

DRAFT

**CHANGING SOURCES OF HOUSEHOLD INCOME AND
POVERTY REDUCTION IN RURAL ASIA, 1985–2004**

Keijiro Otsuka

Prepared for Policy Forum

*Agricultural and Rural Development
for Reducing Poverty and Hunger in Asia:
In Pursuit of Inclusive and Sustainable Growth*

Session E on “Growth and Structural Changes in Asian Rural Nonfarm Activities”

**Organized by
International Food Policy Research Institute (IFPRI)
and Asian Development Bank (ADB)
ADB Headquarters, Manila, Philippines
August 9–10, 2007**

DRAFT

Changing Sources of Household Income and Poverty Reduction in Rural Asia, 1985-2004

Keijiro Otsuka¹ and Jonna P. Estudillo^{2b}

Acknowledgment: This paper draws from four country studies that appear in a special issue of *Agricultural Economics* in November 2006. These studies are Estudillo, Sawada and Otsuka; Cherdchuchai and Otsuka; Nargis and Hossain; and Kajisa and Palanichamy. We thank the authors and the Foundation for Advanced Studies on International Development and the 21st Century Center of Excellence of the National Graduate Institute for Policy Studies in Tokyo, Japan for funding some parts of the data collection of those country studies.

Abstract

Using long-term household panel data in rural villages in the Philippines, Thailand, Bangladesh and Tamil Nadu (India), this paper attempts to describe the changing sources of household income and to identify major factors affecting the decline in poverty in rural Asia. We found that the most decisive factor directly responsible for poverty reduction is the increased income from rural non-farm sectors and urban labor markets. It is, however, important to emphasize that it was the rise in farm income associated with the Green Revolution that has enabled the farm households to invest in schooling of their children, who later found lucrative employment opportunities in the non-farm sector.

¹ Corresponding author: Foundation for Advanced Studies on International Development, 7-22-1 Roppongi, Minato-ku, Tokyo 106-8677, Japan; Tel. +81-3-5413-6030; Fax +81-3-5413-0016; Email: otsuka@grips.ac.jp

² Foundation for Advanced Studies on International Development, 7-22-1 Roppongi, Minato-ku, Tokyo 106-8677, Japan; Tel. +81-3-5413-6038; Fax +81-3-5413-0016; Email: jonna@grips.ac.jp

1. Introduction

It was believed in the 1970s and 1980s that high population pressure on closed land frontier is one of the major causes of rural poverty in Asia. High population pressure leads to a decline in the size of farmland and an increase in the incidence of landlessness, even though farmland is a major asset in rural households (Estudillo and Otsuka, 1999). While farmland has become scarce, agricultural wages remain low and the demand for agricultural labor is uncertain and limited. In addition, there has been an increasing acceleration in the utilization of labor-saving technologies, such as mechanization and direct-seeding, which further contributes to a reduction in agricultural labor demand. Indeed, David and Otsuka (1994) found that the Green Revolution in Asia has had only modest impacts on the demand for agricultural labor in contrast to its dramatic impacts on grain yield.

However, there has been a remarkable movement of households out of poverty in Asia amidst the unfavorable scenario of increasing scarcity of farmland and declining employment opportunities in agriculture. According to the Asian Development Bank (2006), the proportion of the population living on less than US\$1 per day declined from 20 to 14 percent in 1990 to 2003 in the Philippines, from 10 to 1 percent in Thailand, from 34 to 30 percent in Bangladesh, and from 42 to 31 percent in India. During this period, the importance of non-farm income increased visibly and the quality of human capital in terms of schooling improved appreciably. This paper aims to trace the changing structure of household income and to identify the processes by which the rural poverty has been declining in selected villages in Asia.

First of all, we confirmed that rural households shifted away from farm to nonfarm activities remarkably in response to the rising returns to labor in the nonfarm sector. Secondly, we observed that the younger and more educated children are more actively involved in the nonfarm jobs. Thirdly, and most importantly, we found that the Green Revolution is the major driving force behind the rise in investments in children's schooling through the increase in farm income, thereby contributing to the poverty reduction in the longer run. These findings suggest a sequence of long-term changes from the Green Revolution to increased farm income, increased investment in children's schooling, and increased supply of educated labor force to lucrative non-farm jobs, which contributed to the poverty reduction and the development of non-farm sectors.

This paper has three remaining sections. Section 2 traces the changes in the composition of household income and poverty incidence. Section 3 investigates the interrelationship between agricultural development and investments in children's schooling. Finally, Section 4 presents the summary and policy implications of our findings.

2. Changing household income sources and incidence of poverty

In order to investigate long-term changes in rural incomes and incidence of poverty, we use household-level panel data sets in four countries in Asia that cover the last two decades. In the Philippines, we use data from randomly selected 447 households in two villages each in Central Luzon and Panay Island (Estudillo, Sawada and Otsuka, 2006). These households were interviewed in 1985, 1992, 1997, 2001, and 2004. In Thailand, 295 households in three village each in Central Plain and North Eastern Provinces were interviewed in 1987 and 2004 (Cherdchuchai and Otsuka, 2006). Landless households were not included in the survey because there were very few of them in 1987. The Bangladesh panel data cover most parts of the country and collected information from randomly selected 1,239 households in 1988, 1,872 households in 2000, and 1,927 households in 2004 (Nargis and Hossain, 2006). The data sets from the Philippines, Thailand and Bangladesh are basically panel data, with the replacement of households whose heads passed away and left by their successors.

We use the pooled cross-section data collected every year in Tamil Nadu (India) in 1972-80, which are later replaced by three-year rotating panel data in 1981-2003 (Kajisa and Palanichamy, 2006). The Tamil Nadu survey used stratified random sampling based on farm size and includes only those farmers who own land, excluding landless households.

We find a large reduction in the size of operational landholdings of farm households and an increase in the proportion of landless households (Table 1). In the Philippines, the average farm size was 1.0 ha in 1985 but decreased to 0.76 ha in 2004. During the same period, the proportion of landless households rose from 22 to 24 percent. The changes are more drastic in Thailand, whereas similar but more modest changes are also found in Bangladesh. In Tamil Nadu (India), we present the data on the average farm size and proportion of landless households using the census data. This is because the Tamil Nadu survey used stratified random sampling based on farm size and excluded the landless households, as explained earlier. The census data show a small reduction in the average farm size from 1.0 to 0.95 ha. Against the background of such unfavorable changes as the shrinking farm size and increasing landlessness in rural areas in Asia, we found a sharp decline in poverty incidence.

We compare differences in income and poverty incidence between marginal areas, which are commonly characterized by unfavorable rainfed conditions susceptible to drought, and high-potential areas, which are mostly irrigated areas with gravity irrigation. While there was an increase in per capita income in both the high-potential and marginal agricultural areas, income increase was more remarkable in the latter (Table 2). Increase in income was, generally, brought about by the rise in non-farm income in the Philippines, Thailand, and Tamil Nadu (India) and the rise in income from nonrice crop and livestock and poultry propagation in Bangladesh.

The proportion of income coming from agricultural wage has declined in all areas except in the high-potential area in Tamil Nadu (India). This is explained to a large

DRAFT

extent by the decline in labor use in rice production resulting from the adoption of labor-saving technologies, decrease in real rice prices, and stagnant productivity. For instance, in the high-potential area in the Philippines, the labor use in rice production declined from 81 person-days per ha in the wet season of 1985 to 51 person-days in 2004. In the Philippines, there was an acceleration in the adoption of direct-seeding method, tractors, and threshers since 1985, whereas in Thailand, direct-seeding and large mechanization were already adopted as early as in 1987. In Bangladesh, there was a complete adoption of tractors and widespread use of threshers in 2004. Substitution of machine for hired labor is relatively easy because hired labor is engaged in simple tasks amenable to easy supervision (Hayami and Otsuka, 1993). Inasmuch as hired labor is supplied mainly by the landless poor and the near-landless farmers, who make up the ultra poor in the Asian villages, it is clear that reliance on agricultural labor markets alone will not make a significant contribution to income growth and poverty reduction.

The relative contribution of rice income has declined because of the declining rice prices coupled with a modest increase in rice yield since the mid-1980s. On the contrary, the contribution of nonrice farm income has risen indicating that the Asian farming systems have changed from the dominance of grain production to diversified systems with the production of high-value crops as well as livestock. Yet the increase in nonrice farm income is hardly the major driver of income increase because of its relatively small share in the total household income.

Non-farm income share in the Philippines and Thailand has increased dramatically, as their capita incomes have risen significantly. In the high-potential village in the Philippines, the per capita income more than doubled, while the non-farm income share has increased from 45 to 70 percent. Thus, there seems to be no doubt that the non-farm income is the major contributor to the overall increase in income.

Similar or even more rapid changes are found in the marginal areas of the Philippines. Because agricultural production is not as promising as in the high-potential areas, the households in the marginal areas have expanded their non-farm activities more actively to increase their income. As a result, the regional income gap has significantly declined. It must be pointed out that remittances, which are primarily sent by overseas migrants, account for nearly one-half of the non-farm income in the Philippines, attesting to the importance of overseas migrants in supporting the income of rural households in this economy.

The landless households in the Philippines have shifted their economic activities away from farm to non-farm so as to increase the total income in the midst of declining labor employment opportunities in rice farming. As a result, we found a remarkable movement out of poverty for the landless poor and a decline in the income gap between the landless and the farming households (Estudillo, Sawada and Otsuka, 2006).

A more dramatic example of a structure change in the composition of rural household income can be found in the marginal area of the northeast Thailand. The non-farm income share has increased from 21 to 74 percent in the period from 1987 to 2004.

DRAFT

Since the households reside in unfavorable areas for agricultural production, it is understandable that they raised their income by increasing their non-farm income share. Such a change, however, was made possible by the increased availability of non-farm jobs in the local city of Khon Kaen and Bangkok, as farmers in this region used to migrate to western regions to engage in the low-wage employment of sugarcane cutting. Thus, high-wage non-farm job has been substituted for low-wage farm jobs in unfavorable areas. In contrast, the non-farm income share in the high-potential areas increased more modestly from 10 to 47 percent in the same period.

Somewhat unexpectedly, per capita income in high potential areas is lower than in marginal areas in Bangladesh, particularly in 1988, even though rice income is higher in the former than the latter owing to the availability of irrigation. It is remarkable to observe that non-farm income accounts for a much larger share of total income in marginal areas in 1988, suggesting the decisive importance of the access to non-farm labor markets in determining the total income of rural households. Another important observation is a rapidly declining share of rice income, particularly in the marginal areas over time. In the high-potential areas, the total income has caught up with the marginal areas by increasing the non-farm income share. As in Southeast Asia, the share of agricultural wage income in Bangladesh has been very low and declining.

In Tamil Nadu (India), the per capita income in the marginal areas was less than half of the income in the high-potential areas in the mid-1980s. However, somewhat similar to the experience in the marginal areas of the Philippines and Thailand, the households in the marginal areas have increased their non-farm income share from 7 to 27 percent. In addition, the share of non-rice farm income, which consists of the income from the production of high-value crops, such as sugarcane and milk, increased in the marginal areas of Tamil Nadu. As a result, the per capita income in the marginal areas has increased from \$228 to \$623, thus reducing the income gap with the high-potential areas. Therefore, as far as Asian countries are concerned, the development of non-farm labor markets appears to increase the income of rural households, particularly in favor of the less favorable areas.

From our household data collected in a limited number of villages, it is difficult to identify the impacts of the proximity to cities and infrastructure on the household income. As far as Thai villages are concerned, the non-farm income share is higher in Northeast, which is far away from Bangkok, than Central Plain, and within each region the non-farm income share is the highest in the most remote, from the Bangkok or Khon Kaen, and the most unfavorable village. Although we cannot draw a definite conclusion, it seems to us that the remoteness has been overcome by the good road systems in this country and the desire of poor farmers to find non-farm jobs in unfavorable agricultural areas. It is also interesting to report that the Bangladesh study (Nargis and Hossain, 2006) found positive and significant impacts of electrification on non-farm income, but not on farm income. If the electrification is a reasonable proxy for the general infrastructure development, which is likely to be the case, these findings strongly suggest the importance of infrastructure in improving the access of farm population to non-farm jobs.

DRAFT

In all the four countries, we found a consistent decline in poverty and a decline in the regional income gap, which is brought about by the rise in the non-farm income. Interestingly, the decline in poverty and the rise in non-farm income are more remarkable in the marginal than in high-potential agricultural areas indicating that the initial income constraints brought by unfavorable production environment can be overcome by access to the non-farm labor markets. Overall, it is clear that the development of the non-farm sector and the increased access of households to such markets is the major driving force behind the reduction in poverty in rural villages in Asia.

3. Agricultural development and investments in child schooling

As illustrated in Figure 1, we hypothesize that the Green Revolution significantly increases household farm income through higher rice yield, higher cropping intensity, and higher rice prices because of improvement in grain quality. Household investments in child schooling, in turn, tends to rise with the increase in household income. The development of the non-farm sector induces households to invest in children's schooling because of the expanded non-farm labor employment opportunities that tend to increase the returns to schooling. Schooling investment can generate increased non-farm income and remittances in the long run, which can be supplemental sources of funds to finance additional investments in schooling of the younger generation. Indeed, the initial opportunity to increase household income, which was brought about by the Green Revolution, can lead to the virtual cycle of higher schooling investments in children, higher remittance and non-farm wage incomes, and, in some cases, overseas migration. Schooling investments may be a prerequisite of migration, suggesting a sequential human capital investment process.

Quisumbing, Estudillo, and Otsuka (2004), Cherdchuchai (2006), and Takahashi (2006) found that rural households invest a major portion of their additional income in the schooling of children, who later engage in rural non-farm jobs or migrate to cities to seek more lucrative employment opportunities in the Philippines and Thailand. A main source of the additional household income in the earlier years was found to be improved farm technology, e.g., the adoption of high-yielding modern varieties of rice. It is, therefore, reasonable to hypothesize that productivity growth in agriculture contributes to overall economic development by stimulating investments in the schooling of children in rural areas and, subsequently, supplying an educated labor force to the non-farm sectors.

The Asian experience shows that the Green Revolution has been able to break the vicious circle of poverty, sacrifice of schooling of children, and the choice of farming as a major occupation. Indeed, without the initial increase in crop income, Asian rural households could not have afforded to send their children to schools and allocate more time to non-farm activities, which has become more income-earning than farming.

4. Summary and policy implications

This paper explores the changing sources of household income and the decline in poverty in rural villages in four Asian countries. We found that households are able to move out of poverty amidst the increasing scarcity of farmland by diversifying their income away from rice to non-rice crops, livestock, and non-farm sources. Increased participation in non-farm activities is more pronounced among the more educated children, whose education is facilitated by an increase in farm income brought about by the Green Revolution. Thus, it is clear that agricultural development triggered the subsequent transformation of rural Asian economies by stimulating investments in schooling of the young generation. The major policy implication of this paper is that, in order to stimulate the development of the entire economy, it is imperative to develop agriculture, when the sector dominates the economy, with a view to stimulating investments in schooling of children and developing the non-farm sectors, so as to provide ample employment opportunities for the rural labor force.

References

- Asian Development Bank (ADB). 2006. Key Indicators. ADB, Manila, Philippines.
- Cherdchuchai, Supattra. 2006. "Income Mobility and Child Schooling in Rural Thailand: An Analysis of Panel Data in 1987 and 2004," Ph.D. dissertation, National Graduate Research Institute for Policy Studies, Tokyo, Japan.
- Cherdchuchai, Supattra and Keijiro Otsuka. 2006. "Rural Income Dynamics and Poverty Reduction in Thai Villages from 1987 to 2004," *Agricultural Economics* 35 (Supplement to issue 3): 409-423.
- David, Cristina C. and Keijiro Otsuka. 1994. *Modern Rice Technology and Income Distribution in Asia*. Boulder, CO: Lynne Rienner.
- Estudillo, Jonna P. and Keijiro Otsuka. 1999. "Green Revolution, Human Capital, and Off-Farm Employment: Changing Sources of Income among Farm Households in Central Luzon, 1966-94." *Economic Development and Cultural Change* 47 (3): 497-523.
- Estudillo, Jonna P., Yasuyuki Sawada, and Keijiro Otsuka. 2006. "The Green Revolution, Development of Labor Markets, and Poverty Reduction in the Rural Philippines, 1985-2004," *Agricultural Economics* 35 ((Supplement to issue 3): 399-407.
- Hayami, Yujiro and Keijiro Otsuka, 1993. *The Economics of Contract Choice: An Agrarian Perspective*. Oxford, UK: Clarendon Press.
- Kajisa, Kei and K.P. Palanichamy. 2006. "Changing Mechanisms of Income Dynamics over the Last Three Decades in Tamil Nadu, India," *Agricultural Economics* 35 ((Supplement to issue 3): 437-448.
- Nargis, Nigar and Mahabub Hossain. 2006. "Income Dynamics and Pathways out of Poverty in Bangladesh: 1988-2004," *Agricultural Economics* 35 ((Supplement to issue 3): 425-435.

DRAFT

Quisumbing, A.R., Jonna P. Estudillo, and Keijiro Otsuka, 2004. Land and Schooling: Transferring Wealth across Generations. Baltimore, MD: Johns Hopkins University Press.

Takahashi, K. 2006. "Determinants of Schooling, Occupational Choices, and Current Income: A Study of Children of Farm Households in the Philippines, 1979-2004," mimeo, National Graduate Institute for Policy Studies, Tokyo, Japan.

Table 1

Changes in farm size and percentage of landless households
in selected rural areas in Asia

Country	Average farm size (ha)		Percentage of landless households	
	1980s	2003/04	1980s	2003/04
Philippines	1.00	0.76	22	44
Thailand	4.24	2.42	0	30
Bangladesh	0.87	0.59	34	39
Tamil Nadu (India) ¹	1.01	0.95	na ²	na

¹Data are taken from the agricultural census in 1985/86 and 1995/96 (Government of Tamil Nadu, *Economic Appraisal*, Chennai, Government of Tamil Nadu).

²means not available.

Source: Estudillo, Sawada and Otsuka (2006), Cherdchuchai and Otsuka (2006), Nargis and Hossain (2006), and Kajisa and Palanichamy (2006).

Table 2

Composition of household income (%) and poverty incidence (headcount ratio)
in selected rural areas in Asia

Country	High-potential agricultural areas		Marginal agricultural areas	
	1980s	2003/04	1980s	2003/04
<i>Philippines</i> ¹				
Per capita income (PPP\$)	1,065	2,364	386	1,119
Agricultural wage (%)	13	11	30	7
Rice (%)	37	12	20	9
Nonrice farm income (%)	5	7	13	24
Non-farm income (%)	45	70	36	60
Incidence of poverty (%)	40	23	66	42
<i>Thailand</i> ²				
Per capita income (PPP\$)	2,014	4,617	959	2,543
Agricultural wage (%)	4	6	12	5
Rice (%)	66	26	54	7
Nonrice farm income (%)	21	22	13	14
Non-farm income (%)	10	47	21	74
Incidence of poverty (%)	51	12	70	21
<i>Bangladesh</i> ³				
Per capita income (PPP\$)	634	1,001	841	1,094
Agricultural wage (%)	14	8	11	4
Rice (%)	35	20	24	13
Nonrice farm income (%)	18	21	20	26
Non-farm income (%)	33	51	55	57
Incidence of poverty (%)	64	41	58	43
<i>Tamil Nadu (India)</i> ⁴				
Per capita income (PPP\$)	520	697	228	623
Agricultural wage (%)	11	28	17	3
Rice (%)	62	50	39	22
Nonrice farm income (%)	19	18	40	49
Non-farm income (%)	9	4	7	27
Incidence of poverty (%)	72	13	84	47

Source: Estudillo, Sawada and Otsuka (2006), Cherdchuchai and Otsuka (2006), Nargis and Hossain (2006), and Kajisa and Palanichamy (2006).

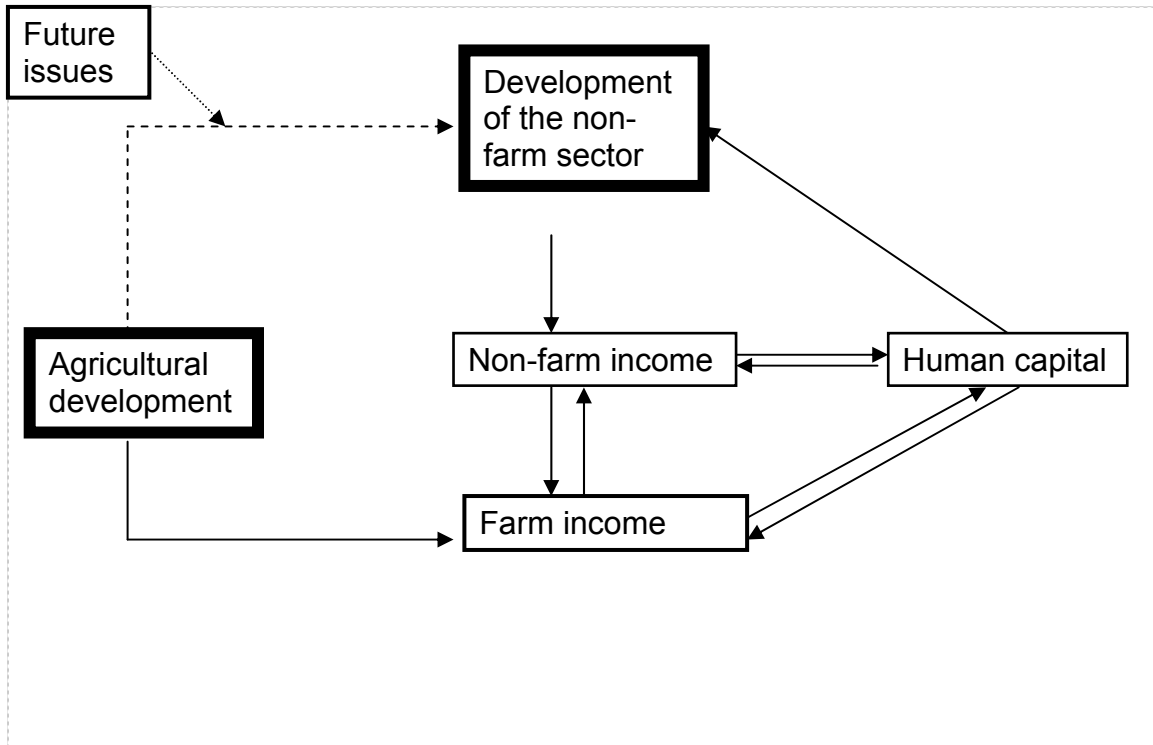


Figure 1

Interrelationship between agricultural development, non-farm sector, and human capital