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Thailand's Income Distribution and Poverty Profile and Their Current Situations

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Paper on

THAILAND'S INCOME DISTRIBUTION AND POVERTY PROFILE AND THEIR CURRENT SITUATIONS

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PREFACE

The main authors of this paper are Somchai Jitsuchon and Suganya Hutaserani. Parts of Chapter 1 was prepared by Khun Kobchai Chimkul. Simulation of THAM-2 model is calibrated by Khun Prasong Werakarnjanapongs of the Agriculture and Rural Development Program, TDRI, who also wrote the brief description of model THAM-2 in appendix B. Khun Theerapol Jumpapech helped preparing some tables.

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CHAPTER 1

Introduction and Overview of Thailand's Economic and Social Development[1]

1.1 Introduction and Overview

Over the past few years, the pace of economic development in Thailand had accelerated significantly. With manufactured exports growing at 35-40% per annum for almost three consecutive years, economic growth this year likely to be near 10% in real terms, and many are mentioning Thailand as the leader of the next wave of the NIC's. The current success has however highlighted a number of problems needs to be taken care in order to maintain and guarantee the future economic development. One such problem, and perhaps the most important one, is the distribution of income and welfare issue.

This paper has three objectives. They are

First, to overview the facts of income distribution and poverty profile before 1986 where the suitable information is available.

Second, to examine and identify factors that influence household income and income inequalities.

Third, to assess the impacts of the rapid economic changes Thailand has experienced recently on the distribution of income and poverty incidence.

The paper consisting of four chapter. This chapter reviews Thailand's economic and social development in a number of dimensions which will provide basic understanding about the circumstances that relate to the problem of income distribution and poverty. The next chapter clarifies the facts of the distribution of income and poverty incidence before 1986 and decompose sources of income inequalities and sources of inequality changes. Chapter 3 extends the analyses to cover distributions of other indicators of welfare, namely, social services, human capital assets, and physical asstets. Conventional income-generating functions are also estimated to finds out the determinants of household income and income inequality. Chapter 4 shows the simulation that assesses impacts of recent economic success on the distribution of income and poverty.

1.2 Economic Development

Over two to three decades since 1960, Thailand has experienced a satisfactorily high rate of growth. Table 1.1 shows that the average annual growth rate of Thai economy has never less than 5% in any decade since 1970. Even in the preceding period, i.e., during 1960-70, the average growth rate is also around 7-9% per annum.[2] This good growth, in conjunction with the decline in the rate of population growth that will be discussed in the next section, led to fairly high rates of per capita GNP growth. The per capita GNP grew about 3.5% per annum in the period 1970-75 and 1980-85, and about 4.5% between 1975 and 1980.[3] Currently, Thailand's per capita GNP is around US 950.

Table 1.1
Average growth rates of GDP at constant price

	1970-75	1975-80	1980-85	1985-87	1987
Agriculture	3.81	4.03	4.92	-0.23	-2.51
Non-Agricul.	6.20	9.21	5.34	2.94	9.39
- Manufacturing	10.34	9.81	4.62	3.76	10.23
- Other Industries	4.58	8.93	5.68	2.56	8.98
Services	6.39	8.56	8.37	2.78	9.44
Total	5.60	7.94	5.65	2.31	7.10

Source : NESDB, National Income of Thailand, new series 1970-1987

Table 1.2
Shares of GDP at constant price

	1970	1975	1980	1985	1987
Agriculture	27.02	24.80	20.63	19.93	17.57
Non-Agricul.	61.52	63.30	67.13	66.16	68.20
- Manufacturing	15.99	19.91	21.70	20.67	22.17
- Other Industries	45.53	43.38	45.43	45.49	46.03
Services	11.47	11.90	12.25	13.91	14.23
Total	100.00	100.00	100.00	100.00	100.00

Source : NESDB, National Income of Thailand, new series 1970-1987

Amidst the overall growth, there has been a gradual but continuous change of economic structure. Since 1960 the share of agriculture in GDP has continually been falling. According to the revised series of national income, GDP share of agricultural sector declined from 27.02% in 1970 to 17.57% in 1987. At the same time, share of manufacturing rose from 16% in 1970 to 22.1/% in 1987 and service share rose from 11.47% to 14.23% (table 1.2). The major factor contributing to this production restructuring is the rapid increase of exports and changes in the export component. The manufactured exports expand quickly compared to the exports of traditional commodities like agricultural and mineral products, especially during the last decade.

The rapid changes of exports and production structure has introduced, directly and indirectly, adjustment in many other areas. Naturally, the employment has to adjust in response to the unequal growth between the traditional and manufactured productions. Labors migrate to the higher-wage areas both temporarily and permanently. Life style and distribution of welfare between social classes also change. How quickly and smoothly these adjustments taking place is the key determinant of the distribution of income and poverty situation.

1.3 Social Development

Apart from the satisfactory overall economic performance over the last two to three decades, Thailand's social development has also been quite good. Most social indicators show significant improvement.

There have been demographic transition toward low fertility, advance in the provision of health care services and basic education to the population. Nevertheless there are some indices suggesting adhered advance in inequality which will be discussed in the following chapter, especially secondary enrollment.

In this sections some social indicators concerning population growth, health care, and education will be discussed briefly.

1.3.1 Trend of Population Growth

Over the last two to three decades, Thailand had been very successful in reducing fertility and mortality rates, resulting in rapid decline of the population growth rate since around the beginning of the 1970's. Such a decline is partly due to improvement in the socio-economic environment, and also reflects the success of the National Family Planning and other Public Health Programs.

Table 1.3 shows that fertility rates, a good indicator for trends of population growth, decreased since the early 1960's, and more rapidly declining since the adoption of the National Family Planning Program in the Third 5-Year Development Plan in the early 1970's. The fertility rate in Thailand has also been declining more rapidly than in many Asian countries during past two decade, and even when compared to the historical experiences of the now developed countries (Knodel, 1977). Table 1.4 shows that the percentage decrease in the fertility rate in Thailand between 1965-1982 ranks close to that of South Korea.

Table 1.3
Total Fertility Rate

YEAR	RATE
1960	6.63
1964-65	6.25
1970	6.09
1970-74	5.09
1974-76	4.90
1978-79	3.77
1980	3.84
11981	3.68
1984	3.47

Source: Op.cit.,TDRI and HRI, Table 2.8

Table 1.4
Percentage Decline in Crude Birth Rates and Total Fertility Rate in Selected Asian Countries

COUNTRY	DECLINE IN CRUDE BIRTH RATE 1965-82	DECLINE IN TOTAL FERTILITY 1965-82
China	54.0	61.3
South Korea	35.4	43.8
Thailand	34.0	42.9
Philippines	32.0	38.2
Indonesia	22.4	25.9
Sri Lanka	20.2	30.6

Source: World Bank ,"World Development Report 1984 Table 4.1, 1984.

1.3.2 Education Attainment

Thailand has made substantial progress over the last two decades in the provision of basic education to the population. Expansion in primary enrollment has been sizable, and currently there is almost

universal enrollment. This is a rather impressive feat considering the high rate of population growth during the 1960's and early 1970's.

The improvement in basic education of the population is indicated by the adult literacy rate, although its accurate measure is not easily got, and primary enrollment as a part of compulsory education system. Table 1.5 shows that the adult literacy rate in Thailand increased from 67.7% in 1960 to 86.0% in 1980. Compared to other Asian countries, the current adult literacy level is one of the best in the region, ranking just behind South Korea and Hong Kong.

TABLE 1.5
ADULT LITERACY RATES
FOR SELECTED ASIAN COUNTRIES

	1960	1970	1980
THAILAND	67.7	78.6	86.0
HONG KONG	70.4	77.3a	90.0b
INDIA	27.8c	34.1a	36.0d
INDONESIA	39.0c	56.6a	62.0e
MALAYSIA	52.8f	58.5	60.0
PHILIPPINES	71.9	82.6	75.0b
SINGAPORE	na	68.9	83.0
SOUTH KOREA	70.6	87.6	93.0
SRI LANKA	75.0f	77.6a	85.0b

Source: IBRD, World Tables, 1983.
Notes : a=1971, b=1979, c=1961, d=1981
e=1978, f=1962.

Table 1.6 shows that universal enrollment of the official primary school aged population has virtually been attained. Enrollment ratios at the secondary and tertiary levels have also increased. Secondary enrollment ratio doubled from the level in 1965. Tertiary enrollment increased significantly since 1970, with a doubled ratio from 1970 to 1975, and increased almost 6 folds between 1975 and 1985. This

TABLE 1.6
GROSS ENROLLMENT RATIOS

	1965	1970	1975	1980	1985
PRIMARY TOTAL	78	83	83	99	97
MALE	82	86	87	NA	NA
FEMALE	74	79	80	NA	NA
SECONDARY TOTAL	14	17	26	29	30
MALE	16	20	28	NA	NA
FEMALE	11	15	23	NA	NA
TERTIARY TOTAL	2	1.7	3.4	13a	20
MALE	NA	1.9	4	NA	NA
FEMALE	NA	1.4	2.7	NA	NA

Source: Various issue of UNESCO Statistical Yearbook, IBRD World Development Report, and World Tables.
Note : a=1979.

rapid increase in enrollment at the tertiary level is due to the establishment of two open universities.

However the increase in secondary enrollment has not been particularly noteworthy over the last decade or so. Indeed, this is one area in which Thailand lags behind other countries in the region, and is likely to be a key issue for human resource development planning in the future.

1.3.3 Health

Thailand has also been making good progress on the health front. Public provisions of health services have been expanding satisfactorily, including services in the rural areas. By the end of the Fifth 5-Year Development Plan in 1986, 525 of the 714 Districts in Thailand have a hospital, and all Tambons (sub-district) have at least one Health

Center.[4] The indicators of the progress is the crude death rates, life expectancy at birth, infant mortality, and malnutrition.

The crude death rate had been declining almost continuously from 9.0 in 1957 to 8.4 in 1960, 6.5 in 1970, 5.3 in 1980, and 4.5 in 1984. As a result, the rate of natural increase of population fell from a peak of 3.02% in 1964 to 1.45% in 1984.

Life expectancy at birth has increased from 58 to 66 for females, and from 54 to 62 for males, between 1965 and 1986. As shown in table 1.7, this is comparable to other Asian countries at a similar stage of development as Thailand, with the exception of Sri Lanka, who, although at a lower per capita income level than Thailand, has a much higher life expectancy than Thailand. In the Asian NIC's (Hong Kong, Singapore and South Korea), life expectancies at birth are much higher, reflecting their more advanced stage of economic development.

Infant mortality rates show a similar pattern to that of life expectancy at birth. The infant mortality rate in Thailand has declined from 84 per 1000 live births in 1965 to 41 in 1986 (table 1.8). The rate in Thailand is lower than that in India, Indonesia, and the Philippines, countries with lower per capita GDP than Thailand. It is higher than in the Asian NIC's and Malaysia, countries with higher per capita GDP than Thailand, and also higher than in Sri Lanka, a country with a long history of successful public social programs. The decline in infant mortality rates in Thailand has occurred in all regions of the country. However, regional disparities still persist, with rates twice as high in the Northeast as in Bangkok, and overall rural rates 25% higher than the urban rates.[5]

TABLE 1.7
LIFE EXPECTANCY AT BIRTH (YEARS)
FOR SELECTED ASIAN COUNTRIES

	FEMALE		MALE	
	1965	1986	1965	1986
THAILAND	58	66	54	62
HONG KONG	71	79	64	73
INDIA	44	56	46	57
INDONESIA	45	58	43	55
MALAYSIA	60	71	56	67
PHILIPPINES	57	65	54	62
SINGAPORE	68	75	64	70
SOUTH KOREA	58	73	55	66
SRI LANKA	65	72	63	68

Source: IBRD, World Development Report, 1988.

TABLE 1.8
INFANT MORTALITY (PER 1,000 LIVE BIRTHS)
FOR SELECTED ASIAN COUNTRIES

	1965	1986
THAILAND	84	41
HONG KONG	28	8
INDIA	151	86
INDONESIA	136	87
MALAYSIA	57	27
PHILIPPINES	72	46
SINGAPORE	26	9
SOUTH KOREA	63	25
SRI LANKA	63	29

Source: IBRD, World Development Report, 1988.

TABLE 1.9
PROPORTION OF CHILDREN AGED 0-5
SUFFERING MALNUTRITION (PERCENT)

REGION	1979-1982 DEGREE OF MALNUTRITION			1986 DEGREE OF MALNUTRITION		
	MILD	MEDIUM	SEVERE	MILD	MEDIUM	SEVERE
NORTHEAST	39.1	15.2	2.4	27.5	4.1	0.1
NORTH	34.8	13.4	2.7	20.9	2.6	0.1
CENTRAL	28.4	7.2	1.1	11.3	0.5	0.02
SOUTH	31.3	10.5	1.8	19.6	2.5	0.1
EAST	27.2	8.0	1.7	11.5	1.2	0.06
WHOLE KINGDOM	35.7	13.0	2.1	22.1	3.0	0.1

Source: Nutrition Division, Department of Health,
Ministry of Public Health.
As quoted in NESDB (1987), p.175.

Surveys done by the Ministry of Public Health show significant improvement in the nutritional status of pre-school children over the last decade. Table 1.9 shows that in 1979-82 50.8% of the children aged 0 to 5 surveyed showed some form of malnutrition. This has declined by half to 25.2% in 1986. In 1986, only 3% suffer medium level of malnutrition (2nd degree), and 0.1% suffer severe malnutrition (3rd degree). As with infant mortality there are still important regional variations, with rates in the poorest region, the Northeast, the highest, and more than twice as high as in the Central region.

1.4 Conclusion

This chapter has examined the broad indicators of socio-economic development for Thailand over the last two to three decades. There is no doubt that Thailand's performance is praiseworthy. The fast declining of fertility rate had led to a reducing burden of urban households and help raising their per capita income. Although the overall development is quite satisfactory, it is also evidently that the problem of income distribution in Thailand, as will be pointed out in the following chapters, becomes more serious over the same period. The worsening of income distribution could be an crucial obstruction for our long-term development. The nature of income distribution problem, as well as that of the poverty problem, will then be intensively examined in this paper.

Notes

[1] Most content of this chapter is reproduced, with some modification, from the paper entitled "Human Resource Problem and Policy Priorities for Thailand", the Human Resources and Social Development Program at TDRI.

[2] ibid, table 2.16, p.20.

[3] ibid, p.20.

[4] See NESDB (1987).

[5] See Sussangkarn, Ashakul and Myers (1986), Chapter 6.

CHAPTER 2

PAST FACTS OF INCOME DISTRIBUTION AND POVERTY INCIDENCE IN THAILAND

Since the adoption of the first 5-year Economic and Social Development Plan in 1962, economic situation in Thailand has been changing rapidly and continuously. The provisions of infratructures initiated in the First Plan helped stimulate modernization of the Thai economy and made it more related to the international market. Since then the economic expansion has been satisfactorily high and the per capita income has been increasing. The economic success is, however, not equally enjoyed by every population group, only those engaging to some certain sectors receive full benefits from the development, while the others benefit much less.

This chapter provides some detailed pictures describing the status and changes of Thailand's income distribution and poverty incidence over the last two to three decades, with particular emphasis upon the situation between 1975 to 1986. The content of the chapter will cover only the observed facts about both issues while the analyses are more focused in the next chapter.

2.1 Studies of Income Distribution and Poverty Incidence Before 1975

Before 1962 the study of income distribution in Thailand was rather limited since there was not suitable information describing Thai households' income. The only available information was the national

account in which only the total household income was reported, there was not detailed information about the breakdown of income by types of household or by income sources. In 1962 the National Statistical Office began collecting these detailed information in a country-wide survey known as the 1962/63 Household Expenditure Survey. Although the survey was designed to collect information on the households' expenditures there also was the information on the income side and thus made the income distribution and poverty studies possible.

The similar surveys were continually conducted by about 5-6 years a time. The later surveys have included more information about the household's socio-economic variables and were known as the various issues of Socio-Economic Surveys. Up to present, there are already six such surveys, namely, during 1962/63, 1968/69, 1971/73, 1975/76, 1980/81, and the latest 1985/86.[1]

Although the first survey was available in 1963, it is about 1970 that the income distribution issue was intensively studied. Almost all studies agreed that the distribution of income was worsening between 1963 and 1969.[2] Between 1968/69 and 1975/76 it seems to be that the income distribution might be better when a study shows that the income disparities between region of Thailand had been narrowed during this period.[3] However, as the inequality within each region was ignored in that study, it was found later that when all sources of income inequality, both the income disparities between region and the inequality within region, were taken into account, the overall distribution of income still showed a worsening trend.[4]

The study of poverty was undertaken relatively later than those of the income distribution. The first study concerning this issue was

that of Meesook[1979]. Her findings are reproduced in Table 2.1. It shows that poverty condition had improved significantly between 1962/63 and 1975/76.

Table 2.1
Poverty Incidence between 1962/63 and 1975/76

	1962/3 (a)	1975/6 (a)	1968/9 (b)	1975/6 (b)
Whole Kingdom	57.0	33.0	39.0	31.0
- Urban Area	38.0	22.0	16.0	14.0
- Rural Area	61.0	37.0	43.0	35.0

Source : Oey Astra Meesook, "Income, Consumption and Poverty in Thailand, 1962/63 to 1975/76," World Bank staff working paper No.364, November 1979.
Note : the sanitary districts in 1975/6 (a) were classified as urban, but in 1975/6 (b) were included in rural areas.

In summary, with help of these past studies we can make a conclusion that

"during 1962 and 1975, the income distribution in Thailand tended to be worsening while the poverty was significantly improved."

2.2 Income Distribution after 1975

It is the distribution and poverty situation of the period after 1975 that will be intensively examined within this paper. First, the general profile of income distribution will be discussed and, second, a measurement of sources of the static income inequality and sources of inequality changes will be introduced. The final section deals with the Thailand's poverty incidence after 1975 and the changing

characteristics of the poor.

2.2.1 The General Picture of Income Distribution

That the distribution of income getting worse during 1962/63 and 1975/76 has continued until the year 1985/86. Table 2.2 shows the shares of income received by five population groups, each constitutes one-fifth of the total population and is classified according to per capita household income level. It is quite obvious from the table that during the ten-year period from 1975/76 to 1985/86, household income in Thailand became increasingly unequally distributed. In 1975/76 the top quintile (the richest 20% of the total population) received 49.3% of the country's total income. Afterward, this group even increased its share, reaching 51.5% and 55.6% in 1980/81 and 1985/86, respectively. Indeed, what is even more note worthy is that almost the entire increase in this group's share was due to the increased income share of the richest 10%, which rose from 33.4% in 1975/76 to 35.4% in 1980/81 and to 39.2% in 1985/86. In contrast, all other four, lower-income groups continually shared less of total income during this ten-year period. This reflects the fact that the bulk of increasing income within this period was mainly earned by the relatively richest.

Two conventional indices of income inequality were calculated for all three surveys' data--the Gini coefficient ratio and the variance of the logarithm of income. Both indices support the noted deterioration of income distribution: the Gini coefficient rose from 0.426 in 1975/76 to 0.453 and 0.500 in 1980/81 and 1985/86, respectively, and the variance of the logarithm of income rose from 0.530 to 0.602 and 0.737 during the same period.

Table 2.2
Income Share by Quintile Group of Population
(% of total income)

Quintile	1975/76	1980/81	1985/86
1-st	49.26	51.47	55.63
highest top 10%	33.40	35.44	39.15
second top 10%	15.86	16.04	16.48
2-nd	20.96	20.64	19.86
3-rd	14.00	13.38	12.09
4-th	9.73	9.10	7.87
5-th	6.05	5.41	4.55
second bottom 10%	3.62	3.28	2.75
lowest bottom 10%	2.43	2.13	1.80
total share	100.00	100.00	100.00
Gini Coefficient	0.426	0.453	0.500
Variance of logarithm of income	0.530	0.602	0.737

Source : Socio-Economic Surveys.

When comparison between the two period, i.e., between 1975/76-1980/81 and 1980/81-1985/86, is made it seems to be that the worsening of income distribution during the later period was greater, the total income was more rapidly concentrated within the richest quintile population than it did during the former period. That is, income share of this richest group rose only around 2.2% of the total income between 1975/76 and 1980/81 (from 49.3 to 51.5%) but rose by around 4.1% during 1980/81 and 1985/86 (from 51.5% to 55.6%). This conclusion is, however, somewhat too exaggerated for the last two surveys were not done in a 'normal' years. In 1981, most crop prices were abnormally high and since then had continually declined, reaching their bottom levels in 1986. This fluctuation of crop prices had led to the earnings fluctuation of most farmers whose income were largely determined by the agricultural prices. And, since the farmers are normally the poorer of the society, their income level will crucially affect the observed distribution of income. Therefore, due to the fluctuation of crop prices just cited above, the income distribution in 1980/81 was thus better, while the distribution in 1985/86 was worse, than its normal trend.

A structure of household income received by groups of household classified by various criteria are calculated for all three surveys in order to provide more detailed information about the distribution of income.[5] Table 2.3 gives the average per capita household income in all three years and their average annual growth rates, classified by population quintile, production sector, community type, area and sector, occupation of household head, and region. Globally, annual growth rate of total household income during 1975-1980 increased at around 16.3% per annum but it was much slower during 1980-1985. This is because of mild

Table 2.3
Changes of Average Income
Classified by various factors

Factors	Per capita baht/year			Annual growth (%)		
	1975/76	1980/81	1985/86	1975-80	1980-85	1980-85
QUINTILE						
quintile 1	10,308.0	22,944.0	27,864.0	17.4	4.0	10.5
quintile 2	4,387.2	9,196.8	9,955.2	16.0	1.6	8.5
quintile 3	2,934.0	5,962.8	6,057.6	15.2	0.3	7.5
quintile 4	2,035.2	4,054.8	3,940.8	14.8	-0.6	6.8
quintile 5	1,267.2	2,412.0	2,280.0	13.7	-1.1	6.0
SECTOR OF PRODUCTION						
inactive	5,474.4	13,056.0	14,484.0	19.0	2.1	10.2
agriculture	2,962.8	6,032.4	5,768.4	15.3	-0.9	6.9
nonagriculture	6,156.0	13,848.0	15,744.0	17.6	2.6	9.8
COMMUNITY TYPE						
village	3,252.0	6,873.6	7,036.8	16.1	0.5	8.0
sanitary district	5,373.6	10,094.4	11,444.4	13.4	2.5	7.9
municipal area	7,908.0	18,468.0	23,472.0	18.5	4.9	11.5
AREA and SECTOR						
inactive	5,474.4	13,056.0	14,484.0	19.0	2.1	10.2
rural agr	2,937.6	5,994.2	5,684.4	15.3	-1.1	6.8
rural non-agr	5,149.2	10,586.0	11,422.0	15.5	1.5	8.3
urban agr	5,794.8	11,919.8	15,222.1	15.5	5.0	10.1
urban non-agr	7,971.6	18,518.0	23,111.7	18.4	4.5	11.2
OCCUPATION OF HEAD						
professional & technic	5,702.4	20,472.0	29,532.0	29.1	7.6	17.9
executives	9,933.6	15,180.0	34,380.0	8.9	17.8	13.2
clerical workers	7,752.0	18,840.0	25,152.0	19.4	5.9	12.5
sales workers	7,933.2	17,280.0	20,268.0	16.8	3.2	9.8
services workers	6,692.4	14,112.0	18,720.0	16.1	5.8	10.8
agriculturists	3,062.4	6,195.6	6,141.6	15.1	-0.2	7.2
labourers	5,481.6	10,818.0	12,156.0	14.6	2.4	8.3
inactive	3,474.0	9,850.8	10,546.8	23.2	1.4	11.7
REGION						
north	3,634.8	8,270.4	8,926.8	17.9	1.5	9.4
northeast	2,983.2	5,847.6	5,859.6	14.4	0.0	7.0
central	5,116.8	9,993.6	11,161.2	14.3	2.2	8.1
south	4,004.4	8,754.0	9,406.8	16.9	1.4	8.9
bkk. city core	8,152.8	19,920.0	25,404.0	19.6	5.0	12.0
bkk. suburb	7,148.4	16,920.0	22,404.0	18.8	5.8	12.1
bkk. fringe	5,274.0	11,239.2	14,988.0	16.3	5.9	11.0
POOR STATUS						
non-poor	5,343.6	10,956.0	13,284.0	15.4	3.9	9.5
poor	1,488.0	2,685.6	2,810.4	12.5	0.9	6.6
WHOLE KINGDOM	4,186.0	8,916.0	10,022.0	16.3	2.4	9.1

Source : Socio-Economic Surveys.

economic recessions since around 1980. The table also shows that the average income of the first quintile grew more rapidly than any other quintiles during both 1975-1980 and 1980-1985. Indeed, the average income of the two poorest quintiles even decreased between 1980 and 1985, namely, the annual growth rates of per capita income within the lowest bottom was -1.1% and that of the second lowest was -0.6%. When classification by production sector is considered, it reveals the fact that the poor that suffered from declining income should be those working in the agricultural sector, for the per capita income of the agricultural sector decreased by -0.9% per annum during 1980-85. Moreover, when classification is further made to cover the locational factor (as denoted by the classification by 'area and sector') it is found that, among the agriculturist, only those resided in the rural areas were the group having negative income growth, while the average income of urban agriculturists still maintained a positive growth rate, i.e., about 5.0% during the same period.

The classification by primary occupation of household head also show the worsening of income distribution. The average income of households whose head were professionals, technicians and executives were the highest among all occupation groups and still grew most rapidly during the whole period between 1975-1985.

The final classification is by region. As expected the average household income in the Bangkok Metropolitan Region (consists of Bangkok and the surrounding provinces) had recorded the highest growth rates, while those in the northeast region was the lowest and had slowest growth.

The structure of income growth considered so far has indicated that during 1975-1985 there certainly exist an imbalance growth of per capita income between the agricultural and non-agricultural sector. This reflects two fundamental problem of the Thai economy. First, the agricultural output grows much slower than the non-agricultural output. Second, the employment transfers between the two sectors could not, at least during the last two or three decades, keep pace with change of the output structure. This is quite clear from tables 2.4 and 2.5. Share of GDP originated from the agriculture reduced significantly during 1970 and 1986, namely from 28.2% of total GDP in 1970 to only 16.7% of total GDP in 1986. At the same time, the employment share of the agriculture decreased at a much lower rate, from 78.9% of total employment in 1970 to around 66.8% of total employment in 1986. As a result, per capita GDP of the non-agriculture was thus increasing in relative to the agricultural per capita GDP. The annual growth rate of value-added at current factor cost per worker in agriculture was only 9.83% during 1976-1980, compared to 14.33% growth within the non-agriculture, and was even negative during 1980-85, namely, -1.53% (table 2.5).

2.2.2 Source of Income Inequality : A Decomposition Method

A decomposition study of income distribution is the study that evaluate the contribution of certain factor(s) in determining the income inequality. The basic methodology is to divide total population into a number of subgroups according to certain criteria or factor(s) and then compute the component of income inequality that emerges from the disparities of each subgroup's average income and the component of income inequality that emerge from the inequalities within each

Table 2.4
GDP AND EMPLOYMENT BY SECTOR

YEAR	1971	1975	1980	1986
GDP (MILLIONS OF BAHT)	144,607	298,816	684,930	1,098,362
AGRICULTURE	40,786	94,063	173,806	183,037
NON-AGRICULTURE	103,821	204,753	511,124	915,325
SHARE (%)				
AGRICULTURE	28.2	31.48	25.38	16.66
NON-AGRICULTURE	71.8	68.52	74.62	83.34
EMPLOYMENT (MILLIONS)	16.619	18.182	22.681	26.672
AGRICULTURE	13.112	13.270	16.092	17.803
NON-AGRICULTURE	3.507	4.912	6.589	8.870
SHARE (%)				
AGRICULTURE	78.9	72.99	70.95	66.75
NON-AGRICULTURE	21.1	27.01	29.05	33.25
PER CAPITA GDP (BAHT/MONTH)	725.1	1369.6	2516.6	3431.7
AGRICULTURE	259.2	590.7	900.1	856.8
NON-AGRICULTURE	2467.3	3474	6464.7	8599.9
RATIO NON-AG/AG	9.52	5.88	7.18	10.04

Source: Reproduced from Table 3.9, 'Human Resource Problem and Policy Priorities for Thailand', HRS, TDRI.

Table 2.5
ANNUAL GROWTH RATES OF VALUE-ADDED AT CURRENT FACTOR COST PER WORKER BY SECTOR

(% growth)

	1976-80	1980-85
AGRICULTURE	9.83	-1.53
NON-AGRICULTURE	14.33	6.56
MANUFACTURING	8.50	5.66
OTHER INDUSTRIES	8.30	5.48
TRADES	10.44	2.64
TRANSP & COMMUNICATION	11.04	13.09
SERVICES	28.80	7.60
TOTAL	15.80	5.69

Source: GDP from NESDB, National Income of Thailand, 1986 edition.
Employment data from NSO Labour Force Survey, July-Sept 1985

subgroup. The first component is usually called the 'between-group' inequality and the second the 'within-group' inequality. For example, Thailand's total income inequality in any time point consists of the disparity between the average income of the agricultural sector and the non-agricultural sector, and the income inequalities within both sectors. Certainly, other different classifications are possible, such as the between-region and within-region inequalities. The contribution of the two components vary according to the factor used for dividing total population. The factors that are more relevant to the determination of income inequality will give the classification of population whose between-group components are relatively higher.[6] The between-group component of the factor can thus be regarded as the source of income inequality contributed by that factor(s). And, the within-group component is the part of inequality that is explained by all other factors not being used in the classification.

A number of inequality measures are decomposable in this way. However, the Shorrocks' index was chose in this paper because of its various favorable properties. First, it satisfies all basic requirement of the inequality measure and can be applied to the analysis of decomposition of inequality change which will be employed in the next section (see Appendix A). Second, its decomposability property has number of theoretical advantages over those of other measures.[7]

Nine socio-economic variables have been used as the classifying factors and their contributions to income inequality are computed. The classification of all nine variables is given in Table 2.6. The first variable group is the 'regional factor', consisting of region, location, and community type.[8] The second variable group is the personal

Table 2.6

Classification of Factors for Decomposition

Factors of Classification	number of group	Classifications		
REGIONAL FACTORS				
REGION	7	- Northeast	- North	- Central
		- South	- BMR City core	- BMR Suburb
		- BMR Fringe		
LOCATION	2	- Rural	- Urban	
COMMUNIT TYPE	3	- Village	- Sanitary District	- Municipal Area
HEAD'S PERSONAL CHARACTORISTICS				
SEX OF HEAD	2	- Male	- Female	
AGE OF HEAD	6	- Less than 20	- 20 to 29	- 30 to 39
		- 40 to 49	- 50 to 59	- 60 and over
EDUCATION OF HEAD	7	- No formal Education		
		- Elementary	- Secondary	
		- Vocational and Techincian		
		- Bachelor	- Higher than Bechelor	
		- Unknown Education		
EMPLOYMENT-RELATED FACTORS				
SOCIO-ECONOMIC CLASS	7	- Economically Inactive		
		- Land-Renter Farmers		
		- Land-Owner Farmers		
		- Labourers	- Other Employees	
		- Professional & Technician		
		- Traders & Entrepreneurs		
OCCUPATION OF HEAD	8	- Professional	- Executives	- Clerical Workers
		- Sales Workers	- Services Workers	- Agriculturists
		- Labourers	- Economically inactive	
SECTOR	3	- Inactive		
		- Agricultural	- Nonagricultural	

characteristics of households' head, consisting of sex, age, and education level. The final variable group is the 'employment-related factors', consisting of households' socio-economic class,[9] occupation of households' head and sector of production. These variable group is called the employment-related factor since the classifications according to these variables are closely related to the different employment status.

Table 2.7 shows the decomposition results of income inequality according to the above factors for 1975/76, 1980/81 and 1985/86. It can be seen that the major sources of Thailand's income inequality in all three years were the income disparities among population groups classified by the employment-related factors. The highest contribution belonged to that of the households' socio-economic class, which contributed around 25.6% of the 1975/76 total income inequality, 27.0% in 1980/81 and increased to 33.8% of the 1985/86 total income inequality. The other two factor in the employment-related variable group also contributed much to the total inequality, namely, around 22.6-31.3% were contributed by the occupation of households' head and round 21.2-28.5% were contributed by the income disparities between production sector.[10] These results conform to the previous notion that the imbalance growth of per capita income between the agricultural sector and the non-agricultural sector was the most striking feature affecting the deterioration of Thailand's income distribution.

The second major sources of Thailand's income inequality during 1975/76 and 1985/86 were the regional income disparities. The percentage contribution of income difference between each community type was around 20.2% of the total income inequality in 1975/76, and rose to

Table 2.7
Source of Income Inequality Classified by various Factors
Between 1975/76 to 1985/86

Factors		1975/76	%	1980/81	%	1985/86	%
Region							
	Between	0.049	16.18	0.069	19.87	0.106	24.90
	Within	0.255	83.82	0.278	80.13	0.321	75.10
	Total	0.304	100.00	0.347	100.00	0.427	100.00
Location							
	Between	0.046	15.01	0.065	18.86	0.107	24.98
	Within	0.258	84.99	0.281	81.14	0.320	75.02
	Total	0.304	100.00	0.347	100.00	0.427	100.00
Community Type							
	Between	0.061	20.20	0.076	21.77	0.120	28.15
	Within	0.243	79.80	0.271	78.23	0.307	71.85
	Total	0.304	100.00	0.347	100.00	0.427	100.00
Sex of Head							
	Between	0.001	0.28	0.002	0.52	0.003	0.76
	Within	0.303	99.72	0.345	99.48	0.424	99.25
	Total	0.304	100.00	0.347	100.00	0.427	100.00
Age of Head							
	Between	0.001	0.47	0.002	0.62	0.001	0.27
	Within	0.303	99.53	0.345	99.38	0.426	99.73
	Total	0.304	100.00	0.347	100.00	0.427	100.00
Education of Head							
	Between			0.052	15.14	0.085	20.00
	Within			0.294	84.86	0.342	80.00
	Total			0.347	100.00	0.427	100.00
Socio-Economic Class							
	Between	0.078	25.57	0.094	26.97	0.144	33.82
	Within	0.226	74.43	0.253	73.03	0.283	66.18
	Total	0.304	100.00	0.347	100.00	0.427	100.00
Occupation of Head							
	Between	0.069	22.62	0.083	24.02	0.134	31.31
	Within	0.235	77.38	0.263	75.97	0.293	68.68
	Total	0.304	100.00	0.347	100.00	0.427	100.00
Sector of Production							
	Between	0.064	21.19	0.083	23.94	0.122	28.53
	Within	0.240	78.81	0.264	76.06	0.305	71.47
	Total	0.304	100.00	0.347	100.00	0.427	100.00

Note : See table 2.5 for the classification of each factor.

21.8% and 28.2% in 1980/81 and 1985/86, respectively. The disparities between region contribute around 16.2% in 1975/76, 19.9% in 1980/81 and increased to 24.9% in 1985/86.

The high and constantly increasing contribution of the regional factors stress a fundamental problem of Thailand concerning the widening income gap between region and location. The development in urban areas, especially in the municipal areas, was much more successful than in the rural areas. On the other hand, the economic success in Bangkok and the surrounding provinces had left those of the other regions far behind.

The final group of variables is the characteristics of households' head. Except the education of household's head, the contributions of factors in this group were quite low. There was not significant income difference stemming from differences in sex or age of the households' head. The between-group contribution of both factors were less than 1% for all periods. The education of households' head, however, explained substantial part of the total income inequality. This reflects the importance of education level of households' head on the households' earning capability.

2.2.3 Decomposition of inequality changes

The decomposition of income inequality in the previous section deals with the static distribution of income and is mainly used to find out the source of income inequality at any given time period. Another application of decomposition analysis, and even more interesting one, is the decomposition of changes of income inequality.

This method is also applied to the population that is divided into a number of subgroups by certain criteria. The underlying concept

of the method comes from the fact that any changes of income inequality during a given time period is composed of one or more of the following structural changes;

1. **Changes in the subgroups' population share.** The changing population structure may results either from unequal natural increase rates of population between each subgroup, as in the case of regional disparities of crude birth and death rates, from the population transfers through migrations, or from changing population characteristics through social and economic transition. The impact of this change on the distribution of income could have either positive or negative impacts on distribution of income.

2. **Changes of income disparities.** The effect of changing income disparity is quite obvious. If the structure of income growth rates is in such a way that the income gap between population subgroup is widened, the overall distribution of income would be worsening, and vice versa.

3. **Changes of Income Inequalities within each subgroups.** The changes of the within-group inequalities are certainly parts of the overall inequality change.

The extent to which each component contributes to the overall inequality change will reveal the nature of the transition process of the income distribution. More understanding about the adjustment processes of socio-economic conditions and their impacts on the distribution of income should thus be enhanced.

The decomposition of income inequality changes between 1975/76 and 1985/86 has been experimented in this paper. Again, the Shorrocks' index is used for this purpose since, it is the only index that can

unambiguously decomposed all the above component. The detailed formula and its derivation is given in Appendix A. By construction, any change of income inequality can be disaggregated into six constituting components, namely,

$$\text{Inequality Change} = W_p + W_w + W_i + B_p + B_m + B_i.$$

Where W_p is contribution of changes of population structure,

W_w is contribution of changes of inequalities within each subgroup,

W_i is contribution of interactive between changes of population share and the subgroups' inequalities. All these three components contribute to the total change of within-group component, and

B_p is contribution of changes of population structure,

B_m is contribution of changes of income disparities,

B_i is contribution of interactive between changes of population share and the income disparities.

The interpretation of each component is as follows. [11]

First, the negative value help improving income distribution, and the positive does the opposite.

W_p is positive when population share of the subgroup with higher income inequality increase in relative to share of the less unequally distributed subgroup, and vice versa.

W_w is positive if the weighted average of all subgroup's inequalities increase, and vice versa.

W_i is positive if the rate of increase of income inequality in

the expanding subgroup is relatively faster than that in the contracting subgroups. For example, if the inequality in non-agricultural sector is increasing at a higher rate than that in the agricultural subgroup and if populations are moving toward the non-agricultural sector then the overall inequality will increase.

B_p is positive if the structure of population share has changed in such a way that income disparity is strengthened. That is, if the major part of population are initially poor, the enrichment of some poor people will in the first time worsen the income distribution but, after substantial poor has succeed in enhancing their income and the richer become the majority, a further enrichment of the poor will help improve income distribution. Indeed, it is this component of inequality change that underlies the inverted-U hypothesis of Kuznets.

B_m is positive if the income gap between the richer subgroup and the poorer subgroup become wider.

B_i is positive if, during the decreasing phase of income disparity due to population shift, as explained by B_p there exist an increasing income disparity due to unequal income growth rate between the richer and the poorer subgroup.

The socio-economic variables used in the static decomposition in the previous section were used again for this purpose, except the sex and age of households' head whose contributions to the overall income inequality were very small (as shown in table 2.7) and thus were

omitted. Only seven variables are therefore experimented. The results are given in tables 2.8 to 2.14. Each table provides the data base for each classification, i.e., the population share of each subgroup, their relative income compared to the national average, the income inequalities within each subgroup, and the decomposition results.

We start with the regional factors, namely, the region, the location, and the community type. First of all, it can be seen that the worsening of income distribution between 1975/76 and 1985/86 came primarily from two components--the increases in income inequalities within all regions, all locations, and all communities, measured by W_w, and the increasing income gap between these areas, measured by B_m. These two effects are, however, conform to our priori expectations. Indeed, the increasing income gap between region and location has already been mentioned in section 2.2.1. What is more interesting is the contribution of population adjustment to the overall income distribution, as measured by B_p. All three classification in tables 2.8, 2.9, and 2.10 show that the population adjustment had helped improving the distribution condition during 1980/81 and 1985/86, as indicated by the negative values of B_p (-3.7% of total change of between-region inequality, -13,4% for that corresponding figure of the location factor, and -12.5% for the community type). This points to the fact that

" **Over 1980/81 and 1985/86, there were some degree of population restructuring, presumably through migration from the lower-income regions or areas to the higher-income regions or areas, that helped reducing the income inequality which would have been more accelerated without this adjustment**".

Table 2.8

A. Changes of population share, income and income inequality - Classified by Region

Region	Pop. share (%)			Relative Income 1/			Income Inequality 2/		
	1975	1981	1986	1975	1981	1986	1975	1981	1986
North	21.3	20.3	19.3	0.87	0.93	0.89	0.285	0.302	0.327
Northeast	35.2	36.6	36.8	0.71	0.66	0.58	0.238	0.262	0.311
Central	18.6	18.5	18.5	1.22	1.12	1.11	0.242	0.275	0.343
South	12.3	12.5	12.9	0.96	0.98	0.94	0.316	0.331	0.368
BMR-City core	6.4	6.1	5.9	1.95	2.23	2.53	0.218	0.238	0.276
BMR-Suburb	3.6	4.6	5.1	1.71	1.90	2.24	0.184	0.222	0.223
BMR-Fringe	2.8	1.4	1.5	1.26	1.26	1.50	0.235	0.267	0.300

1/. Relative Income = Regional average income/National Average income.
2/. Income inequality is measured by Shorrocks' index.

B. Decomposition of Income inequality

	1975	%	1981	%	1986	%
Within	0.255	83.82	0.278	80.13	0.321	75.10
Between	0.049	16.18	0.069	19.87	0.106	24.90
Total	0.304	100.00	0.347	100.00	0.427	100.00

C. Changes in income inequality component.

	1975-81	%	1981-86	%	1975-86	%
Within	0.023	53.98	0.043	53.35	0.066	53.57
Between	0.020	46.02	0.037	46.65	0.057	46.43
Total Change	0.043	100.00	0.080	100.00	0.123	100.00
Soureces of inequality changes						
Wp	-0.001	-3.29	0.000	-0.61	-0.001	-1.73
Ww	0.024	102.83	0.043	100.68	0.067	101.52
Wi	0.000	0.46	0.000	-0.08	0.000	0.21
Total Within	0.023	100.00	0.043	100.00	0.066	100.00
Bp	0.003	16.54	-0.001	-3.69	0.001	2.39
Bm	0.015	78.12	0.039	105.45	0.052	91.77
Bi	0.001	5.33	-0.001	-1.76	0.003	5.84
Total Between	0.020	100.00	0.037	100.00	0.057	100.00

Note : See text for the interpretation of each component.

Table 2.9

A. Changes of population share, income and income inequality
Classified by Location

	Population share			Relative Income 1/			Income Inequality 2/		
Location	1975	1981	1986	1975	1981	1986	1975	1981	1986
Rural	86.0	85.1	84.2	0.85	0.81	0.75	0.256	0.275	0.321
Urban	14.1	14.9	15.8	1.89	2.07	2.34	0.271	0.298	0.298

1. Relative Income = Locationnal average income/National Average income.
2. Income inequality is measured by Shorrocks' index.

B. Decomposition of Income inequality

	1975	%	1981	%	1986	%
Within	0.258	84.99	0.278	80.20	0.318	74.30
Between	0.046	15.01	0.069	19.80	0.110	25.70
Total	0.304	100.00	0.347	100.00	0.427	100.00

B. Changes in income inequality compnent.

	1975-81	%	1981-86	%	1975-86	%
Within	0.020	46.51	0.039	48.67	0.059	48.37
Between	0.023	53.49	0.041	51.33	0.064	51.63
Total	0.043	100.00	0.080	100.00	0.123	100.00
Sourece of inequality changes						
Wp	0.000	0.6	0.000	0.5	0.000	0.4
Ww	0.020	99.0	0.039	100.5	0.060	100.7
Wi	0.000	0.3	-0.000	-1.1	-0.001	-1.1
Total	0.020	100.0	0.039	100.0	0.059	100.0
Bp	-0.006	-26.9	-0.005	-13.4	-0.011	-16.7
Bm	0.031	134.3	0.048	117.8	0.080	124.6
Bi	-0.002	-7.4	-0.002	-4.4	-0.005	-7.9
Total	0.023	100.0	0.041	100.0	0.064	100.0

Note : See text for the interpretation of each component.

Table 2.10

A. Changes of population share, income and income inequality
Classified by Community Type

	Population share			Relative Income 1/			Income Inequality 2/		
Comm.Type	1975	1981	1986	1975	1981	1986	1975	1981	1986
Village	72.8	75.5	75.3	0.78	0.77	0.70	0.231	0.266	0.301
Sanitary Dist.	13.2	9.6	8.9	1.28	1.13	1.14	0.273	0.276	0.370
Municipal Area	14.1	14.9	15.8	1.89	2.07	2.34	0.271	0.298	0.299

1. Relative Income = Community's average income/National Average income.
2. Income inequality is measured by Shorrocks' index.

B. Decomposition of Income inequality

	1975	%	1981	%	1986	%
Within	0.243	79.80	0.271	78.23	0.307	71.85
Between	0.061	20.20	0.076	21.77	0.120	28.15
Total	0.304	100.00	0.347	100.00	0.427	100.00

C. Changes in income inequality compnent.

	1975-81	%	1981-86	%	1975-86	%
Within	0.029	67.09	0.036	44.27	0.064	52.21
Between	0.014	32.91	0.045	55.73	0.059	47.79
Total	0.043	100.00	0.080	100.00	0.123	100.00
Sourece of inequality changes						
Wp	-0.001	-4.0	0.000	0.6	-0.001	-1.7
Ww	0.029	100.3	0.036	101.4	0.067	104.6
Wi	0.001	3.7	-0.001	-1.9	-0.002	-2.9
Total	0.029	100.0	0.036	100.0	0.064	100.0
Bp	0.010	71.9	-0.006	-12.5	0.006	10.5
Bm	0.009	64.4	0.051	115.0	0.059	99.9
Bi	-0.005	-36.2	-0.001	-2.5	-0.006	-10.4
Total	0.014	100.0	0.045	100.0	0.059	100.0

Note : See text for the interpretation of each component.

Table 2.11 shows the decomposition of inequality change when classification by education level of household head is adopted. Like those decompositions by the regional factors, the major source of inequality deterioration came from widening income gap between households of different education level of head (B_m). At the same time, there were a positive effect due to the enlargement of population subgroup with higher education and higher income (B_p), especially the increased share of households' head having university education. The immediate implication of this result is that better education among the population tend to help improving income distribution.

The final group of variable to be considered are those of the 'employment-related' factors, comprising the household's socio-economic class, the occupation of households' head, and the sector of production, Their results are presented in tables 2.12, 2.13, and 2.14, respectively. A similar finding as that of the education of household head is found, that the widening income gap between different class of household (as classified by the households' socio-economic class), by different occupation of households' head, or by different sector, played a crucial role in worsening the overall income distribution, while the movements of people to better occupation, or from agriculture to non-agriculture sector help retarding the increasing inequality trend.

The decomposition by the last two groups of variable help we come to a finding that

" ***The widening income gap between the beter-off and the worse-off, matter what criteria is used to classified between these two, had been increasing over the period 1975/76 and 1985/86 and thus deteriorating Thailand's income distribution. At the same time there***

Table 2.11

A. Changes of population share, income and income inequality
Classified by Head's Education

Education of Head	Population share			Relative Income 1/			Income Inequality 2/		
	1975	1981	1986	1975	1981	1986	1975	1981	1986
No formal Ed.		16.1	13.1		0.86	0.77		0.306	0.370
Elementary		75.0	76.4		0.88	0.83		0.298	0.344
Secondary		5.2	5.1		1.95	1.97		0.279	0.317
Vocation & Tech.		2.6	1.0		2.38	2.47		0.188	0.207
Bachelor		0.8	3.5		4.49	3.50		0.229	0.246
Higher than Bech.		0.1	0.1		4.96	6.84		0.110	0.172
Unknown Educ.		0.3	0.7		0.86	1.12		0.204	0.451

1. Relative Income = Group's average income/National Average income.
2. Income inequality is measured by Shorrocks' index.

B. Decomposition of Income inequality

	1975	%	1981	%	1986	%
Within			0.294	84.86	0.342	80.00
Between			0.052	15.14	0.085	20.00
Total			0.347	100.00	0.427	100.00

C. Changes in income inequality compnent.

	1975-81	%	1981-86	%	1975-86	%
Within			0.047	58.97		
Between			0.033	41.03		
Total			0.080	100.00		
Sourece of inequality changes						
Wp			-0.001	-1.89		
Ww			0.048	101.71		
Wi			0.000	0.17		
Total			0.047	100		
Bp			-0.029	-88.72		
Bm			0.059	178.89		
Bi			0.003	9.83		
Total			0.033	100		

Note : Information of Education of Household head is not available in 1975/76.
See text for the interpretation of each component.

Table 2.12

A. Changes of population share, income and income inequality
Classified by Houshold's Socio-Economic Class.

Socio-Economic Class	Population share			Relative Income 1/			Income Inequality 2/		
	1975	1981	1986	1975	1981	1986	1975	1981	1986
Inactive	2.7	4.4	5.7	1.31	1.46	1.44	0.337	0.418	0.479
Land-Rent Farmers	18.0	14.7	15.4	0.74	0.68	0.54	0.214	0.241	0.233
Land-Own Farmers	43.1	48.0	41.2	0.69	0.68	0.59	0.214	0.216	0.256
Labourers	10.8	9.1	12.3	0.98	1.07	0.98	0.184	0.241	0.284
Other Employees	7.1	7.1	7.8	1.46	1.56	1.77	0.181	0.233	0.245
Professional,Tech.	3.8	4.2	4.4	2.30	2.42	2.86	0.172	0.222	0.227
Trader & Entepren.	14.5	12.6	13.1	1.62	1.61	1.57	0.325	0.385	0.381

1. Relative Income = Class's average income/National Average income.
2. Income inequality is measured by Shorrocks' index.

B. Decomposition of Income inequality

	1975	%	1981	%	1986	%
Within	0.226	74.43	0.253	73.03	0.283	66.18
Between	0.078	25.57	0.094	26.97	0.144	33.82
Total	0.304	100.00	0.347	100.00	0.427	100.00

C. Changes in income inequality compnent.

	1975-81	%	1981-86	%	1975-86	%
Within	0.027	63.12	0.029	36.57	0.056	45.81
Between	0.016	36.88	0.051	63.43	0.067	54.19
Total	0.043	100.00	0.080	100.00	0.123	100.00
Sourece of inequality changes						
Wp	0.000	1.5	0.005	15.7	0.001	2.2
Ww	0.028	103.4	0.025	86.1	0.051	89.7
Wi	-0.001	-5.0	-0.001	-1.8	0.005	8.1
Total	0.027	100.0	0.029	100.0	0.056	100.0
Bp	0.009	59.8	-0.039	-76.4	-0.023	-35.1
Bm	0.009	55.2	0.096	188.4	0.107	161.1
Bi	-0.002	-15.0	-0.006	-12.0	-0.017	-25.9
Total	0.016	100.0	0.051	100.0	0.067	100.0

Note : See text for the interpretation of each component.

Table 2.13

A. Changes of population share, income and income inequality
Classified by Houshold Head's Occupation.

Occupation of Head	Population share			Relative Income 1/			Income Inequality 2/		
	1975	1981	1986	1975	1981	1986	1975	1981	1986
Profession & Tech	10.9	2.5	2.5	1.36	2.30	2.95	0.320	0.206	0.209
Executives	0.9	2.6	0.8	2.37	1.70	3.43	0.446	0.433	0.341
Clerical Workers	1.2	1.5	1.6	1.85	2.11	2.51	0.174	0.183	0.196
Sales Workers	7.6	6.5	6.7	1.89	1.94	2.02	0.320	0.374	0.391
Services Workers	2.8	3.5	3.1	1.60	1.58	1.87	0.193	0.254	0.278
Agriculturists	63.7	61.3	58.7	0.73	0.69	0.61	0.213	0.235	0.258
Labourers	9.6	13.3	14.3	1.31	1.21	1.21	0.245	0.260	0.310
Inactive	3.3	8.7	12.2	0.83	1.10	1.05	0.165	0.371	0.420

1. Relative income = Occupation group's average income/National average income.
2. Income inequality is measured by Shorrocks' index.

B. Decomposition of Income inequality

	1975	%	1981	%	1986	%
Within	0.235	77.38	0.263	75.97	0.293	68.68
Between	0.069	22.62	0.083	24.02	0.134	31.31
Total	0.304	100.00	0.347	100.00	0.427	100.00

C. Changes in income inequality compnent.

	1975-81	%	1981-86	%	1975-86	%
Within	0.028	65.97	0.030	37.19	0.058	47.21
Between	0.015	33.96	0.050	62.81	0.065	52.77
Total	0.043	100.00	0.080	100.00	0.123	100.00
Sourece of inequality changes						
Wp	-0.008	-27.9	0.002	5.9	-0.013	-22.4
Ww	0.016	55.5	0.025	83.7	0.038	66.1
Wi	0.020	72.4	0.003	10.3	0.033	56.3
Total	0.028	100.0	0.030	100.0	0.058	100.0
Bp	0.006	40.1	-0.006	-12.2	0.016	24.8
Bm	-0.027	-182.2	0.046	91.0	0.012	17.7
Bi	0.035	242.1	0.011	21.2	0.037	57.5
Total	0.015	100.0	0.050	100.0	0.065	100.0

Note : See text for the interpretation of each component.

Table 2.14

A. Changes of population share, income and income inequality
Classified by Sector of Production

	Population share			Relative Income 1/			Income Inequality 2/		
Sector	1975	1981	1986	1975	1981	1986	1975	1981	1986
Inactive	2.7	4.4	5.7	1.31	1.46	1.44	0.337	0.418	0.479
Agriculture	61.1	62.7	56.7	0.71	0.68	0.58	0.215	0.221	0.250
Non-Agric.	36.2	32.9	37.6	1.47	1.55	1.57	0.275	0.324	0.362

1. Relative Income = Sectorial average income/National Average income.
2. Income inequality is measured by Shorrocks' index.

B. Decomposition of Income inequality

	1975	%	1981	%	1986	%
Within	0.240	78.81	0.264	76.06	0.305	71.47
Between	0.064	21.19	0.083	23.94	0.122	28.53
Total	0.304	100.00	0.347	100.00	0.427	100.00

C. Changes in income inequality compnent.

	1975-81	%	1981-86	%	1975-86	%
Within	0.024	56.58	0.041	51.61	0.066	53.34
Between	0.019	43.42	0.039	48.39	0.057	46.66
Total	0.043	100.00	0.080	100.00	0.123	100.00
Sourece of inequality changes						
Wp	0.000	0.66	0.007	17.79	0.005	6.97
Ww	0.024	99.8	0.033	80.11	0.057	87.01
Wi	0.000	-0.46	0.001	2.1	0.004	6.01
Total	0.024	100	0.041	100	0.066	100
Bp	0.013	72.24	-0.049	-127	-0.029	-50.65
Bm	0.005	24.81	0.098	253.05	0.100	173.64
Bi	0.001	2.95	-0.010	-26.05	-0.013	-22.99
Total	0.019	100	0.039	100	0.057	100

Note : See text for the interpretation of each component.

were evidence of an continual adjustment process through which more people tend to move to more prosperous areas and better occupations and, consequently improve distribution of income. The adjustment is, however, too slow to outweigh the increasing trend of income inequality caused by the widening income disparities."

2.3 Poverty Incidence and Characteristics of Poor after 1975

The study of poverty in Thailand usually based on the calculation of ratio of poor people to the total population. People whose income is lower than a cut-off level, generally known as the poverty line, is classified as poor. An accurate measurement of poverty incidence is thus dependent on the accuracy of both the household income and the formation of poverty line. In case of Thailand, the major sources of information used to calculate poverty incidence are the Socio-Economic Surveys as in the study of income distribution and, consequently, tend to make the measurement of poverty rather inaccurate. This is because, as widely known, while the expenditure is rather reliable, the household income in the SES is substantially under-reported. Indeed, a cross-check with the statistics in national account has pointed out that both total income and total savings calculated from the SES are much below the true levels. While this income under-reporting does not much affect the calculated distribution of income, provided that the under-reporting is fairly uniform, it does bias the poverty measurement. That is, the poverty incidence suggested by the SES information tend to be exaggerated. However, the use of SES is

SES information tend to be exaggerated. However, the use of SES is still unavoidable and still be the best source of information because (1) there is not any other better source and (2) if we confined ourselves to the comparison of poverty incidence over time, the poverty incidence computed from the SES is still acceptable.

Table 2.15 shows the poverty incidence between 1975/76 and 1985/86. It indicates that ratio of poor people to total population declined from 30.0% in 1975/76 to 23.0% in 1980/81 but rose again to 29.5% in 1985/86. The period between 1981 to 1986 is thus the first period in which average welfare level of Thai people was significantly deteriorated since around 1960. Before 1981, the poverty incidence had continually improved for the entire period. Two factors would explain this welfare worsening. First, as a result of the second oil shock, the economic growths during 1981 and 1986 were relatively low in comparison to all other periods since 1960. Second, as mentioned earlier in section 2.2.1, the 1981 was the peak year for agricultural prices while the 1986 was the bottom. The poverty incidence in 1980/81 is thus better, while the poverty incidence in 1985/86 is worse, than the its trend. During 1981 to 1986, farmers' income had been largely reduced and parts of those used to be above the poverty line had fallen under the line and thus increasing the number of poor.

The trend of poverty incidence was not identical in all regions or areas. Table 2.15 shows that although the overall incidence deteriorated after 1981, the poverty in the Bangkok Metropolitan Region had improved all the time, decreasing from 7.75% in 1975/76 to 3.89% in 1980/81 and further declining to 3.54% in 1985/86. The same pattern is also observed if the municipal areas are considered. The poverty

Table 2.15
Poverty Incidence between 1975/76 and 1985/86
(% of people whose income is below Poverty line)

	1975/76	1980/81	1985/86
Whole Kingdom	30.02	23.04	29.51
NORTH	33.20	21.50	25.54
villages	36.37	23.32	27.74
sanitary districts	19.23	16.16	20.19
municipal areas	17.84	8.03	6.87
NORTHEAST	44.92	35.93	48.17
villages	48.54	37.92	50.49
sanitary districts	24.66	20.81	33.25
municipal areas	20.90	17.99	18.67
CENTRAL	12.99	13.55	15.63
villages	14.26	14.16	17.37
sanitary districts	7.99	11.62	11.36
municipal areas	11.45	11.74	8.87
SOUTH	30.71	20.37	27.17
villages	33.84	22.16	31.17
sanitary districts	18.14	6.75	8.07
municipal areas	21.69	15.20	8.61
BMR	7.75	3.89	3.54
- city core	6.90	3.70	3.11
- suburbs	6.00	2.58	2.51
- fringes	11.97	9.15	8.83
All villages	36.16	27.34	35.75
All sanitary districts	14.76	13.47	18.55
All municipal areas	12.53	7.51	5.90

POVERTY LINE : (per capita/year)

	RURAL	URBAN
1975/76	1981	2961
1980/81	3454	5151
1985/86	3823	5834

Note : Apply the rural poverty line to the sanitary districts.

incidence in all municipal areas except those in the northeast region reduced substantially in both periods, making the overall poverty within the municipal areas fell from 12.5% in 1975/76 to 7.5% and 5.9% in 1980/81 and 1985/86, respectively. Only the ratio of poor in villages and sanitary districts increased after 1981, reflecting the previous remark that the real income of farmers, who intensively live in these two areas, had deteriorated.

Table 2.16 gives another classification of poverty incidence. Here poverty incidences are shown by region and by occupation of household's head. In all region the highest ratio of poor were found within the agriculturist, as high as 50% in the northeast. The poor in agricultural sector in north and south were also very high, around 30%, except in the central region and BMR, which were substantially lower. The second highest ratio of poor were usually in the laborers group, but still be much lower than that in the agriculturists.

Accompanied by large share of agricultural people in the total population, the high poverty incidence within this group implies that any changes in their incomes, either increase or decrease, will much affect the overall poverty status of Thailand. This was well proved during 1981 and 1986 as discussed above.

Table 2.17 provides the distribution of Thailand's poor according to various classification. It confirms that about 80% of total poor were in agricultural sector. Only about 15% were in non-agricultural sector and almost all poor had their household's head educated no more than elementary level.

Table 2.16
Poverty Incidence by Region and Occupation of Household Head

REGION	HEAD'S OCCUPATION	1975/76	1980/81	1985/86
NORTH		33.18	21.50	25.54
	1 Professional & Technician	28.92	0.00	0.27
	2 Executive	20.88	0.00	0.00
	3 Clerical Workers	0.00	0.00	0.00
	4 Sales Workers	15.23	3.12	8.58
	5 Services Workers	4.92	1.46	9.28
	6 Agriculturists	38.13	25.49	30.51
	7 Labourers	19.30	13.61	18.25
NORTHEAST		44.92	35.93	48.17
	1 Professional & Technician	30.45	1.99	1.73
	2 Executive	32.02	23.02	1.73
	3 Clerical Workers	17.44	0.73	2.76
	4 Sales Workers	11.57	17.58	25.39
	5 Services Workers	8.83	10.12	10.30
	6 Agriculturists	51.33	40.34	51.90
	7 Labourers	24.34	28.55	44.61
CENTRAL		12.99	13.55	15.63
	1 Professional & Technician	7.85	0.95	0.00
	2 Executive	2.35	2.62	0.00
	3 Clerical Workers	0.00	3.23	2.22
	4 Sales Workers	3.79	3.21	6.82
	5 Services Workers	0.49	3.54	3.97
	6 Agriculturists	14.74	16.98	20.86
	7 Labourers	13.15	9.63	11.33
SOUTH		30.71	20.37	27.17
	1 Professional & Technician	27.93	0.00	0.00
	2 Executive	0.00	0.00	0.00
	3 Clerical Workers	4.20	0.00	0.00
	4 Sales Workers	13.87	11.73	3.24
	5 Services Workers	10.40	7.48	1.31
	6 Agriculturists	37.17	23.88	34.23
	7 Labourers	18.81	18.65	21.55
GREATER BANGKOK		7.75	3.89	3.54
	1 Professional & Technician	5.69	0.00	0.00
	2 Executives	0.00	0.00	0.00
	3 Clerical Workers	4.48	1.78	0.00
	4 Sales Workers	7.59	4.36	2.13
	5 Services Workers	1.62	4.02	1.50
	6 Agriculturists	14.51	11.15	12.04
	7 Labourers	7.27	3.13	3.40
WHOLE KINGDOM		30.02	23.04	29.51

Table 2.17
Characteristic of Poor

	1975/76	1980/81	1985/86
OCCUPATION OF HEAD			
professional & technician	7.08	0.10	0.05
executives	0.34	1.01	0.01
clerical workers	0.21	0.09	0.04
sales workers	2.45	2.07	1.80
services workers	0.44	0.80	0.49
agriculturists	81.56	80.44	78.02
labourers	5.13	7.45	8.35
inactive	2.80	8.04	11.25
SECTOR OF PRODUCTION			
inactive	1.85	2.82	3.53
agriculture	82.96	82.52	80.95
nonagriculture	15.19	14.66	15.52
COMMUNITY TYPE			
village	87.63	89.53	91.24
sanitary district	6.50	5.62	5.60
municipal area	5.87	4.86	3.16
SEX OF HEAD			
male	89.01	88.00	86.40
female	10.99	12.00	13.60
AGE OF HEAD			
less than 20	0.04	0.30	0.24
20-29	7.35	11.06	9.50
30-39	26.84	28.32	27.36
40-49	33.67	31.64	24.78
50-59	17.90	16.13	20.81
60 and over	14.21	12.55	17.31
EDUCATION OF HEAD			
no formal education		18.97	16.76
elementary		79.82	80.82
secondary		0.97	1.40
vocational & technician		0.05	0.09
bachelor		0.00	0.19
higher than bacheler		0.00	0.00
unknown education		0.20	0.74
TOTAL	100.00	100.00	100.00

Sources : Socio-Economic Surveys.

2.4 Conclusion

The worsening of income distribution in Thailand since 1962 is beyond any doubts. The major source of the worsening has been the widening income gap between the richer and the poorer. At the same time, social and economic adjustments have taken place in response to the unequal growth of income between various population group, there are clear tendency of employment restructuring toward higher-income sector, for example. However, the adjustment has always lagged behind the increasing rate of income disparities. Nevertheless, the average welfare of Thai people when measured by the poverty level, has improved significantly all the time except for the period between 1981 and 1986, during which various abnormal situations occurred, namely, low economic growth and continuously declining agricultural prices.

Notes

[1] There are two years denoted to each survey because, although most surveys were conducted in the secondly denoted year, the questionnaires were designed to cover the household income received in the year before the survey while the household expenditure collected were those occurred during the year of the survey.

[2] See, for example, McCleary[1973], Oshima[1970] and Krongkaew[1977].

[3] see Meesook[1979].

[4] Jitsuchon[1987], table 6.2.

[5] Although the total household income calculated from all Socio-Economic Surveys are usually much lower than the National Account's total household income, we still rely on its *distribution* assuming that the degree of under-reporting are rather proportionate across households.

[6] Basically, the concept of decomposition analysis is quite similar to that of the regression analysis with dummy variables or the analysis of variance. However, when applied to the study of income distribution, the decomposition analysis has an advantage that it provide the results that can be easily understood and are self-explaining.

[7] Shorrocks [1980].

[8] Location factor is derived from the community type factor by grouping the villages and sanitary districts together as the rural area, and the municipal area is defined as urban.

[9] The classification by the households' socio-economic class is based on the major source of household income.

[10] The percentage contribution by more than 20% of total income inequality is rather high in the sense that it is the contribution of only single variable on the cross-section data.

[11] See Jitsuchon[1987], Chapter 5.

CHAPTER 3

FACTORS DETERMINING HOUSEHOLD INCOME AND INCOME INEQUALITY

3.1 Introduction

The micro counterpart to the analysis of income distribution/inequality provided in the preceding chapters is given here. This chapter starts off with section 3.2 by drawing a scenario depicting the role of households in determining current and future income distribution. Since the distribution of household income is determined in part by household assets -- be they physical, financial, or human capital -- the distributions of these assets are explored as well. The relative importance of various sources of income inequality identified by the decomposition technique in the earlier chapters are also investigated here (in section 3.3) using multiple regression analysis based on household-level data.

3.2 Conceptual Framework

A synopsis conceptualized by Behrman (1988) on the role of households in determining income distribution distinguishes between the short- and long-run roles (see Figure 3.2.1). Consider first the long-run perspective, it allows the determinants of income distribution or the sources of income inequality (e.g., location, household structure, and assets) to vary through time, thus enabling more equal distribution of income as development progresses. For instance, changing location can

be achieved via migration, which in turn results in more equal returns to assets, especially human capital assets. Changing household structure toward the nuclear type accompanied by the decline in family size due to lowered fertility also occurs in the development process, which contributes to more equal distribution of financial assets (e.g., the development of money markets, insurance, pensions, government basic health care and transfer programs, etc.) and thereby reducing the advantages of large and extended households. Changing other forms of assets (e.g., physical and human capital) take place simultaneously. With the development of money markets and institutions, asset ownership tends to shift from physical to financial, both of which become more equally distributed due to market integration and to spread effects through savings and investments. In the same vein, the distribution of human capital investments, particularly in children's education and health, tends to be more equal in the long-run after the development of capital and labor markets have lessened the economic benefits of children at the same time that the access to family planning and health/nutrition care programs have been largely felt. By contrast, basic human capital, such as primary education, is likely to be more equally distributed in the early stage of development.

This chapter, however, emphasizes the short-run, rather than long-run, role of households in determining income inequality. Such a role more or less works through the same sources of inequality as the long-run role. These sources are location, household structure, and assets.[1]

The first source of income inequality, namely location, involves community (rural/urban differentials) and regional (various regions) factors. In the short-run, the location of households determines the prices, government services, and environment that the households face. That is, different locations capture not only different prices for consumption goods and services, but also different wage rates and returns to other assets, all of which affect the distribution of household income differently. Government services (e.g., schools, health/nutrition care programs, roads,electricity,water supply,etc.), which differ substantially by location with more concentration in urban areas and in more developed regions, also result in household income inequality across locations. Different environments contribute to household income inequality in that they produce differential effects on health and productivity.

The second source of income inequality in the short-run may be termed "personal" factors. Household structure, which is one of the long-run sources of inequality, in the short-run sense encompasses a wide range of personal factors representing demographic characteristics of household heads and other members (e.g., age, sex, marital status, education, family size, etc.), within which human capital assets are included. This kind of assets reflects past human capital investments in the health, nutrition, education, and experience of the numbers in addition to their innate abilities. The differences in these personal factors lead to earning differentials and, hence, income inequality among households.

The third source of income inequality in the short-run may be called "employment-related" (economic) factors since this source reflects the possession of assets (physical and financial) which affects the nature of employment and economic activities undertaken by household members. These assets usually take the forms of land holdings (land size, land quality, and land tenure), capital (tools, equipments, machinery, plants, currency, stocks, etc.), and other factors of production in the income-generating process. Different degrees of the possession of these assets inevitably contribute to household income inequality.

The conceptual framework outlined above is used to explain the government social service provisions, which differ across locations, in subsection 3.2.1 as well as the distributions of household income and assets classified by various sources of income inequality in three different years in subsections 3.2.2 to 3.2.4. All the corresponding tables to the above distribution are presented at the end of this chapter.

3.2.1 Distribution of Social Services

The data presented in Table 3.2.1 come from a village-level survey administered in 1986 by the Community Development Division, the Ministry of Interior. The survey covers 54,868 villages in 6,194 subdistricts from all over the country, totaling 34,196,642 populations and 6,321,282 households. It contains basic information on village socio-economic characteristics and government services. The rough social service indicators at the provincial and regional levels shown in this table reveal that even though the provisions of social services

tend to favor some more-developed regions like the Central and the East, the differences among regions are not substantial and some social services are even more concentrated in the other three regions.

For example, although the Northeast has the highest percentage of populations having only compulsory education in col. 2 (62.2), its percentage of populations being illiterate in col. 1 is the lowest (1.55) compared to the highest of 4.67 percent in the North. Regarding health/nutrition care programs, the North has the highest percentage of villages having day care centers in col. 3 (17.47) and the Northeast has the lowest (7.0). The South ranks top in terms of the percentage of subdistricts having health stations in col. 4 (98.88), which is not much higher than the lowest percentage found in the Central (97.75). The Central has the best communication system as 81.95 percent of villages there have at least one feeder road (col. 5) compared to 56.64 percent in the South. The provisions of electricity remain low as only 10.01 percent of households in the Central have electricity (col. 6) compared to a mere 2.43 percent in the Northeast. In terms of social welfare maximization, which takes into account different costs of providing these social services across regions,the unequal provisions of such services between more-developed and less-developed regions do not necessarily imply bias against the latter in the sense that the welfare of the latter is being weighed less in some social welfare functions (Behrman, op. cit.)

3.2.2 Distribution of Household Income

Roughly speaking, the provisions of social services have a tendency to become less unequal as a result of rural development

programs heavily emphasized since the fifth plan (1982-86). It is therefore of particular interest to examine if income and assets are moving toward less unequal distributions as well. The evidence is documented in Tables 3.2.2 - 3.2.16 using data from three sets (1975/76,1980/81, and 1985/86) of the Socio-Economic Surveys (SES) conducted by the National Statistical Office (NSO). These surveys contain detailed information on income, expenditures, and socio-economic characteristics of the sample households. We focus our attention only on self-employed farm and non-farm households, which consist of employers and own-account workers, for the simple reason that this type of households constitutes the majority of households in Thailand.[2] However, in order to do away with the problems of negative or zero net income, age misreport, inconsistencies and missing values of some variables of interest, not all the sample self-employed households are included in the analysis. Instead, the included self-employed farm households total 4,121 and 4,297 in 1980/81 and 1985/86 respectively and nonform households 1,806, 1,523, and 1,399 in 1975/76, 1980/81, and 1985/86 respectively. Due to the incomplete data on farm households in 1975/76, these households are excluded for this particular year.

The distributions of income (per worker self-employed household income) classified by the three sources of income inequality mentioned earlier (i.e., locational, personal, and employment-related factors) for the years 1975/76, 1980/81, and 1985/86 are presented in Tables 3.2.2 - 3.2.4, 3.2.6 - 3.2.8, and 3.2.11 - 3.2.13 respectively. Comparing the distributions of income across time in these tables, such distributions--be they considered singly for each type of households or

considered together--are shown to be worsened as indicated by the increases in the Gini coefficients for both types of households as time passed. The coefficient for these households considered together rose from .575 in 1980/81 to .654 in 1985/86. If the distributions of income are classified by those sources of income inequality, such distributions also deteriorate in almost all of the subgroups accompanied by the wider income gaps.

Although these findings support the findings of the earlier chapters in that the distribution of income becomes increasingly unequal through time, the relatively high Gini coefficients reported here compared to those reported earlier reflect the different measurements of income.[3] In the earlier chapters, income is expressed on a per-capita basis measured by total household income, which is composed of money, non-money, and imputed incomes from various sources, divided by household size. This measurement is more or less close to the concept of full income, which places economic values on home-produced goods and household (nonmarket) activities. Consequently, it is more equally distributed than the unadjusted money income (see Behrman, op. cit., Jitsuchon, 1987).

The measurement of income used here, on the contrary, is per worker self-employed household income (i.e., net money income or profits earned by households from self-employed activities over the past 12 months divided by number of family workers). Not only does it fail to adjust for non-money/imputed incomes and incomes from other sources, it also suffers from some drawbacks (e.g., unequal hours of work), all of which contribute to its being more unequally distributed than the

income used in the earlier chapter. Despite such drawbacks, this income measurement is used here so as to be consistent with the measurement in the next section, which investigates the determinants of per worker self-employed household income and its variation by means of multiple regression analysis. More importantly, the advantages of this income measurement lie in the fact that it reflects labor productivities and earning opportunities.

When the distributions of income in the same sets of tables (Tables 3.2.2-3.2.4, 3.2.6-3.2.8, and 3.2.11-3.2.13) are compared across space as classified by the three sources of income inequality, the patterns emerged are also consistent with the findings in the earlier chapters. For example, when income is classified by locational factors in Tables 3.2.2, 3.2.6, and 3.2.11, the Gini coefficients for both types of households considered together can roughly be said to be higher for households in more developed locations, such as those in urban (sanitary and municipal) areas as well as in Bangkok, the Central, and the South compared respectively to those in rural (village) areas and in the Northeast. The reasons underlying these patterns are that more-developed locations allow for greater variety of economic activities that lead to high income inequality within groups.

If income is classified by personal factors, such as age, sex, and education in Tables 3.2.3, 3.2.7, and 3.2.12, the pattern of income distribution classified by age of household heads diverts somewhat from that classified by their education. The mean income and the Gini coefficients for both types of households taken together increase with age (experience) before declining at old age, indicating greater inequality during more productive years of the life cycle. This is

because the two most productive age groups (40-49 and 50-59) normally consist of people with different levels of success. The same explanation may be applied to the highest education group (13-16 years), whose Gini coefficient is higher than the rest. The coefficient, however, tends to decrease first with the increase in education and, hence, income before increasing as education reaches the level of 13-16 years. The distribution of income by sex does not seem to show any clear pattern.

The distributions of income classified by employment-related factors are shown in Tables 3.2.4, 3.2.8, and 3.2.13. For farm households, income inequality increases with larger scale of farm operation as reflected in higher operating costs per rai. The highest Gini coefficient found within the group having the operating costs of B 5,001 to B 10,000 reflects a relatively well-to-do position of this group of households who may be willing to take risk or to experiment on various cash inputs. The resulting income within this group thus varies greatly. The distribution of income, however, becomes less unequal for the higher-income group whose operating costs are beyond B 10,000. This is probably because households in this group tend to have more stable income and, hence, investment behavior.

As for nonfarm households, the most unequal distribution of income is found within manufacturing and services due to the unstable nature of both types of occupations which causes great variation and fluctuation. The mean income of transportation households appears to be the lowest of all, and so is its inequality as indicated by the lowest Gini coefficient within this group.

In sum, our analysis based on the three sets of SES data for the years 1975/76, 1980/81, and 1985/86 reveal the deteriorating

distribution of income. When classified by different sources of income inequality (e.g.,locational, personal, and employment-related factors), the distributions of income in the various subgroups are also worsened at the same time that the income gaps widened.

3.2.3 Distribution of Household Human Capital Assets

Tables 3.2.5, 3.2.9, and 3.2.14 report the distributions of human capital assets (years of schooling) classified by locational factors for the years 1975/76, 1980/81, and 1985/86. Unlike the distribution of income, the distribution of human capital becomes less inequality as evidenced by the decline in the Gini coefficient for farm and nonfarm households considered together from .257 in 1980/81 to .238 in 1985/86. The inequality for each subgroup also declines. Among these subgroups, the inequality of human capital tends to be higher for households in more-developed locations characterized by higher mean years of schooling, such as in urban (sanitary and municipal) areas compared to rural (village) areas as well as in Bangkok compared to the rest. The same pattern also applies to nonfarm compared to farm households. This pattern not only reflects greater variation of human capital among better-off households in more-developed locations, but also reflects greater access to education due to greater social service provisions there.

3.2.4 Distribution of Household Physical Assets

The distributions of physical assets (farm size) classified by locational factors for the years 1980/81 and 1985/86 are shown in Tables

3.2.10 and 3.2.15. Although the distribution of farm size seems to become less unequal as the Gini coefficient reduced from .450 in 1980/81 to .439 in 1985/86, the distribution within each subgroup does not show any clear pattern of decline. Farm size is shown to be more unequally distributed in urban (sanitary and municipal) areas than in rural (village) areas as well as in the Central and the North compared to the rest. This pattern as evidenced in Tables 3.2.10 and 3.2.15 is also supported by village-level data documented in Table 3.2.16. Such pattern, may be a result of past population pressure in the Central and the North, which have caused a decline and variation in farm size accompanied by intensive cultivation.

However, due to data limitation, the measurement of farm size used here is not the size of land owned. Rather, it is the size of cultivated land, which is composed of owned and rented land. This is the reason why the distribution of farm size presented here is less unequal than that of land ownership found by some earlier studies (e.g., Kerdpibule, 1975) as well as less, rather than more, unequal than that of income.

3.3 Determinants of Household Income

This section reports multiple regression results of household income determination and sources of income inequality among self-employed farm and nonfarm households using income-generating functions.[4] These functions relate household income to various factors which are thought of as exerting significant influences on the former, such as locational, personal, and employment-related factors. The

partial effects of these factors on the distribution of income and their relative importance can thus be quantified.

3.3.1 Data and Methodology

The data used here are taken from the 1985/86 Socio-Economic Survey (SES), which is one of the data sets used in section 3.2. For the same reasons as those in the preceding section, only self-employed farm and nonfarm households are the focus of interest and income is measured by self-employed household income per family workers. Such income is expressed in terms of logarithm. The methodology adopted is multiple regression analysis based on income-generating functions, which are estimated separately for self-employed farm and nonfarm households so as to taken into account the fact that some explanatory variables for these two types of households are not the same.

3.3.2 Results and Interpretations

The regression results for farm and nonfarm households reported in Tables 3.3.2 and 3.3.3 enable us to identify the determinants of income and the major source of income inequality because each source is entered singly and together into the regressions. These sources, as conceptualized in section 3.2, are locational (community and regional), personal, and employment-related (economic) factors. The first two sources involve the same factors for both types of households. Specifically, location distinguishes between rural (village) and urban (sanitary and municipal) characters, while regions include Bangkok, the Central, South, North, and Northeast. Personal factors refer to

characteristics of household heads, mainly human capital variables (e.g., age, age squared, sex, and education), and average level of education of other family workers. Although employment-related factors, which are the other source of income inequality, come differently for both types of households, they cover the same set of factors reflecting the nature of economic activities and the factors of production. The former indicate types of farms (rice or non-rice) for farm households and types of occupations (trade, transportation, manufacturing, services, construction and others) for nonfarm households, while the latter indicate the amount of assets used in the production. For farm households, these assets take the form of land quantity (farm size), land quality (percent of irrigated land), land tenure (land ownership), capital (operating costs), and labor (numbers of family and paid workers). As for nonfarm households, the assets in common with those of farm households are capital and labor. The measurements of these variables, however, many differ between these two types of households, depending upon the availability of data (see Table 3.3.1 below).

3.3.2a Farm Households.

Due to the semi-logarithmic nature of the income-generating functions, all effects are expressed proportionately from geometric means. In Table 3.3.2, community factor alone (RURAL), which captures rural/urban differentials, fails to explain income variation of farm household as shown by very low R^2 in regression 1, while regional factors alone (NORTH, SOUTH, CENTRAL, and BK) explain 4.7 percent of the log variance of income in regression 2. When the whole locational factors in regressions 1 and 2 are combined in regression 3, the

explanatory power improves from regression 2 very slightly, indicating the insignificance of RURAL.

Similarly, personal factors alone in regression 4, such as age, age squared, sex, and education of household heads (HAGE, HAGESQ, HMALE, and HED), together with average education level of other family members (OTHED), do not explain much of the variation in income. The major source of the variation appears to be employment-related factors, which account for 25.2 percent of the log variance of income in regression 5.

When these four sources of income inequality are taken together in regression 6, the covariations among them not only raise the overall explanatory power to 27.5 percent, but also create rural/urban differentials. That is, other things equal, farm households located in rural areas earn 9.8 percent more than their urban counterparts, because rural areas and their environments may be more appropriate for farming occupation. The covariations in regression 6 only cause negligible changes in the effects of employment-related factors compared to regression 5, but induce some changes in the effects of regional and personal factors compared to regression 2 and 4 respectively.

Compared first to regression 2, the income differentials between the North and Northeast as well as between the Central and Northeast disappear. Although the differences between the South and Northeast as well as between the Bangkok and the Northeast remain, they reduce in magnitudes, especially those between Bangkok and the Northeast reduce by almost half. For example, holding other things constant, farm households in Bangkok (including its suburb and fringe areas) earn 47.9 percent, instead of 83.2 percent, more than those in the Northeast.

Compared to regression 4, when all sources of income variation are taken into account in regression 6, HMALE becomes significant, albeit at the 10 percent level, with expected positive sign, which implies 7.5 percent higher earning capability of male over female household heads. While the effects of OTHED turn out to be positive, HED is no longer significant. Since there is much room for other family workers to take part in the decision-making process of farm production, it is plausible that when various factors are considered altogether as in regression 6, OTHED is likely to dominate HED.

The relative importance of employment-related factors is noticeable despite the presence of the other sources of income variation. The effects of the former in regression 6 remain more or less the same as in regression 5. These effects are all significant, other things equal. Rice farms (RICE) are associated with 20.3 percent lower income than alternatives. The alternatives may involve cash crops and other more profitable types of farms. The rest of the factors within this group can be referred to as factors of production, namely land size (land per worker, LANDPWK), land quality (percent of irrigated land, IRLAND), land tenure (land ownership, OWNLAND), family labor (number of family workers, NOFAMWK), paid labor (number of paid workers, NOPDWK), and capital (operating costs per rai, CSTPR). Except for NOFAMWK, the remaining factors exert expected positive effects on income. For example, households with one more rai of LANDPWK tend to earn 5.2 percent more. The negative coefficient of NOFAMWK emerges partly because of a decline in its productivity when other factors are held constant.

The three sources of income variation (i.e., locational, personal, and employment-related factors) are also expected to interact

in the course of determining such variation. Since the interactions can involve many different pairs of factors, the choice of interactions is determined by the working hypotheses or the interest in particular pairs of factors which are suspected to interactively influence the dependent variable. If the interactions between two of the three sources of income variation are added to the set of explanatory variables as shown in regression 7, only the interactions between Bangkok and rice farms (BKRICE) are found to be significant. Without interactions, rice farmers tend to earn less than non-rice farmers. The positive coefficient of BKRICE therefore implies that rice farmers in Bangkok are able to earn 31 percent more.

However, a little higher R^2 in the interaction model (regression 7) than in the simple model (regression 6) cannot be regarded as an improvement in the explanatory power especially when the standard errors of the estimate (SEE) are not reduced. Thus, we may not have to resort to a more complicated interaction model for investigating the determinants of household income and its variation when a simple model can do equally well. And the findings obtained place employment-related factors on top of others, followed by locational (mostly regional) factors, in terms of their contributions to income determination and variation among farm households.

3.3.2b Nonfarm Households.

When community (RURAL) and regional (NORTH, SOUTH, CENTRAL, and BK) factors are entered separately in regressions 1 and 2 in Table 3.3.3, each set of factors contributes almost the same proportion (6.2 and 7.0 percent respectively) to the log variance of income of nonfarm

households.

But when they are considered together as locational factors in regression 3, the explanatory power is raised to 12.2 percent. Personal factors alone, namely age, age squared, sex, and education of household heads(HAGE,HAGESQ,HMALE,and HED),together with average education level of other family workers (OTHED), account for 11.7 percent of the log variance of income in regression 4.

Similar to farm households, employment-related factors are the most important source of income variation as shown by higher R^2 (19.1 percent) in regression 5 than in the preceding four regressions. Some factors belonging to this set differ between both types of households. For nonfarm households, the factors which differ from those of farm households are types of occupations in relation to trade, such as transportation, manufacturing, services, and construction (TRSP, MFG, SERV, and CONST). The same factors with those of farm households are labor (number of family workers, NOFAMWK and use of paid workers, PDWK) and capital (use of home for enterprise, HBE), but with somewhat different measurements from those of farm households.

About 34.9 percent of the log variance of income is explained by the four sets of factors taken together in regression 6. The magnitudes and significance levels of the effects of each factor do not change much from regressions 1,2,4, and 5 when each of them is considered only among the factors within the same set. Exceptions are average education level of other family workers (OTHED) which is no longer significant, while the service occupation (SERV) becomes significant at the 10 percent level in relation to trade.

What can be inferred from regression 6 conforms to the findings in earlier chapters that nonfarm households in four regions (NORTH, SOUTH, CENTRAL, and BK) earn more than those in the Northeast, while those in rural areas (RURAL) earn less than their urban counterparts. Unlike farm households, which are found to do better in rural than urban areas, nonfarm households need urban environments due to their being more conducive to making various nonfarm activities possible and more profitable. Personal factors of household heads, which are not important in determining income of farm households, turn out to be important here because nonfarm activities are so diverse that they need appropriate human capital. Nonfarm households whose heads have one more year of education (HED) are therefore able to earn 4.2 percent more and those with male heads (HMALE) earn 17.4 percent more. The curvilinear effects of age of heads are discernible from the positive and negative signs of the coefficients of age (HAGE) and age squared (HAGESQ) respectively . As shown, income increases with age due to better experience. But as age has reached a certain level, reflecting declining stage, it will cause a fall in income.

Taking a look at employment-related factors, nonfarm households engaging in transportation (TRSP) earn 14.7 percent more than those engaging in trade. Those engaging in manufacturing (MFG) and services (SERV), on the other hand, respectively earn 38.8 and 14.2 percent less. The negative coefficient of the number of family workers (NOFAMWK) partly reflects their lower productivity while holding other things constant. Although the data on firm size are not available, the use of paid workers (PDWK) against nonuse can be regarded as a proxy. This explains why those using paid workers earn 85 percent more than

nonusers. Those using home for enterprise (HBE) also earn 14.3 percent more than nonusers. Not only do home-based enterprises possess transactional advantages, which involve less frictions or lower transaction costs due to their being family-operated, they also reduce capital costs (Strassmann, 1987). Since these advantages enable such enterprises to survive against the power of the modern formal sector, these enterprises become the core of the informal sector (Lipton, 1980).

As the three sources of income variation (i.e., locational, personal, and employment-related) are expected to have interactive effects on income variation, we add some interactions to the set of explanatory variables as shown in regression 7. Only the interactions between Bangkok and construction (BKCONST) and those between education of household heads and construction (HEDCONST) appear to be significant. The positive coefficients of these two interactive terms imply that nonfarm households engaging in construction in Bangkok and its proximity earn 97.9 percent more and construction households whose heads have an additional year of education earn 6.5 percent more. In other words, higher education of heads makes possible upward mobility among those engaging in construction. Without interacting with any other variables, the coefficient of construction (CONST) is in itself negative, though significant only at the 10 percent level, implying that construction households earn 50 percent less in relation to trade. The inclusion of the interactive terms, however, raises the overall explanatory variables by only 0.5 percent from 34.9 to 35.4 and the standard errors of the estimate (SEE) remain the same at .867. As such, we need not recourse

to a more complicated model such as regression 7 in order to explain the determinants of income and its variation.

The findings obtained for nonfarm households are similar to those for farm households in that employment-related factors are the most important set of factors determining household income and its variation. To an extent that nonfarm activities differ greatly in nature, personal factors (especially human capital variables) play a prominent role in determining nonfarm income as well as its distribution. Not surprisingly, personal factors are given second place as a source of income variation for nonfarm households and the counterpart to farm households is regional factors. Nevertheless, if community and regional factors are viewed together as locational factors for nonfarm households, the effects of personal factors become a little less than those of locational factors.

3.4 Conclusion

This chapter stresses the role of households in determining income and its distribution. Such a role works through various sources of income variation, namely locational (community and regional), personal, and employment-related (economic) factors. The conceptual framework is laid first in section 3.2 in order to provide the basis for subsequent analysis of the distribution of household income in relation to the distributions of social services and of household physical as well as human capital assets. The findings obtained support those in the preceding chapters in that the distribution of income is worsened over time. The provisions of social services, which seem to be relatively widely dispersed across locations, help explain in part why

the distribution of human capital assets becomes less unequal through time and is less unequal than that of income. Although the distribution of physical assets in terms of land size appears to improve slightly, the results are not conclusive due to data limitation. Land size is measured here by the size of total cultivated land, which is a combination of owned and rented land, instead of measured by the size of land ownership, whose distribution is found by some earlier studies to be highly skewed and more unequal than that of income.

The determinants of household income, together with their relative importance as the sources of income variation, are investigated for both farm and nonfarm households in section 3.3 using multiple regression analysis applied to the income-generating functions. The estimated results for both types of households are consistent with those in the earlier chapters, in which employment-related factors are found to be the major source of income inequality, followed by locational and personal factors respectively. But when locational factors are separated into community and regional factors, personal factors contribute more than each of these locational factors to explaining the income variation for nonform households. This is probably because of the diversity of nonform activities which requires certain personal factors (mainly human capital) to match.

Notes

[1] To be consistent with the analysis in the preceding chapters, the short-run sources of income inequality are grouped and named differently from the grouping and naming provided by Behrman (1988)--see also Jitsuchon, (1987).

[2] Based on the data from the Labor Force Survey (LFS) conducted by the National Statistical Office (NSO), self-employed workers accounted for 74.2 percent of the total employed populations in 1984.

[3] The Gini coefficients reported here for the years 1975/76 and 1980/81 are more or less comparable to those reported by Jitsuchon (1987) in Appendix C, in which the measurement of household income is based on a per-worker basis.

[4] Income-Generating functions are statistical tools used to explain income inequality and other economic outcomes and behavior (Fields and Schultz, 1982).

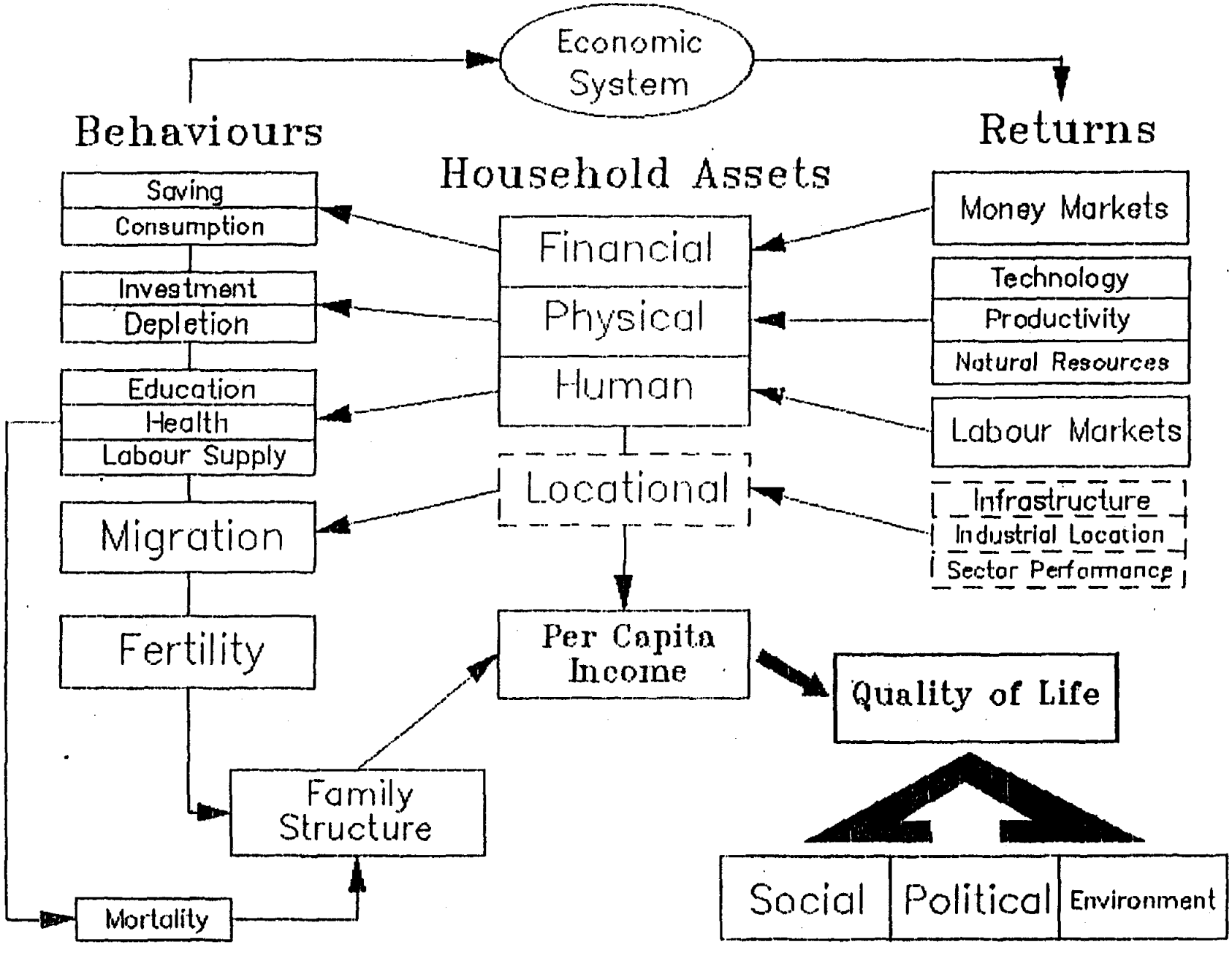
Economic System
Behaviours
Returns
Household Assets
Saving
Consumption
Investment
Depletion
Education
Health
Labour Supply
Migration
Fertility
Financial
Physical
Human
Locational
Money Markets
Technology
Productivity
Natural Resources
Labour Markets
Infrastructure
Industrial Location
Sector Performance
Per Capita Income
Quality of Life
Family Structure
Mortality
Social
Political
Environment

Figure 3.2.1

TABLE 3.2.1

SOCIAL SERVICE INDICATORS (COMMUNITY DEVELOPMENT DIVISION, MINISTRY OF INTERIOR, 1986)

	(1)	(2)	(3)	(4)	(5)	(6)
Central	1.58	59.48	7.37	97.75	81.95	10.01
1 Ang Thong	0.88	64.82	6.31	100.00	91.87	5.14
2 Phra Nakhon Si Ayuthaya	1.61	66.75	4.36	96.83	89.70	16.87
3 Chaing Mai	7.98	61.33	9.49	100.00	73.42	2.92
4 Kanchanaburi	3.35	54.74	8.47	97.59	62.15	2.77
5 Lop Buri	1.09	61.02	5.34	93.16	70.75	0.92
6 Nakhon Pathom	1.19	61.83	6.90	98.96	91.40	6.37
7 Nonthaburi	0.21	62.21	2.62	97.67	95.70	33.72
8 Pathum Thani	2.32	57.30	6.90	100.00	92.50	7.86
9 Phetchaburi	2.09	61.65	8.27	96.10	79.04	3.54
10 Prachuap Khiri khan	1.50	63.49	14.75	94.87	47.86	1.80
11 Ratchaburi	0.45	63.48	5.49	100.00	86.83	4.42
12 Samut Prakan	0.62	38.18	15.30	97.62	97.19	23.28
13 Samut Sakhon	2.14	60.45	18.78	100.00	91.98	23.67
14 Samut Songkham	1.65	61.75	3.35	100.00	92.22	40.89
15 Saraburi	0.50	62.28	3.15	98.06	66.66	3.38
16 Sing Buri	1.12	63.29	7.34	100.00	90.89	29.37
17 Suphan Buri	0.95	66.95	12.39	98.00	79.68	6.78
East	1.98	60.48	9.65	98.67	61.12	7.78
1 Chachoengsao	1.72	59.16	9.89	97.75	64.84	19.92
2 Chanthaburi	1.76	64.09	3.44	100.00	56.59	3.63
3 Chon Buri	0.81	59.69	10.60	100.00	70.59	2.70
4 Nakhon Nayok	2.71	61.96	5.35	100.00	71.37	9.09
5 Prachin Buri	3.27	59.61	12.73	98.15	54.33	5.39
6 Rayong	1.13	62.30	14.01	95.92	64.13	1.30
7 Trat	0.85	64.56	7.39	100.00	51.82	6.90
Northeast	1.55	62.20	7.00	97.77	63.35	2.43
1 Buri Rum	1.16	61.12	5.15	91.89	47.00	2.68
2 Chaiyaphum	2.64	63.08	6.33	96.23	60.42	2.59
3 Kalasin	1.19	65.17	7.09	94.50	81.69	2.62
4 Khon kaen	0.52	64.64	6.74	98.75	74.61	2.35
5 Loei	3.00	62.31	8.35	98.72	69.86	5.37
6 Maha Sarakham	2.32	64.48	4.68	100.00	80.82	3.49
7 Mukdaharn	3.10	57.06	7.06	100.00	58.41	0.94
8 Nakhon Phanom	0.70	61.29	10.00	100.00	60.19	1.88
9 Nakhon Ratchasima	0.53	62.32	7.00	96.61	56.05	2.29
10 Nong Khai	2.85	61.03	9.51	98.95	58.45	1.41
11 Roi Et	2.13	63.89	7.17	95.63	72.95	2.72
12 Sakon Nakhon	1.36	61.32	11.94	100.00	69.85	1.34
13 Si Sa Ket	2.05	61.45	4.79	99.38	56.01	3.28
14 Surin	1.33	59.18	3.97	100.00	44.70	1.93
15 Ubon Ratchthani	1.82	62.69	6.35	98.68	58.85	2.13
16 Udon Thani	1.32	59.74	8.67	97.73	70.81	2.07
17 Yasothon	1.05	65.10	12.22	100.00	68.42	2.06

TABLE 3.2.1 (Continue)

SOCIAL SERVICE INDICATORS (COMMUNITY DEVELOPMENT DIVISION, MINISTRY OF INTERIOR, 1986)

	(1)	(2)	(3)	(4)	(5)	(6)
North	4.67	57.40	17.47	98.17	67.21	4.48
1 Chaing Mai	7.39	56.48	32.48	99.42	71.80	3.93
2 Chaing Rai	7.96	51.39	25.30	98.00	78.54	1.98
3 Kamphaeng Phet	1.39	57.97	10.00	96.83	47.19	4.00
4 Lampang	4.47	59.93	41.46	98.72	72.91	1.74
5 Lamphun	5.35	56.76	29.18	97.78	76.78	3.18
6 Mae Hong Son	28.98	25.16	7.64	94.44	27.02	36.94
7 Nakhon Sawan	2.01	65.25	7.82	100.00	58.43	4.48
8 Nan	6.62	49.71	15.81	97.62	72.40	4.54
9 phayoa	2.75	59.39	24.17	94.44	88.84	0.92
10 Phetchabun	2.01	60.17	6.85	95.92	64.46	1.09
11 Phitsanulok	2.16	59.46	8.05	100.00	63.05	3.83
12 Phrae	4.29	59.15	24.57	100.00	77.88	1.95
13 Phichit	1.30	59.96	5.21	97.44	66.56	2.53
14 Sukhothai	1.24	63.08	14.16	98.68	61.25	3.24
15 Tak	11.96	40.68	10.89	100.00	52.74	19.06
16 Uthai Thani	2.98	61.79	5.42	96.72	40.06	1.74
17 Uttaradit	2.48	61.47	21.04	98.33	71.79	3.55
South	3.38	54.35	8.76	98.88	56.64	4.95
1 Chumphon	1.10	61.56	5.69	100.00	37.35	2.67
2 Krabi	2.24	59.71	5.64	95.74	32.06	10.97
3 Nakhon Si Thammarat	0.61	57.69	8.53	97.35	45.85	6.97
4 Narathiwat	11.10	43.69	9.80	100.00	77.99	1.34
5 Pattani	11.27	43.26	4.09	100.00	82.66	0.71
6 Phangnga	4.48	58.75	9.03	97.83	52.62	10.76
7 Phatthalung	1.27	56.38	12.08	100.00	60.98	1.98
8 Phuket	2.00	58.15	11.54	100.00	85.39	2.88
9 Ranong	2.28	57.93	14.18	100.00	53.60	8.96
10 Satun	1.55	52.05	7.76	100.00	57.16	10.34
11 Songkha	3.20	56.61	9.11	100.00	75.11	1.44
12 Surat Thani	1.47	55.01	8.81	99.17	43.55	9.40
13 Trang	2.06	57.19	12.24	96.34	35.31	4.37
14 Yala	6.11	39.66	9.66	100.00	73.65	1.03
All Region	2.54	59.51	9.60	98.09	66.20	4.86

*** Note ***
(1) : % of populations being illiterate
(2) : % of populations having only compulsory education
(3) : % of villages having day care centers
(4) : % of subdistricts having health stations
(5) : % of villages having at least one feeder road
(6) : % of households having electricity

TABLE 3.2.2

DISTRIBUTIONS OF INCOME (PER WORKER SELF-EMPLOYED HOUSEHOLD INCOME) CLASSIFIED BY LOCATIONAL FACTORS (1975/76)

	Non-Farm HH			
	mean	Gini	cases	%col.
Community type				
- Village	1022.6	.468	261	14.5
- Sanitary district	1588.6	.444	346	19.2
- Municipal area	1816.7	.464	1199	66.4
Region				
- North	1170.5	.593	283	15.7
- Northeast	1412.3	.463	421	23.3
- Central	1727.7	.462	300	16.6
- South	1639.8	.446	248	13.7
- BKK city core	2242.5	.433	373	20.7
- BKK suburb	1718.0	.383	117	6.5
- BKK fringe	1664.8	.441	64	3.5
Whole	1658.3	.481	1806	100.0

TABLE 3.2.3

DISTRIBUTIONS OF INCOME (PER WORKER SELF-EMPLOYED HOUSEHOLD INCOME) CLASSIFIED BY PERSONAL (DEMOGRAPHIC) FACTORS (1975/76)

	Non-Farm HH			
	mean	Gini	cases	%col.
Age of head				
- < 20	1652.9	.481	290	16.1
- 20 - 29	-	-	0	0.0
- 30 - 39	-	-	0	0.0
- 40 - 49	-	-	0	0.0
- 50 - 59	1755.7	.505	1296	71.8
- >= 60	1091.6	.445	220	12.2
Sex				
- Male	1648.3	.487	1413	78.2
- Female	1377.0	.445	393	21.8
Education of head				
- 0	1417.2	.445	478	26.5
- 1 - 4	1614.8	.470	1018	56.4
- 5 - 7	1768.0	.396	114	6.3
- 8 - 10	2378.1	.489	140	7.8
- 11 - 12	1714.3	.304	7	0.4
- 13 - 16	2126.8	.767	44	2.4
- > 16	6693.2	.548	5	0.3
Whole	1658.3	.481	1806	100.0

TABLE 3.2.4

DISTRIBUTIONS OF INCOME (PER WORKER SELF-EMPLOYED HOUSEHOLD INCOME) CLASSIFIED BY EMPLOYMENT-RELATED (ECONOMIC) FACTORS (1975/76)

	Non-Farm HH			
	mean	Gini	cases	%col.
Occupation				
- construction	3398.9	.546	66	3.7
- manufacturing	1709.4	.577	204	11.3
- services	1864.6	.412	150	8.3
- transportation	1448.0	.347	166	9.2
- trade	1559.1	.471	1220	67.6
Whole	1658.3	.481	1806	100.0

TABLE 3.2.5

DISTRIBUTIONS OF HUMAN CAPITAL ASSETS (YEARS OF SCHOOLING) CLASSIFIED BY LOCATIONAL FACTORS (1975/76)

	Non-Farm HH			
	mean	Gini	cases	%col.
Community type				
- Village	3.49	.292	261	14.5
- Sanitary district	4.02	.390	346	19.2
- Municipal area	3.71	.495	1199	66.4
Region				
- North	3.60	.369	283	15.7
- Northeast	4.25	.321	421	23.3
- Central	3.70	.357	300	16.6
- South	3.33	.436	248	13.7
- BKK city core	3.51	.585	373	20.7
- BKK suburb	4.03	.367	117	6.5
- BKK fringe	3.38	.408	64	3.5
Whole	3.73	.418	1806	100.0

TABLE 3.2.6

DISTRIBUTIONS OF INCOME (PER WORKER SELF-EMPLOYED HOUSEHOLD INCOME)
CLASSIFIED BY LOCATIONAL FACTORS (1980/81)

	Farm HH				Non-Farm HH				Both HH			
	mean	Gini	cases	%col.	mean	Gini	cases	%col.	mean	Gini	cases	%col.
Community type												
- Village	598.1	.469	3463	84.0	1746.9	.553	193	12.7	858.8	.492	3656	64.8
- Sanitary district	591.5	.498	597	14.5	2013.5	.455	200	13.1	948.3	.562	797	14.1
- Municipal area	701.3	.469	61	1.5	3304.8	.486	1130	74.2	3171.4	.498	1191	21.1
Region												
- North	632.1	.494	1001	24.3	2654.0	.539	236	15.5	1017.8	.538	1237	21.9
- Northeast	444.8	.416	1633	39.6	2309.7	.549	278	18.3	716.1	.474	1911	33.9
- Central	800.2	.491	709	17.2	2321.3	.484	256	16.8	1203.7	.538	965	17.1
- South	605.4	.432	489	11.9	3281.8	.533	200	13.1	1382.3	.541	689	12.2
- BKK city core	384.0	.562	4	0.1	3685.6	.440	398	26.1	3652.9	.444	402	7.1
- BKK suburb	559.8	.591	21	0.5	3764.1	.520	93	6.1	3173.8	.573	114	2.0
- BKK fringe	876.5	.488	264	6.4	2228.7	.455	62	4.1	1133.7	.520	326	5.8
Whole	598.7	.472	4121	100.0	2937.8	.518	1523	100.0	1229.9	.575	5644	100.0

TABLE 3.2.7

DISTRIBUTIONS OF INCOME (PER WORKER SELF-EMPLOYED HOUSEHOLD INCOME)
CLASSIFIED BY PERSONAL (DEMOGRAPHIC) FACTORS (1980/81)

	Farm HH				Non-Farm HH				Both HH			
	mean	Gini	cases	%col.	mean	Gini	cases	%col.	mean	Gini	cases	%col.
Age of head												
- < 20	533.6	.371	16	0.4	1755.5	.131	2	0.1	669.3	.389	18	0.3
- 20 - 29	572.1	.504	526	12.8	2522.2	.416	181	11.9	1071.4	.569	707	12.5
- 30 - 39	645.5	.452	999	24.2	3327.7	.520	402	26.4	1415.1	.571	1401	24.8
- 40 - 49	613.6	.471	1133	27.5	3213.3	.504	444	29.2	1345.5	.582	1577	27.9
- 50 - 59	572.4	.480	865	21.0	2783.4	.521	295	19.4	1134.7	.584	1160	20.6
- >= 60	554.4	.460	582	14.1	2154.2	.592	199	13.1	962.0	.549	781	13.8
Sex												
- Male	610.6	.470	3570	86.6	3141.7	.502	1116	73.3	1213.4	.567	4685	83.0
- Female	521.7	.481	551	13.4	2378.8	.552	407	26.7	1310.7	.615	958	17.0
Education of head												
- 0	498.5	.472	626	15.2	2253.3	.484	308	20.2	1077.2	.570	934	16.5
- 1 - 4	604.9	.465	3342	81.1	2543.9	.485	843	55.4	995.4	.534	4185	74.1
- 5 - 7	607.0	.404	90	2.2	3547.7	.504	140	9.2	2397.0	.613	230	4.1
- 8 - 10	1348.1	.548	55	1.3	4141.6	.479	147	9.7	3381.0	.555	202	3.6
- 11 - 12	431.8	.322	6	0.1	5523.7	.528	58	3.8	5046.3	.560	64	1.1
- 13 - 16	1211.0	.332	2	0.0	7773.6	.664	27	1.8	7321.0	.681	29	0.5
- > 16	-	-	0	0.0	-	-	0	0.0	-	-	0	0.0
Whole	598.7	.472	4121	100.0	2937.8	.518	1523	100.0	1229.9	.575	5644	100.0

TABLE 3.2.8

DISTRIBUTIONS OF INCOME (PER WORKER SELF-EMPLOYED HOUSEHOLD INCOME)
CLASSIFIED BY EMPLOYMENT-RELATED (ECONOMIC) FACTORS (1980/81)

	Farm HH			
	mean	Gini	cases	%col.
Operating costs per rai				
- < 500	482.7	.442	2712	65.8
- 501 -1000	750.8	.480	826	20.0
- 1001-5000	887.5	.457	542	13.2
- 5001-10000	1388.7	.548	30	0.7
- > 10000	1403.0	.450	11	0.3
Whole	598.7	.472	4121	100.0

	Non-Farm HH			
	mean	Gini	cases	%col.
Occupation				
- construction	5309.2	.548	35	2.3
- manufacturing	2711.0	.584	226	14.8
- services	3489.5	.566	161	10.6
- transportation	2266.2	.360	172	11.3
- trade	2932.3	.505	929	61.0
Whole	2937.8	.518	1523	100.0

TABLE 3.2.9

DISTRIBUTIONS OF HUMAN CAPITAL ASSETS (YEARS OF SCHOOLING)
CLASSIFIED BY LOCATIONAL FACTORS (1980/81)

	Farm HH				Non-Farm HH				Both HH			
	mean	Gini	cases	%col.	mean	Gini	cases	%col.	mean	Gini	cases	%col.
Community type												
- Village	3.4	.223	3463	84.0	3.9	.361	193	12.7	3.4	.231	3656	64.8
- Sanitary district	3.3	.247	597	14.5	4.1	.317	200	13.1	3.5	.272	797	14.1
- Municipal area	3.4	.303	61	1.5	4.5	.424	1130	74.2	4.4	.421	1191	21.1
Region												
- North	3.2	.264	1001	24.3	4.8	.378	236	15.5	3.5	.279	1237	21.9
- Northeast	3.5	.165	1633	39.6	4.2	.349	278	18.3	3.6	.178	1911	33.9
- Central	3.5	.223	709	17.2	4.6	.361	256	16.8	3.8	.258	965	17.1
- South	3.0	.337	489	11.9	3.9	.471	200	13.1	3.3	.357	689	12.2
- BKK city core	4.5	.417	4	0.1	4.3	.467	398	26.1	4.3	.467	402	7.1
- BKK suburb	4.5	.365	21	0.5	4.6	.315	93	6.1	4.6	.325	114	2.0
- BKK fringe	3.4	.204	264	6.4	3.8	.349	82	4.1	3.5	.238	326	5.8
Whole	3.4	.225	4121	100.0	4.3	.397	1523	100.0	3.6	.257	5644	100.0

TABLE 3.2.10

DISTRIBUTIONS OF PHYSICAL ASSETS (FARM SIZE) CLASSIFIED BY LOCATIONAL FACTORS (1980/81)

	Farm HH			
	mean	Gini	cases	%col.
Community type				
- Village	20.0	.447	3463	84.0
- Sanitary district	18.8	.476	597	14.5
- Municipal area	12.6	.616	61	1.5
Region				
- North	18.2	.510	1001	24.3
- Northeast	19.1	.384	1633	39.6
- Central	26.8	.443	709	17.2
- South	13.4	.436	489	11.9
- BKK city core	8.3	.629	4	0.1
- BKK suburb	6.3	.416	21	0.5
- BKK fringe	23.1	.437	264	6.4
Whole	19.7	.450	4121	100.0

TABLE 3.2.11

DISTRIBUTIONS OF INCOME (PER WORKER SELF-EMPLOYED HOUSEHOLD INCOME) CLASSIFIED BY LOCATIONAL FACTORS (1985/86)

	Farm HH				Non-Farm HH				Both HH			
	mean	Gini	cases	%col.	mean	Gini	cases	%col.	mean	Gini	cases	%col.
Community type												
- Village	566.3	.527	3264	76.0	1930.3	.546	277	19.8	873.0	.567	3541	62.2
- Sanitary district	555.5	.554	904	21.0	2611.4	.599	300	21.4	1067.8	.683	1204	21.1
- Municipal area	1234.5	.595	129	3.0	4327.4	.544	822	58.8	3907.9	.578	951	16.7
Region												
- North	521.3	.490	1159	27.0	2521.9	.466	253	18.1	879.9	.554	1412	24.8
- Northeast	385.3	.444	1433	33.3	3386.9	.707	218	15.6	781.7	.553	1651	29.0
- Central	811.0	.607	756	17.6	3303.6	.557	365	26.1	1622.6	.653	1121	19.7
- South	711.0	.549	683	15.9	3427.6	.611	225	16.1	1384.2	.632	908	15.9
- BKK city core	615.8	.418	9	0.2	4223.1	.472	219	15.7	4080.7	.485	228	4.0
- BKK suburb	318.6	.359	12	0.3	5708.2	.515	66	4.7	4879.0	.576	78	1.4
- BKK fringe	1001.5	.471	245	5.7	4152.1	.565	53	3.8	1561.9	.583	298	5.2
Whole	584.1	.533	4297	100.0	3484.7	.580	1399	100.0	1298.5	.654	5696	100.0

TABLE 3.2.14

DISTRIBUTIONS OF HUMAN CAPITAL ASSETS (YEARS OF SCHOOLING)
CLASSIFIED BY LOCATIONAL FACTORS (1985/86)

	Farm HH				Non-Farm HH				Both HH			
	mean	Gini	cases	%col.	mean	Gini	cases	%col.	mean	Gini	cases	%col.
Community type												
- Village	3.66	.215	3264	76.0	4.10	.272	277	16.2	3.70	.220	3541	62.2
- Sanitary district	3.93	.232	904	21.0	4.89	.308	300	21.4	4.17	.264	1204	21.1
- Municipal area	4.87	.206	129	3.0	5.27	.349	822	58.8	5.21	.328	951	16.7
Region												
- North	3.61	.245	1159	27.0	4.96	.289	253	18.1	3.85	.254	1412	24.8
- Northeast	3.81	.182	1433	33.3	5.21	.273	218	15.6	4.00	.195	1651	29.0
- Central	3.78	.209	756	17.6	5.06	.272	365	26.1	4.20	.228	1121	19.7
- South	3.80	.309	683	15.9	4.62	.358	225	16.1	4.01	.318	908	15.9
- BKK city core	4.33	.068	9	0.2	5.13	.361	219	15.7	5.01	.353	228	4.0
- BKK suburb	4.00	.358	12	0.3	4.35	.319	66	4.7	4.29	.326	78	1.4
- BKK fringe	3.83	.167	245	5.7	4.66	.388	53	3.8	3.98	.218	298	5.2
Whole	3.57	.216	4297	100.0	4.95	.319	1399	100.0	4.05	.238	5696	100.0

TABLE 3.2.15

DISTRIBUTIONS OF PHYSICAL ASSETS (FARM SIZE) CLASSIFIED BY
LOCATIONAL FACTORS (1985/86)

	Farm HH			
	mean	Gini	cases	%col.
Community type				
- Village	20.93	.435	3264	76.0
- Sanitary district	17.37	.479	904	21.0
- Municipal area	15.56	.472	129	3.0
Region				
- North	18.60	.511	1159	27.0
- Northeast	20.59	.385	1433	33.3
- Central	24.87	.447	756	17.6
- South	13.80	.403	683	15.9
- BKK city core	4.56	.271	9	0.2
- BKK suburb	7.17	.397	12	0.3
- BKK fringe	27.02	.384	245	5.7
Whole	20.02	.439	4297	100.0

TABLE 3.2.12

DISTRIBUTIONS OF INCOME (PER WORKER SELF-EMPLOYED HOUSEHOLD INCOME)
CLASSIFIED BY PERSONAL (DEMOGRAPHIC) FACTORS (1985/86)

	Farm HH				Non-Farm HH				Both HH			
	mean	Gini	cases	%col.	mean	Gini	cases	%col.	mean	Gini	cases	%col.
Age of head												
- < 20	457.5	.338	5	0.1	1012.5	.241	2	0.1	616.3	.354	7	0.1
- 20 - 29	472.3	.463	421	9.8	2703.1	.509	153	10.9	1066.9	.598	574	10.1
- 30 - 39	627.1	.514	1054	24.5	3378.1	.504	448	32.0	1447.6	.633	1502	26.4
- 40 - 49	590.2	.538	1064	24.8	4391.9	.605	406	29.0	1640.2	.698	1470	25.8
- 50 - 59	630.6	.590	996	23.2	3715.4	.612	257	18.4	1263.3	.674	1253	22.0
- >= 60	517.7	.498	757	17.6	1584.9	.553	133	9.5	674.2	.527	890	15.6
Sex												
- Male	586.5	.530	3757	87.4	3871.1	.590	1044	74.6	1300.8	.544	4801	84.3
- Female	567.1	.555	540	12.6	2348.1	.528	355	25.4	1273.5	.579	895	15.7
Education of head												
- 0	561.9	.584	507	11.8	1981.6	.488	137	9.8	863.9	.623	644	11.3
- 1 - 4	564.7	.523	3482	81.0	2946.9	.549	890	63.6	1047.3	.617	4372	76.8
- 5 - 7	808.3	.524	157	3.7	4704.8	.607	155	11.1	2744.1	.707	312	5.5
- 8 - 10	1036.5	.528	84	2.0	5360.5	.634	128	9.1	3647.2	.702	212	3.7
- 11 - 12	98.0	.000	1	0.0	3811.1	.461	31	2.2	3695.1	.510	32	0.6
- 13 - 15	832.5	.621	66	1.5	7712.0	.510	58	4.1	4050.3	.756	124	2.2
- > 16	-	-	0	0.0	-	-	0	0.0	-	-	0	0.0
Whole	584.1	.533	4297	100.0	3484.7	.580	1399	100.0	1296.5	.654	5696	100.0

TABLE 3.2.13

DISTRIBUTIONS OF INCOME (PER WORKER SELF-EMPLOYED HOUSEHOLD INCOME)
CLASSIFIED BY EMPLOYMENT-RELATED (ECONOMIC) FACTORS (1985/86)

	Farm HH			
	mean	Gini	cases	%col.
Operating costs per rai				
- < 500	415.4	.452	2748	64.0
- 501 -1000	581.2	.490	850	19.8
- 1001-5000	999.3	.524	614	14.3
- 5001-10000	3161.0	.761	50	1.2
- > 10000	2935.5	.582	35	0.8
Whole	584.1	.533	4297	100.0

	Non-Farm HH			
	mean	Gini	cases	%col.
Occupation				
- construction	7278.9	.563	38	2.7
- manufacturing	3106.9	.661	175	12.5
- services	3706.9	.604	135	9.6
- transportation	3087.6	.393	177	12.7
- trade	3441.4	.581	874	62.5
Whole	3484.7	.580	1399	100.0

TABLE 3.2.16

DISTRIBUTION OF PHYSICAL ASSETS (FARM SIZE) CLASSIFIED BY PROVINCE AND REGION (COMMUNITY DEVELOPMENT DIVISION, MINISTRY OF INTERIOR, 1986)

	<6 rai	6-10 rai	11-20 rai	21-50 rai	> 50 rai	Gini
Central	4.96	7.77	11.21	11.44	2.86	.461
1 Ang Thong	10.10	14.38	18.42	14.22	2.55	.461
2 Phra Nakhon Si Ayuthaya	3.18	5.93	12.05	20.91	7.26	.416
3 Chaing Mai	6.89	13.28	21.10	23.02	5.14	.437
4 Kanchanaburi	8.91	10.74	10.54	6.31	1.31	.488
5 Lop Buri	4.75	8.57	13.53	12.82	4.24	.466
6 Nakhon Pathom	6.07	7.15	8.97	9.00	2.46	.491
7 Nonthaburi	0.86	2.36	4.66	4.49	0.83	.405
8 Pathum Thani	1.75	3.49	8.64	19.20	5.62	.376
9 Phetchaburi	9.79	12.28	14.29	11.29	1.68	.465
10 Prachuap Khiri khan	6.71	7.43	3.78	1.07	0.12	.422
11 Ratchaburi	6.60	10.30	11.54	8.24	1.30	.457
12 Samut Prakan	0.30	0.68	1.64	2.07	0.55	.408
13 Samut Sakhon	1.30	2.23	4.44	4.33	1.01	.433
14 Samut Songkham	0.13	0.20	0.35	0.47	0.05	.390
15 Saraburi	2.48	5.28	11.20	18.19	4.82	.401
16 Sing Buri	9.62	13.96	18.98	17.55	3.16	.454
17 Suphan Buri	6.35	12.34	20.62	18.44	4.22	.441
East	6.25	8.17	12.14	13.39	4.63	.481
1 Chachoengsao	3.30	6.59	12.50	19.94	7.73	.428
2 Chanthaburi	7.60	5.70	3.87	1.62	0.15	.469
3 Chon Buri	8.10	8.95	8.96	6.34	1.37	.499
4 Nakhon Nayok	3.91	6.16	14.80	28.76	10.36	.403
5 Prachin Buri	5.09	9.56	20.07	20.68	7.49	.448
6 Rayong	11.70	10.66	5.84	1.89	0.26	.450
7 Trat	5.65	7.19	6.71	4.34	0.47	.459
Northeast	10.77	22.37	29.81	20.20	3.92	.444
1 Buri Rum	8.74	19.75	31.94	23.19	5.86	.446
2 Chaiyaphum	14.12	25.84	24.85	12.91	2.31	.453
3 Kalasin	14.32	28.99	28.78	14.63	2.13	.435
4 Khon kaen	11.67	24.09	29.44	18.25	3.12	.440
5 Loei	35.26	24.89	11.30	3.77	0.58	.456
6 Maha Sarakham	8.56	20.40	32.46	25.83	5.48	.434
7 Mukdaharn	18.90	36.20	25.07	9.54	1.18	.421
8 Nakhon Phanom	15.15	28.30	31.19	17.61	2.97	.447
9 Nakhon Ratchasima	8.82	18.59	24.21	16.43	3.92	.457
10 Nong Khai	10.15	24.53	31.34	16.08	2.69	.424
11 Roi Et	9.28	24.19	34.02	23.22	4.41	.431
12 Sakon Nakhon	9.13	21.99	33.39	19.32	3.85	.430
13 Si Sa Ket	11.48	25.51	30.99	19.19	3.13	.435
14 Surin	10.04	22.12	32.95	23.69	4.81	.438
15 Ubon Ratchthani	5.13	15.29	31.24	32.46	6.39	.402
16 Udon Thani	8.53	20.00	32.20	21.97	3.88	.423
17 Yasothon	7.33	22.35	35.37	25.11	4.01	.410

TABLE 3.2.16 (Continue)

DISTRIBUTION OF PHYSICAL ASSETS (FARM SIZE) CLASSIFIED BY PROVINCE AND REGION (COMMUNITY DEVELOPMENT DIVISION, MINISTRY OF INTERIOR, 1986)

	<6 rai	6-10 rai	11-20 rai	21-50 rai	> 50 rai	Gini
North	23.12	14.93	12.95	9.88	2.60	.549
1 Chaing Mai	31.96	14.92	4.28	0.56	0.04	.356
2 Chaing Rai	18.56	21.72	17.52	5.97	0.73	.440
3 Kamphaeng Phet	7.58	13.39	23.75	20.52	5.60	.452
4 Lampang	54.66	17.33	4.76	0.66	0.06	.337
5 Lamphun	40.38	12.42	5.15	0.85	0.06	.374
6 Mae Hong Son	41.16	11.83	2.85	0.56	0.17	.356
7 Nakhon Sawan	2.66	6.40	14.65	25.04	8.72	.403
8 Nan	47.77	8.01	1.03	0.10	0.00	.214
9 phayoa	27.70	22.04	13.55	5.36	0.67	.470
10 Phetchabun	9.73	13.28	17.97	11.92	2.51	.468
11 Phitsanulok	11.60	16.09	19.82	16.49	4.33	.485
12 Phrae	46.33	16.66	3.64	0.35	0.02	.316
13 Phichit	3.68	7.82	18.40	28.81	11.96	.417
14 Sukhothai	11.79	19.37	24.69	16.61	3.03	.454
15 Tak	25.06	20.17	9.57	2.69	0.89	.477
16 Uthai Thani	3.12	7.32	18.98	28.52	4.63	.364
17 Uttaradit	26.14	18.94	16.22	9.14	1.44	.506
South	24.74	16.43	7.76	2.21	0.28	.442
1 Chumphon	13.33	12.40	5.27	1.22	0.14	.409
2 Krabi	22.90	16.98	5.95	0.90	0.17	.391
3 Nakhon Si Thammarat	21.39	19.54	12.45	4.84	0.71	.469
4 Narathiwat	30.73	11.67	2.69	0.27	0.02	.325
5 Pattani	48.25	18.84	4.50	0.46	0.01	.325
6 Phangnga	12.17	7.83	2.60	0.18	0.00	.344
7 Phatthalung	27.13	30.92	18.08	4.51	0.29	.404
8 Phuket	7.32	2.01	0.25	0.00	0.00	.250
9 Ranong	8.08	5.79	1.19	0.23	0.01	.348
10 Satun	33.41	20.33	6.00	1.18	0.11	.382
11 Songkha	33.36	17.48	8.49	2.14	0.30	.440
12 Surat Thani	10.02	11.44	7.27	2.56	0.29	.441
13 Trang	26.68	17.55	5.10	0.85	0.13	.380
14 Yala	28.29	6.43	1.09	0.25	0.01	.282
All Region	14.61	16.48	18.50	13.33	2.97	.493

Table 3.3.1
Definitions and Measurements of Variables

Variable Names	Definitions and Measurements
Dummy Variables	
RURAL	=1 if household is located in rural (village)areas =0 if household is located in urban (sanitary and municipal)areas
NORTH	=1 if household is located in the North =0 otherwise
SOUTH	=1 if household is located in the South =0 otherwise
CENTRAL	=1 if household is located in the Central =0 otherwise
BK	=1 if household is located in Bangkok and its proximity =0 otherwise
HMALE	=1 if household is headed by male =0 otherwise
RICE	=1 if rice is major crop =0 otherwise
OWNLAND	=1 if household owns most of the cultivated land =0 otherwise
TRSP	=1 if household engages mainly in transportation =0 otherwise
MFG	=1 if hotel engages mainly in manufacturing =0 otherwise
SERV	=1 if household engages mainly in services =0 otherwise
CONST	=1 if household engages mainly in construction and others =0 otherwise
PDWN	=1 if household uses paid workers =0 otherwise
HBE	=1 if household uses house space for enterprise =0 otherwise

Table 3.3.1 (continued)
Definitions and Measurements of Variables

Variable Names	Definitions and Measurements
Continuous Variables	
HAGE	age of household head, in years
HAGESQ	age of household head squared
HED	education of household head, in years of schooling
OTHED	average education of other family workers, in years of schooling
LANDPWK	area of cultivated land per family workers
IRLAND	percent of cultivated land being irrigated
NOFAMWK	number of family workers (= household head plus others)
NOPDWK	number of paid workers
CSTPR	total operating costs per rai
Interactions	
The rest of variables in Tables 3.3.2 and 3.3.3 are interactive terms	Each interactive variable is a product of two variables as shown by their names.

TABLE 3.3.2
Regressions on the Logarithm of Self-Employed Farm Households' Income per Family Workers

Explanatory Variables	1	2	3	4	5	6	7
Locational Factor							
(Deviation from Urban) RURAL	.309		.042			.098*	.095*
	(1.03)		(1.14)			(2.97)	(2.88)
Regional Factors (Deviations from Northeast)							
NORTH		.248*	.252*			.045	.047
		(6.08)	(6.16)			(1.13)	(1.17)
SOUTH		.405*	.406*			.329*	.324*
		(8.44)	(8.47)			(7.38)	(7.26)
CENTRAL		.454*	.456*			.041	.041
		(9.81)	(9.84)			(.89)	(.90)
BK		.832*	.830*			.479*	.313***
		(12.09)	(12.07)			(7.06)	(1.64)
Personal Factors							
HAGE				.011		.009	.009
				(1.20)		(1.09)	(1.12)
HAGESQ				-.0001		-.0001	-.0001
				(-1.13)		(-1.41)	(-1.43)
HMALE (Deviation from female)				.045		.075***	.074***
				(.90)		(1.71)	(1.69)
HED				.031*		-.002	-.005
				(4.03)		(-.28)	(-.52)
OTHED				-.020*		.017*	.017*
				(-3.06)		(2.61)	(2.61)
Employment-Related (Economic) Factors							
RICE (Deviation from nonrice farms)					-.244*	-.203*	-.242*
					(-7.95)	(-6.40)	(-4.24)
LANDPWK					.053*	.052*	.051*
					(27.13)	(26.00)	(25.96)
IRLAND					.003*	.003*	.002*
					(8.96)	(6.43)	(6.21)
OWNLAND (Deviation from not own land)					.156*	.192*	.194*
					(4.99)	(5.91)	(5.97)
NOFAMWK					-.056*	-.068*	-.069*
					(-5.27)	(-5.13)	(-5.22)
NOPDWK					.013*	.016*	.016*
					(6.60)	(8.15)	(8.05)
CSTPR					.00002*	.00002*	.00002*
					(10.11)	(10.07)	(10.09)
Interactions							
BKHED							-.020
							(-.575)
BKRICE							.310**
							(2.14)
HEDRICE							.007
							(.582)
Constant	8.25	8.02	7.98	7.95	7.85	7.40	7.42
R^2	.0003	.047	.048	.006	.252	.275	.276
SEE	1.055	1.030	1.030	1.052	.913	.900	.900

t ratios reported in parenthesis beneath coefficients
* = Significant at the 1% level.
** = Significant at the 5% level.
*** = Significant at the 10% level.

TABLE 3.3.3

Regressions on the Logarithm of Self-Employed NonFarm Households' Income per Family Worker

Explanatory Variables	1	2	3	4	5	6	7
Locational Factor (Deviation from Urban)							
RURAL	-.668*		-.620*			-.500*	-.484*
	(-9.62)		(-9.12)			(-8.39)	(-8.04)
Regional Factors (Deviations from Northeast)							
NORTH		.282*	.343*			.249*	.249*
		(2.96)	(3.69)			(3.09)	(3.08)
SOUTH		.407*	.436*			.429*	.438*
		(4.15)	(4.58)			(5.14)	(5.24)
CENTRAL		.457*	.490*			.426*	.428*
		(5.17)	(5.70)			(5.69)	(5.71)
BK		.870*	.830*			.771*	.789*
		(9.71)	(9.52)			(10.12)	(6.79)
Personal Factors							
HAGE				.129*		.097*	.095*
				(6.04)		(6.87)	(6.66)
HAGESQ				-.001*		-.001*	-.001*
				(-8.36)		(-7.15)	(-6.95)
HMALE (Deviation from female)				.174*		.174*	.176*
				(2.75)		(2.99)	(3.01)
HED				.070*		.042*	.043*
				(8.06)		(5.48)	(4.11)
OTHED				-.025*		-.006	-.006
				(-3.25)		(-.71)	(-.72)
Employment-Related (Economic)Factors							
TRSP -->					.173**	.147***	.140
					(2.04)	(1.83)	(.92)
MFG (Deviations -> from					-.438*	-.388*	-.514*
					(-5.38)	(-5.24)	(-3.70)
SERV trade)					-.112	-.142***	-.188
					(-1.23)	(-1.70)	(-1.18)
CONST -->					.025	.023	-.501***
					(.15)	(.16)	(-1.76)
NOFAMWK					-.204*	-.194*	-.189*
					(-7.02)	(-6.17)	(-5.97)
PDWK (Deviation from not use of paid workers)					1.04*	.850*	.849*
					(15.72)	(13.88)	(13.71)
HBE (Deviation from not use of home for enterprise)					.138*	.143*	.137*
					(2.45)	(2.75)	(2.64)
Interactions							
BKHED							-.018
							(-1.03)
BKTRSP							.169
							(1.02)
BKMFG							.153
							(.89)
BKSERV							.087
							(.46)
BKCONST							.979**
							(2.25)
HEDTRSP							-.009
							(-.33)
HEDMFG							.019
							(.80)
HEDSERV							.005
							(.222)
HEDCONST							.065***
							(1.70)
Constant	10.14	9.57	9.67	6.95	10.12	7.51	7.56
R^2	.062	.070	.122	.117	.191	.349	.354
SEE	1.035	1.032	1.003	1.008	.964	.867	.867

Note : t ratios reported in parenthesis beneath coefficients

* = Significant at the 1% level. ** = at the 5% level. *** = at the 10% level.

CHAPTER 4

SIMULATION OF THE 1988 INCOME DISTRIBUTION AND POVERTY INCIDENCE

So far the discussion and analysis of income distribution and poverty confined itself to the period before 1986. However, as the economic conditions have changed very rapidly after 1986, the most remarkable is the fast economic growth Thailand has achieved just recently since 1987, the assessment of their impact on both the income distribution condition and the welfare of Thai people, is thus necessary. Unfortunately, the suitable information for this purpose is not available because the country-wide Socio-Economic Survey conducted in 1988 has not yet been completed. Nevertheless, with an appropriate method and tool, it is still possible to do a simulation that takes into account the recently prominent economic features and assesses their impacts. In this paper, the Thailand Agricultural Model II (THAM-2), which is appropriate in evaluating the economic impacts that are primarily incured within the agricultural sector, was chose for this simulation. The model is thus capable of predicting the likely consequences of the recently sharp increase of various major crop prices, which are, as pointed out in Chapter 2, largely relevant to the income distribution and poverty in Thailand.

4.1 The Recent Economic Situations

A number of dramatic economic changes has been addressed since 1987. Table 4.1 gives some key economic indicators during 1986 and 1988.

Table 4.1
Some key Economic Indicators during 1986-88

	1986	1987	1988
Economic Growth (%)	4.7	7.1	10.3
- Agriculture	1.4	-2.5	10.1
- Manufacturing	9.1	10.3	12.0
- Services	4.8	9.4	9.9
Exports (Mil.Baht)	231,481	298,100	400,258
(Growth Rate,%)	20.7	28.8	34.3
Imports (Mil.Baht)	245,690	341,626	493,194
(Growth Rate,%)	-3.0	39.0	44.4
Farm Gate price (Baht/ton)			
- Paddy		2,816	4,263
- Maize		1,819	2,696
- Casava		790	573
- Sugarcane		292	332
- Rubber		17,357	23,144
Farm Gate price (% growth)			
- Paddy			51.38
- Maize			48.21
- Casava			-27.47
- Sugarcane			13.70
- Rubber			33.34

Source : Overall economic Growht for 1986-87 from NESDB,
1988 growth and all sectorial growth are TDRI's forecast.
Exports and Imports in 1986-87 from BOT,
1988 figures are TDRI's forecast.
Farm Gate prices from Bank of Thailand,
'The first 9 month Economic Situation, 1988'.
Note : 1988 Farm gate price are estimates.

First, the Thai economy has been expanding with an accelerating rate in 1987 and 1988. The overall economic growth in 1987 was 7.1% in real term, and around 10% growth is expected for this year.

Second, the engine of growth in both 1987 and 1988 is the rapidly increasing exports and high investment. Total exports was growing by around 28.8% in 1987 and is expected to grow even faster in 1988, by around 34-35%, reaching the total export value of more than 400 billion baht.

Third, the agricultural production has much recovered in 1988, due mainly to the higher crop prices that has taken place since the late 1987. The GDP in the agricultural sector is predicted to grow by about 10% this year. Farm gate prices of most major crops, except for cassava price, also rise sharply.

All the above phenomena suggest higher income of Thai people in the recent years. What is most important is the improving income of farmers in 1988 as a result of production recovery and increasing agricultural prices. In fact, the agricultural growth is seen to be the major factor that should help improving the distribution of income and enormously reduce the poverty problem.

4.2 The Methodology

As mentioned earlier, the method used to assess the impacts of the recent economic success mentioned above is a simulation through a general equilibrium model called THAM-2, the Thailand Agricultural Model II, which is available at the Agriculture and Rural Development Program, TDRI. Some brief summary of the model's features and its functioning are available in Appendix B.

The model is quite appropriate for estimating the impact of expanding agricultural output and price increases, as Thailand has experienced during the last two years, on both the income level of farmers and their linkage to non-farm production. The impacts of high export growth was also incorporated in order to see the overall picture of income distribution and poverty after the 1988 experiences.

4.3 Income Distribution in 1988

Table 4.2 shows the simulation result and the calculated income inequality suggested by the model. According to the THAM-2 model, households are classified into 33 group, by region and by farm size (in case of farm households) or by expenditure class (in case of non-farm households).[1] The simulated average income of all households increase by around 17.4% during 1986 and 1988 as a result of increased income of both farm households and non-farm households.[2] With these growth rates of average household income obtained from the THAM-2 model and the help of the Shorrock's index we find that the income inequality between these 33 household groups does not much change between 1986 and 1988. If we assume that the income inequality within each household group remain unchanged then we could come to a conclusion that the overall income distribution during 1986 and 1988 is quite stable. In other words, although the non-farm income has accelerated because of the fast expansion of export sector, the farm income is also rising due to higher agricultural earnings and, consequently, help protecting distribution of income from getting worse. However, the income distribution still not show a reversing trend to be more equally distributed.

Table 4.2

Simulated Distribution of Income

REGION	Household Group	Population Share (%)	Inequality shorrocks	per capita Income 1986	1986-88 growth (%)	per capita Income 1988
UPPER NORTH	small farmer	2.72	0.302	7,207.7	18.47	8,538.8
	medium farmer	2.50	0.242	6,562.2	18.44	7,772.1
	large farmer	1.06	0.232	7,054.4	14.49	8,076.9
LOWER NORTH	small farmer	1.46	0.279	7,168.7	13.89	8,164.6
	medium farmer	2.91	0.188	5,897.6	14.89	6,775.7
	large farmer	3.66	0.177	8,261.4	18.59	9,797.1
NORTH	non-farmer poor	1.19	0.164	4,528.7	16.62	5,281.2
	non-farmer medium	1.64	0.121	8,517.6	16.46	9,919.4
	non-farmer rich	2.17	0.222	11,851.9	15.87	13,733.3
NORTHEAST	small farmer	11.17	0.221	4,301.2	15.86	4,983.5
	medium farmer	10.66	0.177	4,670.4	16.61	5,446.1
	large farmer	9.07	0.180	5,809.7	16.03	6,740.9
NORTHEAST	non-farmer poor	2.89	0.167	3,575.3	10.65	3,956.2
	non-farmer medium	1.37	0.189	9,905.8	10.50	10,945.5
	non-farmer rich	1.67	0.280	11,634.8	9.99	12,797.0
EAST & WEST	small farmer	1.73	0.256	8,530.7	32.22	11,278.9
	medium farmer	2.72	0.201	7,494.5	28.93	9,663.0
	large farmer	2.38	0.427	11,336.6	28.56	14,573.9
EAST & WEST	small farmer	1.00	0.241	9,889.0	22.87	12,126.3
	medium farmer	1.41	0.198	7,004.8	21.53	8,512.9
	large farmer	1.56	0.344	11,221.6	22.39	13,733.7
CENTRAL PLAIN	non-farmer poor	1.51	0.086	4,472.2	20.10	5,371.3
	non-farmer medium	2.52	0.119	8,323.6	19.96	9,984.7
	non-farmer rich	3.68	0.242	21,608.8	19.46	25,814.2
SOUTH	small farmer	4.13	0.277	6,664.0	13.38	7,555.8
	medium farmer	4.14	0.255	7,145.2	14.90	8,210.1
	large farmer	0.92	0.189	8,565.7	29.98	11,134.0
SOUTH	non-farmer poor	0.74	0.123	4,304.0	15.64	4,977.3
	non-farmer medium	1.16	0.101	8,492.4	15.49	9,807.8
	non-farmer rich	1.78	0.272	24,178.9	14.95	27,794.7
BANGKOK	non-farmer poor	0.33	0.132	6,791.8	18.02	8,015.7
	non-farmer medium	2.26	0.113	10,431.0	17.88	12,293.9
	non-farmer rich	9.88	0.227	26,367.1	16.61	30,746.0
WHOLE KINGDOM		100.00	0.427	10,021.8	17.39	11,764.1

The implied change of income inequality (Shorrocks' Index)

Year	1986	1988
Within-Group Inequality	0.2134	0.2134
Between-Group Inequality	0.2137	0.2142
Total Inequality	0.4271	0.4276

Source : 1988's Population shares, income inequalities and average income are calculated the Socio-Economic Survey 1985/86, income growth rates are simulated by model THAM-2.

Note : Per capita income is Baht/year.

4.4 Poverty Incidence in 1988

The simulation of poverty incidence is more impressive. As we anticipate, the poverty level reduced substantially as the income of all household groups grew faster than the cost of living (measured by the inflation rate). Tables 4.3 and 4.4 show that the percentage of population living under the poverty line (which is per capita 4,091 baht/year for villages and sanitary districts, and 6,251 baht for municipal areas) decreases from 29.5% in 1986 to about 25.2% in 1988, much close to the 23.0% level achieved in 1981. Generally, poverty within the farm households got more improvement because their income are more closely clustering1g near the poverty line and, consequently, only small income improvement would help them to be above the line. The similar reasoning can also explain the poverty reduction within the villages areas as shown in table 4.4.

4.5 Conclusion

Accompanied by the previous analyses of income distribution and poverty incidence in the last two chapter, the simulation results within this paper enable us to conclude the followings.

1. The incidence of poverty improved dramatically over the last two years, mainly as a result of the improvement in crop prices.

2. The rapid change is also a reflection of the fact that a large number of households are concentrated at around the poverty line. This means that the ratio under the poverty the line will be rather sensitive to changes in income levels. The recent rapid improvement in the economic situation has therefore reduced poverty substantially. However, it has to be hoped that the current high level of agricultural

Table 4.3
Simulated Poverty Incidence by Region and Household Group
(% of population under poverty line)

		1986	1988
WHOLE KINGDOM		29.51	25.16
UPPER NORTH	small farmer	34.26	30.92
	medium farmer	36.01	30.42
	large farmer	28.05	25.36
LOWER NORTH	small farmer	31.11	27.67
	medium farmer	35.07	29.12
	large farmer	15.06	10.85
NORTH	non-farmer poor	50.73	46.15
	non-farmer medium	9.32	5.50
	non-farmer rich	0.78	0.78
NORTHEAST	small farmer	61.63	54.26
	medium farmer	49.56	42.99
	large farmer	36.21	30.81
NORTHEAST	non-farmer poor	71.40	69.18
	non-farmer medium	13.51	12.96
	non-farmer rich	2.46	2.15
EAST & WEST	small farmer	25.16	17.75
	medium farmer	20.01	11.89
	large farmer	15.19	6.51
EAST & WEST	small farmer	11.59	5.61
	medium farmer	19.93	17.14
	large farmer	16.61	13.70
CENTRAL PLAIN	non-farmer poor	41.47	30.70
	non-farmer medium	9.32	6.50
	non-farmer rich	0.98	0.64
SOUTH	small farmer	37.67	33.71
	medium farmer	30.94	28.02
	large farmer	17.33	7.19
SOUTH	non-farmer poor	47.23	44.84
	non-farmer medium	10.44	8.27
	non-farmer rich	1.64	1.37
BANGKOK	non-farmer poor	28.19	25.31
	non-farmer medium	10.56	8.11
	non-farmer rich	1.10	0.50

Note : income growth between 1986-88 in each subgroup is derived from the TDRI's model THAM-2.

Table 4.4
Simulated Poverty Incidence by Region and Community Type
(% of population under poverty line)

	1975/76	1980/81	1985/86	1988
Whole Kingdom	30.02	23.04	29.51	25.16
NORTH	33.20	21.50	25.54	21.63
villages	36.37	23.32	27.74	23.55
sanitary districts	19.23	16.16	20.19	16.87
municipal areas	17.84	8.03	6.87	5.56
NORTHEAST	44.92	35.93	48.17	42.50
villages	48.54	37.92	50.49	44.53
sanitary districts	24.66	20.81	33.25	29.05
municipal areas	20.90	17.99	18.67	17.21
CENTRAL	12.99	13.55	15.63	10.52
villages	14.26	14.16	17.37	11.60
sanitary districts	7.99	11.62	11.36	7.76
municipal areas	11.45	11.74	8.87	6.50
SOUTH	30.71	20.37	27.17	23.86
villages	33.84	22.16	31.17	27.48
sanitary districts	18.14	6.75	8.07	7.46
municipal areas	21.69	15.20	8.61	6.53
BMR - city core	6.90	3.70	3.11	2.40
BMR - suburbs	6.00	2.58	2.51	1.62
BMR - fringes	11.97	9.15	8.83	6.27
All villagess	36.16	27.34	35.75	30.60
All sanitary districts	14.76	13.47	18.55	15.31
All municipal areas	12.53	7.51	5.90	4.80

Note : income growth between 1986-88 in each subgroup is derived from the TDRI's model THAM-2.

prices will be maintained into the future. A reversion to the trend experienced between 1981 and 1986 would lead to a further deterioration in poverty.

3. Income distribution has not improved. this is because while agriculture has benefited from the increases in crop prices, the current boom is being pushed mainly by a rapid growth in manufactured exports. The manufactured export sectors are however located mostly in and around the greater Bangkok area (see TDRI, 1987 Year-End Conference paper "Prospects of Thai Economic Development"), and therefore incomes of the relatively better off have also increased rapidly.

4. It is not surprising that income distribution has not changed much over the last couple of years. Many factors that affect income and income distribution are long-term in nature. It is not easy for people to quickly adjust to regional disparities: nor is it easy for the distribution of human or physical assets to change quickly. Basically, There are some relationships between income distribution and the state of a country's development, and the real changes in income distribution occur over a longer term horizon.

Notes

[1] Farm households are classified according to size of utilized land. Small farmers are those occupying less than 15 rais (except for the upper north that those occupying less than 10 rais are small farmers, since the Northern traditional crops usually require less land) and the medium farmers are those having land between 15-30 rais (10-30 rais for the upper north and 15-45 rais for the northeastern farmers), and all the remaining are large farmer. The non-farm households are classified according to their real expenditures measured in 1978. Households that expend less than 3,000 baht (in 1978 price) are poor and those expend more than 3,000 baht but less than 5,200 baht are medium class, those expend more than 5,200 in real term are the rich class.

[2] The growth rates of household income obtained from the model are downward adjusted because growth rates of the consumer price index determined within the model is somewhat higher than the official rates.

APPENDICES

APPENDIX A

SHORROCKS' INDEX AND ITS PROPERTIES

This appendix provides some discussions about the properties of Shorrocks' index of degree zero (I) which is intensively employed in Chapter 2 and 4.

The followings are simplified proof of how the Shorrocks' index satisfies the four necessary requirements of an inequality measure.

Let y denotes a vector of income with n elements, then, the value of Shorrocks' index applied to this income vector is defined as

$$(1) \qquad I[y;n] = \frac{1}{n} \sum_{i}^{n} \ln(u/y_i)$$

where u is arithmetic mean income of vector y.

Property 1: Non-negativity

This property states that the inequality measure must be positive for all income vector and be zero if all elements in vector y are equal.

Proof Rewriting the Shorrocks' index in (1) as

$$I[y;n] = \frac{1}{n} \sum_{i}^{n} \ln(u) - \frac{1}{n} \sum_{i}^{n} \ln(y_i)$$

$$= \ln(u) - \ln(v)$$

where v is geometric mean of income in vector y.

It can be proved that the arithmetic mean of a set of positive numbers is always greater than or equal to the geometric mean and the equality occurs only when all numbers are equal. Thus

$$I[y;n] > 0$$

Property 2: Mean Independence

This property states that the inequality remains unchanged if all elements of vector y are multiplied by a positive scalar value, say k.

Proof $$I[ky;n] = \frac{1}{n}\sum_{i}^{n} \ln(ku/ky_i)$$

$$= \frac{1}{n}\sum_{i}^{n} \ln(u/y_i)$$

$$= I[y;n]$$

Property 3: Population Replication

This property states that the value of inequality is unaffected by any replications of income vector y.

Proof $$I[\underbrace{y,y,\ldots,y}_{r};rn] = \frac{1}{rn}\sum_{i}^{rn} \ln(u/y_i)$$

$$= \frac{1}{rn}.r.\sum_{i}^{n} \ln(u/y_i)$$

$$= \frac{1}{n}\sum_{i}^{n} \ln(u/y_i)$$

$$= I[y;n]$$

Property 4: Principle of Transfer

This principle states that inequality is reduced if an amount of income ($d > 0$) is transferred from a richer person (r) to a poorer person (p), while still leaving r richer than p.

Proof Let y_r and y_p be income of the richer and the poorer respectively, the conditions of transfer are that $y_r > y_p$ before the transfer

and $(y_r - d) > (y_p + d)$ after the transfer. Let x denotes the vector of income after transfer, then the differential between the measured inequalities after and before the transfer is

$$I[x;n] - I[y;n] = \frac{1}{n}\{\ln[u/(y_r-d)] + \ln[u/(y_p+d)]\} - \frac{1}{n}\{\ln[u/y_r] - \ln[u/y_p]\}$$

Since mean income are equal in both income vectors, we have

$$I[x;n] - I[y;n] = \frac{1}{n}\{\ln[y_r] + \ln[y_p] - \ln[y_r-d] - \ln[y_p+d]\}$$

$$= \frac{1}{n}\{\ln[y_r/(y_r-d)] - \ln[(y_p+d)/y_p]\}$$

By conditions that $y_r > y_r - d > y_d + d > y_p$ it can be shown that

$$y_r/(y_r-d) - (y_p+d)/y_p = 1 + d/(y_r-d) - 1 - d/y_p$$

$$= d/(y_r-d) - d/y_p$$

$$< 0$$

because $y_r - d > y_p$.

Therefore $\frac{1}{n}\{\ln[y_r/(y_r-d)] - \ln[(y_p+d)/y_p]\} < 0.$

That is, $I[x;n] < I[y;n]$ and the principle of transfer is satisfied.

Shorrocks's Index and the Decomposition of Inequality Change

To illustrate the decomposability of Shorrocks' index when applying to change of inequality, it is appropriate to use matrix notation. If there is *n* population subgroups, let define the followings.

Let define $P = [p_1 \; p_2 \; p_3 \; \ldots\ldots \; p_n]$

$W = [w_1 \; w_2 \; w_3 \; \ldots\ldots \; w_n]^T$

$M = [(u/y_1) \; (u/y_2) \; \ldots\ldots \; (u/y_n)]^T$

where

P is row vector of each subgroup's population share, with sum of all element equal 1,

W is column vector of each subgroup's 'within-group' inequality, measured by the Shorrocks' index, and

M is column vector of each subgroup's inversed relative mean income (defined by u/y_k ,where u is global mean income and y_k is group's mean income).

Then the formula of Shorrock's index can be rewritten as

$$I = PW + PM$$

where I is the Shorrock's Index for the whole group

The change in income inequality is measured by

$$\text{Change} = I_1 - I_0$$

where I_1 is Shorrock's index in time 1, and

I_0 is Shorrock's index in time 0.

And

$$\text{Change} = P_1W_1 + P_1M_1 - P_0W_0 - P_0M_0$$

$$= (P_1W_1 - P_0W_0) + (P_1M_1 - P_0M_0)$$

The total change of inequality can be considered as composed of 2 terms, namely, the first blacket is total change in the 'within-group' term and the second blacket is the 'between-group' term.

We can rearrange the 'within-group' component to reflect the source of change in inequality from each of its matrix component as follow.

$$
\begin{aligned}
(P_1W_1 - P_0W_0) &= (P_1W_1 - P_1W_0 + P_1W_0 - P_0W_1 + P_0W_1 - P_0W_0 + P_0W_0 - P_0W_0) \\
&= (P_1W_0 - P_0W_0) + (P_0W_1 - P_0W_0) + (P_1W_1 - P_1W_0 - P_0W_1 - P_0W_0) \\
&= (P_1W_0 - P_0W_0) + (P_0W_1 - P_0W_0) + (P_1 - P_0)(W_1 - W_0) \\
&= (P_1 - P_0)W_0 + P_0(W_1 - W_0) + (P_1 - P_0)(W_1 - W_0) \\
&= W_p + W_w + W_i
\end{aligned}
$$

where

$$
\begin{aligned}
W_p &= (P_1 - P_0)W_0 \\
W_w &= P_0(W_1 - W_0) \\
W_i &= (W_1 - W_0)(P_1 - P_0)
\end{aligned}
$$

The first term (Ww) is effect of change in income inequality within each group, the second term (Wp) is the effect of change in population share of each subgroup upon the total within-group inequality, and the final term (Wi) is the 'interactive term' between the two.

Likewise, the 'between-group' component can also be rearraged in the similar way.

$$
\begin{aligned}
(P_1M_1 - P_0M_0) &= (P_1M_1 - P_1M_0 + P_1M_0 - P_0M_1 + P_0M_1 - P_0M_0 + P_0M_0 - P_0M_0) \\
&= (P_1M_0 - P_0M_0) + (P_0M_1 - P_0M_0) + (P_1M_1 - P_1M_0 - P_0M_1 - P_0M_0) \\
&= (P_1M_0 - P_0M_0) + (P_0M_1 - P_0M_0) + (P_1 - P_0)(M_1 - M_0) \\
&= (P_1 - P_0)M_0 + P_0(M_1 - M_0) + (P_1 - P_0)(M_1 - M_0) \\
&= B_p + B_m + B_i
\end{aligned}
$$

where

$$B_p = (P_1 - P_0)M_0$$

$$B_m = P_0(M_1 - M_0)$$

$$B_i = (P_1 - P_0)(M_1 - M_0)$$

The first term (Bm) is effect of change in mean income within each group, the second term (Bp) is the effect of population restructuring upon the total between-group inequality, and the final term (Bi) is the 'interactive term' between the two.

Thus, according to any classification, inequality change is composed of these six component, or

$$\text{Inequality Change} = W_p + W_w + W_i + B_p + B_m + B_i.$$

Appendix B

The THAM-2 Model

THAM 2 (Thailand Agricultural Model II) is the dynamic, economy-side simulation models for the analysis of food production and distribution over the medium and long run. The models are formulated using an applied general equilibrium framework which attempts to apply general equilibrium theory to describe the working of actual economics. Such applications have their origins in the input-output models of Leontief and Johansen. This approach to modeling economic behavior is based on microeconomic theory which allows as many individual consumers and producers to be identified as plausible in the description of the economic process, and includes all sectors of the economy. Hence detailed information on the feedback effects of policies aimed at specific producers or consumers can be obtained and the impact of alternative policies or resource allocation evaluated.

In principle; there are two main components in the model: the supply component and the exchange component. The supply component is further divided into the production activities with a lagged price adjustment (most agricultural commodities) and the production activity which output is adjustable within a year (most non-agricultural products).

The output produced by both types of production activities are brought to the market. The exchange component of the model describes the demand-supply balancing mechanism of each market, in which an

activity can be switched from one market clearing situation to another, i.e., from an import or export situation to autarky and vice versa. This is known as regime switch.

In THAM 2, the country is divided into 5 main regions: Northeast, North, Central, South and Bangkok. The commodities are disaggregated into 26 commodities: 20 agricultures and 6 non-agricultures. The households are classified into 33 classes by regions, occupation and approximation of wealth. Finally, the production sectors are separated into 16 sectors by regions and types of commodities: agricultures, tradable non-agricultures and non-tradable non-agricultures. For simulation runs, social accounting matrix is used for providing some needed data and calculating some necessary parameters.

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