employment and will contribute to the family farm of enterprise while receiving no direct payment in return.

Table 5 gives the distributions of paid and unpaid workers by various classifications, as well as the proportion working unpaid in each group.[13/] Of all those reporting themselves as working, as many as 46% are unpaid workers. This is a very high proportion which certainly highlights the significance of the family farm or enterprise in the production system. Presumably individuals are only prepared to work without being paid if the fruits of their work directly benefit themselves and their immediate family.

The characteristics of paid and unpaid workers are quite different. Whereas 15% of unpaid workers are under 15 years of age, only 1% of paid workers are; 26% of unpaid workers are between 15 and 19, compared with only 8% of paid workers. Unpaid workers are a great deal more heavily represented by the younger age groups; the proportion of unpaid workers declines steadily with age, from 92% and 74% in the 10-14 and 15-19 age groups down to 18% in the over-60 group. In terms of the level of educational attainment, the proportion of unpaid workers is highest among those with some education and is in fact lower in the uneducated group. This is not really surprising and simply reflects the impact of governmental policy to make primary education compulsory for all children. Thus the younger generation has more years of schooling on average, while it is mostly older people who have no education at all.

Women workers represent over two-thirds of the unpaid work force. This compares with their share of only 30% in the paid group. Whereas 28% of all male workers are unpaid, 66% of female workers fall in

this category. As would be expected, unpaid workers are to be found in greater proportions in rural areas, in the agricultural sector. Fully 57% of agricultural workers are unpaid, compared with only 15% outside of agriculture.

Thus a general characterization of unpaid workers shows more young people, more people with a few years of schooling, more women workers, more agricultural workers in rural areas, than we find in the economically active population as a whole. What we need now is to show the effect of each of these factors individually, while controlling for the effects of all the other factors.

Given that an individual works, we are interested in the probability that he or she will be an unpaid family worker. Accordingly, individuals who are household members, not heads, are classified by their age, level of educational attainment, sex, sector of the household head, urban/rural location and whether or not they work in the same sector as their household head with the head self-employed. Within each cell classified by all these characteristics, the proportion of unpaid family workers is calculated. These cells are used as observations in the regression equation with the proportion unpaid as the dependent variable. The regressions were run separately for males and females, and for urban and rural areas. The results are presented in Tables 6 and 7, the base group in each case consisting of individuals 30-39 years of age, with no education, with the household head having his major occupation in agriculture, and not in the same sector as the head or the head is not self-employed.

The chances of being an unpaid worker are highest for young workers, especially those under 20. A male worker under 15 has a probability of 44 and 36 percentage points, while a female worker under 15 has a probability of 14 and 18 percentage points, greater than a worker in his 30's of being an unpaid worker, in urban and rural areas respectively. The proportion of unpaid workers is lowest for those between 20 and 50 years of age, but increases for older workers. Women workers in urban and rural areas have a probability of 10 and 8 percentage points greater than men of working unpaid. Having more education significantly reduces the chances that an individual will be an unpaid worker. Urban households have a lower proportion of unpaid family workers in general. The proportion of unpaid workers is lower for households in which the head's major occupation is outside of agriculture, by 26 percentage points for both males and females in urban households, and by 10 and 18 percentage points for rural households. As would be expected, the probability of being an unpaid worker is considerably increased for those who work in the same sector as the household head with the head self-employed, by 25 and 43 percentage points in urban areas, and by 31 and 25 percentage points in rural areas, for male and female workers respectively.

It is important to estimate the proportion of those in the labor force who are unpaid family workers because otherwise the incomes of those actually receiving income would be underestimated. The underestimation would not be uniform since, as we have seen, certain

population groups have a higher probability of being unpaid than other.. Moreover, the contribution of unpaid family workers shows up elsewhere, as part of the household head's income and as own consumption.

Income

Total household income consists of both money income and nonmoney income, or own consumption. Household money income is simply the sum of the money incomes of all household members who receive income.

Money income is reported in the Socio-economic Survey, 1968-9, both for the month and the year preceding the survey. In this study, income for the year preceding the survey is used. For each individual in the sample, the amount of money income received is reported separately for each of these 7 categories:

(i) wages, salaries, overtime, bonuses and commissions
(ii) net profit from self-employment
(iii) interest and dividends
(iv) pensions and annuities
(v) income from rents
(vi) subsidies
(vii) other income

In this study we combine rent income with interest and dividends, and subsidies and other income with pensions and annuities. Thus we have 4 categories of income:

(i) wage income: wages, salaries, overtime, bonuses and commissions

(ii) self-employment income: net profit from self-employment

(iii) rent and interest income : interest, dividends, income from rents

(iv) transfer income: pensions, annuities, subsidies, other income

With respect to nonmoney income, the Socio-economic Survey, 1968-9, reports the cash expenditures made by the household on over 200 items of goods and services for the month preceding the survey. At the same time, information on the quantities of various goods which were home-produced or received free and consumed by the household was also obtained. Such consumption items were valued at retail prices prevailing in the area and recorded in the survey. By summing the values of these, we obtain the total value of goods home-produced or received free; this is defined as the household's nonmoney income, after adjusting to an annual basis.

Table 8 gives the proportions of the income-receiving population having each of the four types of income, and Table 9 gives the corresponding average incomes. The tabulations are given by sex and area of residence. Each row sums to more than 100%, reflecting the fact that some people have income from more than one source. It is evident, however, that the majority of individuals have either wage or self-

employment income, that very few of them have any rent and interest income at all, and that a little over 10% of them receive transfer incomes. A smaller proportion of women than men receive wage income. In urban areas, a larger proportion of them receive income from self-employment and also transfer income, and a slightly larger proportion of them have rent and interest income.

Average wage and self-employment incomes are much lower for women than for men. In addition, for a given sex and area of residence, wage income is lower than self-employment income. Average rent and interest and transfer incomes are somewhat difficult to interpret, since they include those for whom these are not necessarily the major sources of income.

Because of the problem of unpaid family workers, it is useful to consider three different groups of individuals in estimating the income-generating equations, namely unpaid family workers, ordinary paid workers and workers whose incomes include the contributions of unpaid family workers. In estimating income, nonmoney income is allocated to the self-employment income of the household head, so long as he already has some money self-employment income. If he does not, the nonmoney income is added to the head's total income but is not used in the equation for self-employment income. The reason for this is that if we automatically add nonmoney income to the self-employment income of the head, this will greatly increase the number of self-employed persons when in fact many of these have only some small nonmoney income, and

therefore will throw off the estimates for self-employment income.

The total number of unpaid family workers in a household is obtained. A series of dummy variables is created corresponding to 1, 2, 3 and 4 or more unpaid family workers, such that they can be nonzero for the household head only. Thus all four dummy varialbes for unpaid family workers will be zero for individuals who are not heads of household, as well as for heads of households containing no unpaid family workers. For heads of households with unpaid workers, the dummy variable corresponding to their number takes the value one. The family-worker variables are included to explain the head's income irrespective of whether or not he has nonmoney income.

Two sets of regression estimates were obtained separately for agriculture and nonagriculture.

A. Probability of having income in the first set of equations, the probability that an individual will have each of the four categories of income defined above is estimated, given his age, level of education, sex, sector and area of residence. For this the sample consists of the working population reporting income. The results are reported in Tables 10 to 13.

B. Income income equations are estimated, both for income and the natural logarithm of income, for each of the four income, for each of the four income categories, as well as for total income, given the age, level of education, sex, sector and area of residence of

the individual. Again, the sample consists of the working population reporting income. The contributions of unpaid family workers are taken to accrue to the household head, either in money terms or as own consumption, and are estimated in the family-worker coefficients which are applicable to household heads only. The two sets of regressions are reported in Tables 14 to 18 and 19 to 23.

Since most of the individuals with income have either wage or self-employment income, we find corresponding trends in the regression equations estimating the probabilities of having these two types of incomes. Thus the probability of having wage income tends to decline with age, while that of having self-employment income increases. The tendency therefore is for individuals to start out as wage earners, but later switch to self-employment. In nonagriculture, a higher level of schooling is associated with a higher probability of having wage income and a lower one of being self-employed, whereas this is not true in the agricultural sector. In nonagriculture, women are less likely to be wage earners when compared with men of otherwise similar characteristics, and are correspondingly more likely to be self-employed. However, in the agricultural sector, women have a probability 10 percentage points lower than men of being wage earners, and 5 percentage points lower of being self-employed. Outside of agriculture, urban workers are more likely to earn wages and less likely to be self-employed than rural workers.

The results of trying to predict the probabilities of having rent and interest or transfer income are not good, reflecting the failure

of personal characteristics of individuals to explain variations in them. However, we can say that older people outside the agricultural sector have a greater probability of having rent and interest income, and that increasing age is associated with a greater likelihood of having transfer income. Women in nonagriculture have a somewhat higher probability than men of having these two types of income.

In general terms, the results of the income equations are as expected. For each type of income, and holding other characteristics constant, increasing age is associated with higher income, except for a falling off of wages and self-employment income for those sixty and older in the nonagricultural sector. More education and higher incomes go together. Women make less than men in terms of wage and self-employment income, given otherwise similar characteristics. Incomes are higher in urban areas.

As was the case with the probability equations, personal characteristics such as are included in the regression do not explain rent and interest and transfer incomes successfully. And indeed we would not expect them to. Average transfer income is in fact higher for those with more schooling, reflecting the fact that employment opportunities which are available to the better educated have better pension benefits.

The results in Tables 15 and 20 show that the contribution of unpaid family workers to household income is definitely positive. For household heads with similar personal characteristics working in

the same sector and rural/urban location, those with unpaid family workers have a higher total income, his money income plus the value of own consumption, than those working alone. The total contribution to household income of unpaid family workers increases with the number of such workers, although the average contribution does decline.

Using the results in Table 20, we find that one unpaid family worker in the agricultural sector contributes an additional 48% to household income over what the head earns, while two, three and four or more workers together contribute another 62%, 75% and 95% respectively. The average addition to household income by a worker is thus 48%, 31%, 25% and under 24% over the contribution of the head, depending on the total number of family workers

Conclusion

This paper uses data from the Socio-economic Survey, 1968-9, for Thailand to investigate the process of income generation in the household sector. It examines in turn the factors which affect the labor force participation decision of household members, the probability of being unpaid family workers, the probability of having different types of income and finally income itself. Both personal and household characteristics are considered; both are found to have their impact in the determination of labor force participation and income. In particular, it seems important to incorporate unpaid family workers in the analysis of household incomes in Thailand explicitly.

The prevalence of family farms and enterprises in Thailand and the significance of household characteristics in determining the level of household income would suggest that more attention should be directed at the household sector as a way of achieving a better understanding of the problem of income distribution in Thailand.

Since personal and household characteristics turn out to be important in determining the labor force participation behavior and income of individuals, a study of this nature will raise questions concerning the role of these characteristics in shaping the distribution of income as development proceeds. Changes in their distribution can alter the structure and composition of the labor force and hence the income distribution, as well as have their direct impact.

Consider demographic changes which can be expected to accompany economic development, such as lower fertility and mortality rates and later marriages. These can affect the distribution of income in the short run, directly by changing the size and composition of households, and indirectly to the extent that they lead to changes in the size and composition of the labor force and hence in income. For example, fewer children as a result of a fall in fertility may raise the participation rate of women. On the other hand, the resulting higher level of income of the household head per household member may deter entry into the labor force by household members. In the longer run, changes in the distribution of income have their impact through the generation of individuals directly affected by the original demographic changes.

Changes taking place over time can have both a direct and indirect effect on the distribution of income. Thus policies designed to alter the distribution of educational attainment affect the distribution of income directly to the extent that the level of schooling is related to the level of income. But, as we have seen, the level of schooling is an important factor in determining whether or not an individual will be in the labor force, as well as whether he will work as a paid or unpaid worker. Moreover, changes in the composition of the educational distribution of the labor force will alter the relative rates of remuneration between different education classes and thus affect the distribution of income in this way as well.

The labor force participation of household member has been shown to be influenced by household characteristics such as the adequacy of the head's income in providing for the material requirements of the household, whether or not there is a family enterprise, and, in the case of women, the presence of children in the household. Changes involving these, such as the diminishing importance of the family farm or enterprise, will have their effect on the distribution of income.

One of the phenomena accompanying economic growth is rural to urban migration and the movement of the labor force out of the agricultural sector. The labor force participation rates of individuals have been found to vary significantly between rural and urban areas, and to depend on whether they belong to agricultural households. Moreover, their incomes also differ greatly between locations and sectors. The income

distribution is correspondingly affected. In these cases the situation is complicated by the fact that the effect of any given change is not necessarily unambiguous. A movement of the labor force out of the agricultural sector can be expected to reduce participation, even though those who move may receive higher incomes. Of course both the participation rates and income differentials themselves are subject to change as well and therefore the problem is compounded.

Individual and household characteristics affect not only labor force participation and income, but also savings and consumption. As these characteristics and income change, the size of savings and the pattern of consumption will also change, there by affecting income on the production side by changing the relative demands for different factors of production.

The paper attempts to understand the process of income generation in the household sector in Thailand. It concludes that household and personal characteristics of individuals are important in the explanation of the different aspects of household income. But it is also evident that there is still a great deal more to learn before we can hope to grasp the thorny problem of income distribution.

Footnotes

1/ Official tabulations of this survey appear in Report, Socio-economic Survey, B.E. 2511-2512, National Statistical Office, O Office of the Prime Minister, Bangkok, Thailand, 1973. Details concerning the sampling procedure and the type of information collected are given in the report on pages 25-28.

2/ The definition of a household in the Socio-economic Survey,1968-9 is given as a private household consisting of a person or a group of related persons who live, eat and consume other living essentials together, but some persons may keep their finances separately.

3/ Tabulations of the National Statistical Office always use the household as the unit of reference. No information is ever given concerning individuals.

4/ Individuals are considered to be in the labor force if they report one or more occupations, regardless of whether they report any income. The Socio-economic Survey, 1968-9, classified the following people as not having an occupation:

1. people under 11 years of age
2. people looking for work
3. housewives or persons who work around the house
4. students
5. people unable to work because of old age

6. people unable to work because of physical or mental disability or because of chronic illness
7. people who are voluntarily idle
8. people receiving subsidies

A very serious shortcoming of the data is the fact that there is no information recorded on either the number of hours worked in a week or the number of weeks worked in a year. This has to be borne in mind in interpreting the results.

5/ This problem has been extensively examined for the U.S. and elsewhere. See, for example, William G. Bowen and T. Aldrich Finegan, The Economics of Labor Force Participation, Princeton University Press, 1969.

6/ In the Thai section of the Report, Socio-economic Survey, B.E. 2511-2512, the second sentence of the definition reads, 'Usually he is a person with an occupation or income, and is responsible for providing living essentials for, and looking after the welfare of, other household members.'

7/ Bowen and Finegan, op.cit., pp.132-145.

8/ All individuals are classified by the following characteristics:

Classifications	Categories
A. Personal characteristics	
A.1 Age:	10-14 15-19 20-29 30-39 40-49 50-59 60 and over

A.2 Education: none
1-9 years
10 years or more

Note: Unfortunately the Survey paid more attention to higher levels of schooling but failed to differentiate among the first nine years of education. Since most people have no education or only a few years of schooling, it it did not seem worthwhile to keep the breakdown for the group with ten years or more.

A.3 Sex: male
female

B. Household characteristics

B.1 Presence of children: the individual is female and there is at least one child under 7 present in the household

B.2 Number of Adults (15-64): 1
2
3
4 or more

B.3 Income of household head per household member :

<1,000 baht per year
≥1,000 but <2,000 baht per year
≥2,000 baht per year

Note: Money income was used here. Total income, the sum of money and nonmoney income, is preferable conceptually. However, there is a problem in isolating that part of nonmoney income which is produced by the household head, since nonmoney income includes the contributions of other household members.

B.4 (Potential) existence of a family enterprise:

the household head has income from self-employment the household head has no income from self-employment

Note: This classification is considered to be an extremely crude proxy for whether or not a household has a family farm or enterprise. The household head having income from self-employment is a necessary but not sufficient condition for a family enterprise. Thus we include too many household in the family-enterprise category. The definition is expected to be less defective in the agricultural sector.

B.5 Sector of household head: agriculture
nonagriculture

B.6 Area of Residence: urban
rural

9/ There are potentially 6,048 cells, but some are empty. In particular, certain cells are not expected to have any observations in any case, for example those which would involve people 10-14 years of age with 10 or more years of schooling.

10/ The term urban area is used interchangeably with municipal area as officially defined. There are three types of municipalities:

Type of Municipality	Minimum Population Size	Minimum Population Density (per square kilometer)
City (nakorn)	50,000	3,000
Town (muang)	10,000	3,000
Small town (tambol)	no specific criteria	

Correspondingly, a rural area refers to a nonmunicipal area and consists of sanitary districts and villages.

11/ The estimated equations suffer from the fact that the assumption of a homoscedastic error term is not satisfied. We hope to take care of this problem in future work.

12/ Bowen and Finegan, op.cit., pp.53-57 and 114-127.

13/ Unpaid family worker are individuals who report an occupation, and hence are considered to be in the labor force, but do not report any income.

Table 1

Determinants of Labor Force Participation Rates, Thailand, 1968-9, Urban Areas

Dependent Variable: Labor Force Participation Rate

Independent Variable	Males		Females	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	.9329	21.22	.7746	21.20
Age: 10-14	-.9354	-38.51	-.5438	-26.59
15-19	-.6040	-24.67	-.2880	-13.22
20-29	-.1363	-5.38	-.0665	-3.19
40-49	-.0265	-.75	-.0529	-2.17
50-59	-.1367	-3.44	-.1864	-6.43
60+	-.4897	-13.62	-.4210	-13.67
Education: 1-9 years	.1318	4.53	.0361	1.85
10 years or more	-.0040	-.13	.0091	.34
Children: with children under 7			-.0621	-4.96
Number of Adults: 1	.1542	4.61	.0889	2.16
2	.0023	.11	-.0898	-4.75
4 or more	-.0011	-.07	-.0067	-.42
Income of Household Head per member:				
< 1,000 baht/year	.0629	3.83	.0564	3.12
≥ 2,000 baht/year	-.0198	-1.43	-.0280	-1.93
Family Enterprise: Household head is self-employed	.0294	2.46	.0794	6.39

Table 1 (continued)

Determinants of Labor Force Participation Rated, Thailand, 1968-9, Urban Areas

Dependent Variable: Labor Force Participation Rate

Independent Variable	Males		Females	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Sector: Nonagricultural	-.1253	-5.60	-.1760	-8.21
R^2	.8867		.5992	
Number of Observations	477		898	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 2

Determinants of Labor Force Participation Rates, Thailand, 1968-9, Rural Areas

Dependent Variable: Labor Force Participation Rate

Independent Variable	Males		Females	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	.8734	18.68	.7896	29.46
Age: 10-14	-.6743	-23.07	-.5559	-32.60
15-19	-.1905	-6.30	-.0972	-5.24
20-29	-.0291	-.95	-.0352	-2.07
40-49	-.0078	-.15	-.0400	-1.97
50-59	-.2234	-3.47	-.0998	-3.96
60+	-.5817	-11.90	-.4525	-17.02
Education: 1-9 years	.1368	3.82	.0694	4.16
10 years or more	-.0821	-1.50	-.2251	-4.89
Children: with children under 7			-.0582	-5.16
Number of Adults: 1	.1467	3.40	.0616	1.79
2	-.0346	-1.63	-.0174	-1.21
4 or more	.0004	.02	.0363	2.79
Income of Household Head per member:				
< 1,000 baht/year	.0564	3.40	.0455	3.67
≥ 2,000 baht/year	-.0192	-.85	-.0292	-1.76

Table 2 (continued)

Determinants of Labor Force Participation Rates, Thailand, 1968-9, Rural Areas

Dependent Variable: Labor Force Participation Rate

Independent Variable	Males		Females	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statostic
Family Enterprise: Household head is self-employed	-.0336	-2.09	.0476	3.81
Sector: Nonagricultural	-.1784	-10.50	-.1672	-12.73
R^2	.8219		.7024	
Number of Observations	474		1,000	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 3

Labor Force Participation Rates for People with No Education, in Households with No Children, Three Adults, Income of Head per Member ฿1,000-2,000 per year and with Head Not Self-Employed

	Urban (Nonagriculture)		Rural (Agriculture)	
Age	Male	Female	Male	Female
10-14	*	.0518	.1991	.2337
15-19	.2036	.3076	.6829	.6924
20-29	.6713	.5291	.8443	.7544
30-39	.8076	.5956	.8734	.7896
40-49	.7811	.5427	.8656	.7496
50-59	.6709	.4092	.6500	.6898
60+	.3179	.1746	.2917	.3371

Source: Tables 1 and 2

* Predicted value is negative.

Table 4

Probability of a Household Member in the Labor Force Being in the Same Sector as the Household Head

		Household Head's Sector	
		Agriculture	Nonagriculture
Urban			
Males:	agriculture	.4878	.0259
	nonagriculture	.5122	.9741
Females:	agriculture	.6857	.0189
	nonagriculture	.3143	.9811
Rural			
Males:	agriculture	.8595	.4101
	nonagriculture	.1405	.5899
Females:	agriculture	.9257	.3953
	nonagriculture	.0743	.6047

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 5

Characteristics of Paid and Unpaid Workers, Thailand, 1968-9

Classification		Distribution of Paid Workers	Distribution of Unpaid Workers	%Unpaid in this Group
Age:	10-14	1.09	15.25	92.32
	15-19	7.61	25.71	74.39
	20-29	18.73	25.09	53.53
	30-39	24.94	15.29	34.52
	40-49	21.16	9.66	28.18
	50-59	14.33	5.89	26.13
	60+	12.14	3.12	18.11
Education:	none	19.80	14.34	38.38
	1-9 years	75.14	84.71	49.23
	10 years or more	5.06	.95	13.95
Sex:	male	69.56	31.41	27.97
	female	30.44	68.59	65.96
Sector of Head:	Agriculture	59.43	91.59	57.00
	Nonagriculture	40.57	8.41	15.13
Location:	Urban	13.35	3.57	18.68
	Rural	86.65	96.43	48.91
Same Sector as Head who is Self-employed		67.07	82.00	51.26
Not in Same Sector as Head or Head is not Self-employed		32.93	18.00	31.97
TOTAL		100.00	100.00	46.24

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 6

Probability of Being an Unpaid Family Worker, Thailand, 1968-9, Urban Areas

Dependent Variable: Proportion of Unpaid Family Workers in Total

Independent Variable	Males		Females		Total	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	.3148	3.86	.4012	7.16	.3350	6.52
Age: 10-14	.4352	4.78	.1447	2.30	.2209	4.04
15-19	.1826	3.94	.1119	2.76	.1341	4.14
20-29	.1036	2.51	-.0221	-.62	.0237	.82
40-49	-.0052	-.09	.0126	.31	.0099	.27
50-59	-.0242	-.34	.0976	1.81	.0591	1.29
60+	.0774	1.00	.0241	.31	.0404	.69
Education: 1-9 years	-.0455	-.72	-.0375	-.98	-.0505	-1.48
≥10 years	-.0603	-.88	-.1419	-2.73	-.1102	-2.64
Sector of Head: Nonagricultural	-.2556	-5.69	-.2616	-7.09	-.2725	-9.00
Same Sector as Head; Head is self-employed	.2492	8.67	.4296	16.91	.3632	17.83
Sex: Female					.0962	4.49
R^2	.6350		.8006		.7146	
Number of Observations	105		117		222	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand

Table 7

Probability of Being an Unpaid Family Worker, Thailand, 1968-9, Rural Areas

Dependent Variable: Proportion of Unpaid Family Workers in Total

Independent Variable	Males		Females		Total	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statisttic
Constant	.5196	4.26	.5897	9.78	.4966	8.80
Age: 10-14	.3616	4.62	.1796	2.92	.2456	5.34
15-19	.2040	2.82	.0292	.60	.0884	2.28
20-29	.0254	.35	.0243	.53	.0077	.20
40-49	-.0953	-.76	.0106	.19	-.0027	-.06
50-59	-.0871	-.44	.0586	.85	.0421	.68
60+	.0572	.28	.1130	1.20	.0996	1.20
Education: 1-9 years	-.1545	-1.36	-.0029	-.06	-.0347	-.82
≥10 years	-.2839	-1.62	-.2029	-1.20	-.2120	-1.85
Sector of Head: Nonagriculture	-.0950	-1.62	-.1794	-3.89	-.1536	-4.26
Same Sector as Head: Head is self-employed	.3122	7.63	.2476	6.97	.2781	10.35
Sex: female					.0831	3.10
R^2	.5854		.4921		.5125	
Number of Observations	119		123		242	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand

Table 8

Proportions of Working Population with Income Having Various Types of Income

(%)

Area of Residence	Type of Income			
	Wage	Self-employment	Rent & Interest	Transfer
Rural:				
Males	40.45	66.95	2.36	12.23
Females	33.81	60.59	2.66	11.69
Total	38.52	65.11	2.45	12.07
Provincial Urban:				
Males	55.74	44.54	3.78	11.01
Females	42.56	52.95	3.91	13.17
Total	50.58	47.83	3.83	11.86
Bangkok-Thonburi:				
Males	71.55	27.20	2.73	8.89
Females	61.71	34.55	2.89	9.00
Total	67.67	30.10	2.79	8.93

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand

Table 9

Average Annual Income for Working Population with Income

(in Baht)

Area of Residence	Type of Income				
	Wage	Self-employment	Rent & Interest	Transfer	Total
Rural:					
Males	4,463.07	8,262.61	4,951.73	2,459.97	8,224.78
Females	2,338.38	4,365.16	2,817.40	2,752.50	4,025.45
Total	3,922.84	7,211.82	4,280.40	2.542.03	7,008.19
Provincial Urban:					
Males	10,827.35	25,260.99	14,437.70	6,913.00	19,088.94
Females	7,157.09	8,622.85	6,827.23	5,490.58	8,741.29
Total	9,618.15	18,049.72	11,397.86	6,294.38	15,037.41
Bangkok-Thonburi:					
Males	14,865.92	22,509.12	14,826.20	12,787.72	18,766.09
Females	8,490.36	12,542.58	21,192.37	9,029.38	11.146.00
Total	12,573.52	17,998.86	17,423.09	11,294.84	15,761.66

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand

Table 10

Dependent Variable: Probability of Having Wage Income

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	.4362	23.25	.5287	38.63
Age: 10-14	.2848	4.70	.3814	12.25
15-19	.4032	15.13	.2254	16.85
20-29	.1283	6.83	.0926	9.12
40-49	-.0889	-5.40	.0309	2.80
50-59	-.1913	-10.59	-.1467	-10.22
60+	-.2714	-13.51	-.3309	-21.26
Education: 1-9 years	-.0683	-4.42	.0545	4.66
≥ 10 years	-.0002	-.00	.3215	20.51
Sex: female	-.0993	-7.32	-.1902	-24.48
Area: urban	-.0334	-.67	.0373	4.68
Number of observations	5,964		15,587	
R^2	.1187		.1640	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 11

Dependent Variable: Probability of Having Self-employment Income

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	.7149	39.79	.5555	38.99
Age: 10-14	-.4600	-7.92	-.4164	-12.84
15-19	-.4531	-17.76	-.2816	-20.21
20-29	-.1129	-6.28	-.1409	-13.32
40-49	.0491	3.11	-.0309	-2.69
50-59	.1056	6.10	.0454	3.04
60+	.0811	4.22	-.1226	-7.56
Education: 1-9 years	.0552	3.74	-.0311	-2.56
≥ 10 years	.0672	1.01	-.3089	-18.93
Sex: female	-.0464	-3.57	.1137	14.06
Area: urban	-.0042	-.09	-.0697	-8.40
Number of observations	5,964		15,587	
R^2	.1012		.0935	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 12

Dependent Variable: Probability of Having Rent and Interest Income

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	.0377	6.15	-.0207	-3.93
Age: 10-14	-.0234	-1.18	-.0181	-1.51
15-19	-.0188	-2.16	-.0264	-5.13
20-29	-.0068	-1.18	-.0229	-5.87
40-49	-.0148	-2.75	.0133	3.15
50-59	-.0131	-2.22	.0592	10.71
60+	.0104	1.59	.1319	22.01
Education: 1-9 years	-.0156	-3.09	.0452	10.06
≥ 10 years	.0553	2.44	.0676	11.21
Sex: female	.0021	.47	.0123	4.12
Area: urban	.0294	1.79	-.0061	-2.00
Number of observations	5,964		15,587	
R^2	.0100		.0478	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 13

Dependent Variable: Probability of Having Transfer Income

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	.0704	4.89	.0841	9.62
Age: 10-14	.0225	.48	-.0904	-4.55
15-19	-.0961	-4.70	-.0566	-6.22
20-29	-.0338	-2.34	-.0477	-7.35
40-49	.0118	.94	.0042	.59
50-59	.0703	5.07	.0432	4.71
60+	.0890	5.78	.2926	29.44
Education: 1-9 years	.0509	4.29	-.0103	-1.38
≥ 10 years	.0420	.79	.0584	5.84
Sex: female	.0094	.90	.0293	5.91
Area: urban	-.0574	-1.49	-.0042	-.83
Number of observations	5,964		15,587	
R^2	.0176		.0940	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 14

Dependent Variable: Annual Wage Income (in Baht)

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	2485.94	10.81	3810.67	10.11
Age: 10-14	-1079.15	-1.99	-4915.18	-7.97
15-19	-784.01	-3.22	-4355.52	-14.74
20-29	-338.88	-1.70	-2072.07	-8.87
40-49	452.16	2.22	1526.47	5.86
50-59	288.38	1.11	3728.19	9.43
60+	439.54	1.29	-26.34	-.05
Education: 1-9 years	5.08	.02	3099.34	9.08
≥ 10 years	6419.56	7.96	10194.05	26.04
Sex: female	-965.54	-5.47	-2522.12	-12.76
Area: urban	3520.01	4.87	4120.18	21.97
Number of observations	1,910		9,636	
R^2	.3977		.5003	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 15

Dependent Variable: Annual Self-employment Income (in Baht)

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	4500.02	10.72	5606.06	4.30
Age: 10-14	-1876.05	-.97	-6813.06	-1.35
15-19	-2503.45	-3.11	-4227.65	-2.62
20-29	-1775.25	-4.48	-4234.28	-3.99
40-49	1311.57	3.94	-872.96	-.81
50-59	79.76	.22	4886.98	3.70
60+	140.46	.35	-3195.77	-2.05
Education: 1-9 years	755.03	2.50	3636.59	3.45
≥ 10 years	9009.52	6.67	26677.18	12.96
Sex: female	-1558.66	-5.07	-4829.79	-5.94
Area: urban	5997.73	6.08	9090.76	10.77
Unpaid Family Workers: 1	1672.04	5.26	7734.07	6.90
2	2787.60	7.47	8185.88	5.02
3	4613.96	11.05	8611.61	3.46
≥4	6132.94	14.56	12122.93	4.72
Number of observations	4,338		5,473	
R^2	.5056		.2034	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 16

Dependent Variable: Annual Rent and Interest Income (in Baht)

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	2414.66	2.23	1223.36	.37
Age: 10-29	82.67	.07	-156.35	-.04
40-49	-576.01	-.46	2878.46	1.09
50-59	1010.30	.81	7183.92	2.73
60+	-704.28	-.64	5351.14	2.15
Education: ≥ 1 year	678.67	.73	3293.36	1.29
Sex: female	-1350.58	-1.58	-2317.78	-1.25
Area: urban	3465.42	1.69	7752.04	4.24
Number of observations	129		600	
R^2	.3089		.1855	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 17

Dependent Variable: Annual Transfer Income (in Baht)

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	405.19	.37	-1341.48	-1.80
Age: 10-29	-338.39	-.30	-1924.62	-2.77
40-49	1342.74	1.44	570.15	.85
50-59	624.49	.67	2148.52	2.82
60+	2270.92	2.20	4210.84	6.41
Education: 1-9 years	1115.28	1.31	3210.10	5.45
≥ 10 years	12521.54	3.31	8327.40	10.42
Sex: female	553.66	.72	826.68	1.81
Area: urban	436.65	.13	4359.23	9.35
Number of observations	791		1,826	
R^2	.0855		.2851	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 18

Dependent Variable: Annual Total Income (in Baht)

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	5831.31	17.71	6512.67	10.68
Age: 10-14	-4129.19	-3.88	-7919.02	-5.71
15-19	-3867.70	-8.27	-7281.49	-12.22
20-29	-2310.70	-7.00	-5043.95	-11.14
40-49	2473.76	8.56	1449.95	2.95
50-59	2134.40	6.73	6836.73	10.69
60+	1684.74	4.78	650.08	.94
Education: 1-9 years	1154.09	4.26	4365.59	8.39
≥ 10 years	11216.72	9.19	14643.54	20.97
Sex: female	-3023.01	-12.69	-4607.94	-13.31
Area: urban	4613.54	5.23	5767.30	16.25
Number of observations	5,964		15,587	
R^2	.4644		.2510	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 19

Dependent Variable: Natural Logarithm of Annual Wage Income

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	7.3392	89.32	7.8947	197.42
Age: 10-14	-.7179	-3.70	-1.4627	-22.34
15-19	-.3937	-4.52	-.8286	-26.42
20-29	-.1653	-2.32	-.1137	-4.59
40-49	.0981	1.35	.1631	5.90
50-59	.0231	.25	.2578	6.15
60+	.1263	1.04	-.3006	-4.92
Education: 1-9 years	-.0094	-.12	.4958	13.70
≥ 10 years	1.6539	5.74	1.2218	29.41
Sex: female	-.5215	-8.27	-.4783	-22.80
Area: urban	1.0682	4.14	.7091	35.65
Number of observations	1,910		9,636	
R^2	.9781		.9864	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 20

Dependent Variable: Natural Logarithm of Annual Self-employment Income

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	8.1052	179.10	8.1709	176.18
Age: 10-14	-.7609	-3.64	-1.8477	-10.27
15-19	-.6419	-7.41	-.7224	-12.58
20-29	-.3418	-8.01	-.1725	-4.57
40-49	.1448	4.04	.1935	5.08
50-59	.0996	2.52	.4596	9.77
60+	.1153	2.69	.0010	.02
Education: 1-9 years	.0534	1.64	.3842	10.24
≥ 10 years	.5113	3.51	.5493	7.50
Sex: female	-.5659	-17.09	-.6257	-21.64
Area: urban	.5078	4.78	.7780	25.92
Unpaid Family Workers: 1	.4752	13.86	.4813	12.08
2	.6183	15.36	.6360	10.96
3	.7453	16.56	.6958	7.87
≥ 4	.9470	20.86	.9758	10.69
Number of observations	4,338		5,473	
R^2	.9908		.9856	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 21

Dependent Variable: Natural Logarithm of Annual Rent and Interest Income

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	6.7954	18.17	7.0708	35.66
Age: 10-29	1.0746	2.60	.4236	1.97
40-49	.2188	.51	.5002	3.17
50-59	.5535	1.29	.8470	5.39
60+	-.2126	-.56	.6062	4.07
Education: ≥ 1 year	-.0057	-.02	.5916	3.89
Sex: female	-.5729	-1.95	-.4498	-4.04
Area: urban	1.4863	2.10	.9441	8.64
Number of observations	129		600	
R^2	.9606		.9745	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 22

Dependent Variable: Natural Logarithm of Annual Transfer Income

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	6.6703	48.22	6.7542	71.43
Age: 10-29	-.2424	-1.72	-.3863	-4.37
40-49	.4477	3.79	-.0500	-.59
50-59	.3482	2.95	.3328	3.44
60+	.4826	3.70	.4556	5.46
Education: 1-9 years	.1258	1.17	.5839	7.81
≥ 10 years	1.8808	3.93	1.2684	12.50
Sex: female	.0866	.89	.1965	3.39
Area: urban	.6961	1.65	.7369	12.43
Number of observations	791		1,826	
R^2	.9756		.9741	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.

Table 23

Dependent Variable: Natural Logarithm of Annual Total Income

Independent Variable	Agriculture		Nonagriculture	
	Estimated Coefficient	t-Statistic	Estimated Coefficient	t-Statistic
Constant	8.5030	228.57	8.4013	317.09
Age: 10-14	-1.6316	-13.57	-1.8071	-29.97
15-19	-1.2413	-23.50	-1.0618	-40.99
20-29	-.5509	-14.78	-.3166	-16.09
40-49	.2858	8.75	.2119	9.93
50-59	.3293	9.19	.3544	12.75
60+	.2743	6.88	-.0194	-.65
Education: 1-9 years	.0837	2.73	.4369	19.31
≥ 10 years	.6256	4.54	1.0401	34.27
Sex: female	-.8865	-32.95	-.6143	-40.84
Area: urban	.4124	4.14	.5942	38.52
Number of observations	5,964		15,587	
R^2	.9891		.9879	

Source: Data tapes of the Socio-economic Survey, 1968-9, National Statistical Office, Bangkok, Thailand.