

Rich Periphery, Poor Center: Myanmar's Rural Economy under Partial Transition to Market Economy *

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Abstract

In this paper, we investigate the behavior and welfare of rural households under transition from a planned economy to a market economy for the case of Myanmar. Myanmar's case is particularly interesting because her military regime has not disclosed detailed information on the country's unique attempts in preserving a number of discretionary measures, especially in land transactions and marketing institutions. From a sample household survey conducted in 2001 covering about 600 households with diverse agro-ecological environments, we found two paradoxes. First, income level is higher in villages far from the center than in villages located in regions under the stronghold of the central authority. Second, farming income is lower for farmers and villages with more emphasis on a paddy-based, irrigated cropping system than others. We show that these paradoxes of rich periphery and poor center can be explained by a principal-agent framework between local administrators and farmers, which incorporates as constraints the market and political institutions under the partial transition to a market economy.

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1 Introduction

The objective of this paper is to investigate the determinants of income disparity across regions and among households in rural Myanmar (formerly Burma). Based on a primary dataset collected from eight agro-ecological regions in 2001, we show two paradoxes. First, income level is higher in villages far from the center than in villages located in regions under the stronghold of the central authority, mainly due to the disparity in the development of commercial agriculture and the availability of non-agricultural employment opportunities. Second, farming income is lower for farmers and villages with more emphasis on a paddy-based, irrigated cropping system than others. This is in sharp contrast to Asian experiences in which irrigation investment in paddy production contributed to the rapid improvement in agricultural productivity and farmers' income (Jimenez 1995). The two paradoxes can be summarized as "rich periphery, poor center."

We show that underlying these paradoxes lies a distortion created by agricultural policies. Myanmar is in a partial transition from a planned economy to a market economy. Market incentives, which were introduced during the late 1980s, led to a substantial increase in agricultural production and farming income at the beginning. Nevertheless, the state has maintained a number of discretionary measures, especially in land transactions and marketing institutions for paddy/rice.¹ A strong orientation for maximizing paddy output lies under the state-led market economy approach, which led to stagnation in rural income. We attempt to understand why these paradoxes of rich periphery and poor center can be sustained, borrowing an intuition from a principal-agent framework between local administrators and farmers, which incorporates as constraints the market and political institutions in the study villages.²

Myanmar's case is particularly interesting as a case study of regime transition in rural developing countries because her military regime has not disclosed detailed information on the country's unique attempts in preserving the policy intervention and their effects on household welfare. Except for a survey conducted by the International Rice Research Institute in 1996 (Garcia et al. 2000) and a couple of village surveys conducted by Japanese economists (see below), Myanmar's rural economy has remained under a thick veil. The first contribution of this paper is, therefore, to present a cross-sectional view of the behavior and welfare of rural households based on a primary dataset covering more recent period, more detailed information, and geographically more diverse regions.

¹ In this paper, "paddy" means unhusked paddy and "rice" means husked, cleaned rice for consumption.

² An econometric test of the model is left for further study. Our argument is supported by informal discussion with villagers. More comprehensive interviews on political issues conducted by Thawngmung (2001) also support our argument regarding the administrative and political aspects of agricultural policies at the village level in rural Myanmar.

In the existing literature, Takahashi (2000) and Garcia et al. (2000) are exceptional in analyzing several agro-ecological regions and the whole household economy. This paper is distinguished from Takahashi's (2000) study, which analyzed the early stage of transition (1987-95) when the new incentives were the most effective. The study period of this paper is after this stage. The paper by Garcia et al. (2000) shares the motivation with ours, focusing on the income disparity across regions and cropping systems in Ayeyarwady Delta. They found that the average income was lower in the irrigated villages with newly adopted, high-cost irrigated paddy farming, which is similar to our findings, but attributed the finding to the transient nature of technology adoption ("adoption of these technologies in the long run ... is expected to increase yield and farm incomes in the irrigated villages", Garcia et al., 2000, p.4675). The most important finding of this paper is that the low income of input-intensive, irrigated paddy farming has been sustained since then and, therefore, cannot be regarded as transitory. Furthermore, unlike their study, the study region of this paper include non-paddy cropping systems outside the delta.

The existing studies that examine the effects of agricultural policies on village and household economy in Myanmar for a period similar to this paper include Okamoto (2001, 2003), Fujita and Okamoto (2000), and Fujita (2003). All of them are case studies of paddy villages located close to Yangon, the national capital. This paper is unique in that we examine not only similar villages but also villages in the periphery and villages based on non-paddy crops. Regional disparity found in this paper has not been demonstrated elsewhere with detailed household-level analysis.

The paper is organized as follows. Section 2 describes agricultural development and policies in Myanmar, thereby giving the background of this study. Section 3 characterizes study regions and sample households. In the remaining three sections, the nature and determinants of income disparity are investigated. Section 4 treats the total household income with a short discussion on income poverty found among the sample households. Section 5 investigates the farming aspects and Section 6 examines the non-agricultural spheres. Section 7 concludes the paper with a discussion on the political-economy mechanism that sustains the paradoxes.

2 Myanmar's Economy and Agricultural Policies

Myanmar, whose population is close to 50 million, is endowed with bountiful land resources (approximately 0.7 million km²), indicating a favorable man-land ratio in the Asian context. Industrial development is under process, but currently the agricultural sector still remains dominant in the national economy (Table 2.1). A substantial progress has been achieved in the sown acreage,

production, and exports, but achievements are far short of its potentials.

The partial success is the most clearly shown in paddy/rice production trends. Rice is the staple food in Myanmar, accounting for 20% and 22% of the total consumption expenditure in urban and rural areas respectively (national averages, according to 1997 household expenditure survey [CSO 2002]). According to the official statistics, paddy production increased rapidly during the period from the end of 1980s to the middle of 1990s (Figure 2.1). Nevertheless, the yield level is still around 3 tons per hectare, indicating a gap between Myanmar and Asian neighbors such as Vietnam. There are two main factors explaining the production drive in the early 1990s. The first is the agricultural marketing liberalization since 1987 (followed by the official abandonment of the Burmese Socialism in 1988) and the second is the Summer Paddy Program since 1992/93.

Under the first reform, the state sector reduced the amount of statutory government procurement and gave farmers more freedom to sell the surplus in private markets. Although rice export was still under the state monopoly, domestic paddy/rice marketing was deregulated, resulting in active participation by private traders. Under the deregulated system, the main purpose of paddy procurement is to supply rice to government employees, hospitals, and other social welfare institutions at subsidized price. Since the market prices were usually much higher than the procurement price, the reform in the late 1980s gave a substantial incentive to produce surplus rice.

The procurement quota is fixed in quantity per acre of land designated as paddy fields. In main paddy-growing areas, the quota is approximately 20% of the gross produce while it is lower in other areas. Since the quota does not respond to farmers' actual acreage under paddy or actual output of paddy, it may seem to be a non-distortionary implicit tax. In reality, however, the system adversely affects agricultural production in Myanmar. The first route is through its disincentive effect on quality. The quality of rice in the public procurement/rationing is so low that it is not accepted in the foreign markets and urban population in lower middle class or higher sell the rice to livestock feed dealers on their salary day. The second route is through its effects on farmers' cropping choice. This is discussed in detail in the following sections.

Under the Summer Paddy Program, production of so called "summer paddy" (dry season paddy) was promoted by investing in irrigation. Traditionally, the main paddy season in Myanmar was the monsoon season, which brings sufficient (and frequently too much) water to paddy crops in rainfed fields. Under the program, a number of small to medium scale dams were constructed in some areas, private investment in small scale diesel pumps was promoted in others, depending on the topology with respect to water availability during the dry season, and the additional output from summer

paddy was exempted from the procurement. The official statistics in Figure 2.1 show a remarkable increase of both area and production of paddy in the early 1990s. The main driving force of this increase was the increased acreage of summer paddy with irrigation (Garcia et al. 2000). Table 2.1 also shows the recent development in irrigation.

Since the late 1990s to the early 2000s, the impetus of summer paddy drive was lost due to the exhaustion of easy irrigation potentials and low paddy prices for producers (Fujita 2003). It is suspected that the official production figures for this period in Figure 2.1 are overestimates (Fujita 2003). Due to the ban on the private sector's rice export, low quality of rice in the public marketing channel, and the managerial inefficiency of the state trade agency, rice export from Myanmar did not increase as fast as the increase in output, resulting in lower market prices of paddy for farmers. The market premium over the procurement price fell down from the range 50 - 120% to approximately 30% in the early 2000s. This implies that the disparity between international and domestic market prices widened. According to Fujita's (2003) estimates, the domestic price in 2001 was almost half the price of Thai rice (25% broken) evaluated at the market exchange rate.

The main problem was the institutional rigidity when price incentives were eroded. In Myanmar, farmland belongs to the state and farmers are given cultivation rights only. Farmers do not have the official right to exchange, transfer, lease, inherit, or mortgage their land, although children of a farmer are usually given the right to cultivate their parents' land and unofficial transfers among non-relatives are frequent. To maintain the cultivation rights for paddy fields, farmers are obliged to grow paddy crops and deliver the designated amount of paddy to the government procurement system, regardless of the profitability of paddy crops. It is true that more freedom is allowed in crop choices under the current system than under the Burmese Socialist period until 1988, but there exists an enforceable threat on villagers not to deviate too much from crop plans, especially with respect to paddy.³

Another aspect related with the state ownership of land is the existence of a large pool of landless, non-farm households in rural Myanmar. Land is not distributed equally to all residents in villages. In distributing land use rights, a minimum size for the optimal use of a pair of bullocks (its actual acreage depends on villages) has been considered. Only those households who were given the rights are officially registered as farm households. The rest have to depend on farm households as agricultural laborers or to find non-agricultural jobs. The share of landless, non-farm households in

³ Each parcel of farmland was classified into one of the six categories: paddy fields, dry land for upland crops, alluvial land, garden land, nipa palm land, and shifting cultivation land. The classification is almost permanent, implying that a garden land remains a garden land even the farmer grows paddy on it, for

villages is 20 to 50% typically.

To summarize, the policy environment surrounding the study villages is characterized by four elements inherited from the Socialist period: state ownership of land, state procurement of major crops,⁴ crop planning by the state, and the state monopoly of international trade of rice (Takahashi 2000, Fujita 2003). Because of the economic distortion created by these elements, the transition of rural economy in Myanmar from a planned economy to a market economy has been partial. A strong orientation for maximizing paddy output, with little consideration for farmers' income, lies under the state-led market economy approach.

3 Study Villages and Sample Households

3.1 Study Villages

A survey of sample households belonging to eight purposively selected villages in Myanmar was conducted in June-October 2001. Table 3.1 shows the characteristics of eight study villages.⁵

The first two villages on the delta (DELTA1 and DELTA 2) and the third village (DRY1) represent the core regions of paddy-based agricultural development in Myanmar. Three villages are different with respect to irrigation development and crops other than paddy. DELTA1 is a showcase to evaluate the Summer Paddy Program because almost all the paddy fields were under summer paddy cultivation since the early 1990s using diesel pump water. In DELTA2, summer paddy production was introduced in 1999 when a small dam was built nearby but the canal irrigation system was still under construction at the time of our survey. DRY1 is located in the Mandalay Basin, which has been one of the central granaries and the centers of commercial crop production in Myanmar due to its long history of canal irrigation dating back to the dynasty period of Burma..

The other five villages represent regions outside the paddy-based agricultural development. DRY2 and DRY3 represent rain-fed agriculture, contrasted by the existence of paddy farming. Complicated

example. The policy of crop planning is the most strictly applied to paddy fields.

⁴ In addition to paddy, so-called "industrial crops" are also subject to the state procurement system. The industrial crops include cotton, sugarcane, jute, and rubber. State enterprises or agencies exist for each crop to procure the produce from farmers. The objective of procurement of these crops is to provide constant supply of raw materials to the state-owned factories at low prices. Rubber and jute are also exported. The government attempted to extend the procurement system to pulses, which recorded a remarkable increase in export during the 1990s initiated by private traders (Okamoto 2001), in 1999/2000 and 2000/01, but the attempt was abolished after two years of experiments.

⁵ In the table, "Villagetract," which is the smallest administrative unit in rural Myanmar, is referred to as "village" in this paper. A villagetract usually contains several natural villages.

crop mixture consisting of pulses and oilseed crops is observed in both villages. The weather and vegetation are similar to those observed in semi-arid, Deccan villages in India (Walker and Ryan 1990). Intercultivation is also popular. HILL1 and HILL2 villages represent vegetable-based development in hilly regions. HILL1's agriculture includes small scale vegetable growing on the floating plots on Inya Lake. HILL2 is more specialized in vegetables grown on upland fields. The eighth village, COAST, is from the coastal region in Southern Myanmar, where tropical agroforestry (rubber, fruits, cashew, etc.) is developed. Small-scale rubber estates are run by peasant farmers in the study village together with paddy fields.

Thus, the eight study villages represent the diversity of the ecosystems observed in Myanmar, classifying into two broad groups (the first three and the last five) if we focus on paddy versus non-paddy based cropping systems.⁶ On the other hand, in the context of Burmese political history, the first five represent the "center" while the last three represent the "periphery." The former is inhabited by local Burmese people and has been under the stronghold of the central authority throughout the history of Burma. In the field, we felt more the enforcement of the paddy production maximization policies. In contrast, the latter is inhabited by non-Burmese or migrant population and far from the central authority.

In choosing the specific village in each region, one of the authors (Fujita) visited a number of villages before the survey so that the study villages would represent each region. As far as statistics on cropping pattern and land distribution indicate, our intention was achieved. After the survey, however, we found that Village DRY2 is exceptionally less poor in the region, thanks to recent rural development policies including micro credit schemes. For other seven villages, we do not have such concerns. The survey year 2001 was to be remembered as a year when the contradictions of Myanmar's paddy/rice policies reached their peak. Paddy prices in private markets recovered after the year, although marginally at the time of this writing. Villages DRY3 and HILL2 were hit by adverse weather so that their farming income should be affected as well. These factors should be considered when we interpret the survey results in the following sections.

3.2 Survey Methodology

From each study village, sample households were chosen from the complete household list to represent the farmland distribution within the village. Therefore, the sample share of households registered as "Farm" is higher than the population share (Table 3.2). A total of 521 households were

⁶ The existing studies (see Introduction) cover villages comparable to DELTA1 and DELTA2, except for the study by Takahashi (2000), who surveyed villages in the dry zone and in hilly regions as well.

surveyed in the eight villages: 341 households are registered as "Farm" households and 180 are "Non-Farm" households officially.

Households registered as "Farm" households are given cultivation rights to farmland that is officially belong to the state. Because of inter-vivo inheritance or tenancy contracts, not all them actually cultivate their land and some of the households registered as "Non-Farm" households do cultivate farmland. The latter category is shown as "Non-Farm with farmland" in the table. We do not distinguish in this paper those households registered as "Farm" by their actual cultivation status. This is because their social and economic status is similar regardless of whether or not they cultivate their farmland actually. They belong to a class of landed farmers in rural Myanmar.

Households registered as "Non-Farm" are classified into three types in this paper. The first is the de facto farmers: "Non-Farm with farmland" (the total sample size is 14 out of 180, see Table 3.2). The rest are divided into those households whose main income source is agricultural labor ("Non-Farm, Agri. labor" in the table) and those whose main income source is non-agricultural activities ("Non-Farm, Non-agri." in the table). There are 107 "Non-Farm, Agri. labor" households and 59 "Non-Farm, Non-agri." households in our sample.

Among the non-farm, agricultural laborer households, two types of labor contracts are of importance in rural Myanmar. Daily hired laborers are usually paid in cash for a well-specified farm operation. In contrast, seasonally hired laborers are paid for a cropping season by cash, paddy, clothes, etc., and are responsible for various farm operations, just like family workers. Details of the contracts differ from village to village, from operation to operation, and over time (Takahashi 2000). In this paper, all the non-cash payments including the imputed value of meals are included as the income from daily or seasonally hired labor on the farm.

A structured questionnaire was used for all households, asking household rosters (age, sex, education, working status, earnings, etc.), household assets (land, livestock, household and farm equipment, etc.), consumption (rice management, etc.), and debt and credit including informal transactions. When households operate farmland, another part was added, asking cropping patterns, use of hired labor, cost of production of major crops, and the disposal of output including both public procurement and actual sales to private agencies. Household heads or other relevant persons were interviewed by Myanmar investigators, checked by the authors on the spot to ensure internal consistency and data quality.

3.3 Characteristics of Sample Households

Table 3.3 shows the demographic characteristics of the sample households. The average household size is 5.5 persons. Almost all households in the sample are nuclear families. Therefore, the variation in household size comes from the variation in the number of co-resident children. The majority of the household heads are educated either at monastery or at modern schools. The only exception is Village HILL1, where more than 20% of household heads are without any education. The average schooling years for those attended modern schools are not very high, corresponding to the primary level. If we look at children at the schooling age, the primary enrollment ratio is as high as almost 100% in all the villages.

Asset ownership in terms of agricultural machinery and household equipment is in poor status by the Asian context. No households owned four-wheel tractors. Two wheel power tillers are on the way to spreading. Bicycles are common among villagers but motorcycles and four-wheel vehicles for transportation are very rare. Because all the sample villages (and the majority of villages in Myanmar) are not electrified, TV or VCR owners (using batteries) are very rare. Livestock are the main source of assets. The majority of sample farmers own draft animals and a number of sample households (both farm and non-farm households) keep pigs.

Utilizing these physical capitals and human capitals, sample households make their livelihood. We describe it by focusing on the household income and allocation of these capitals. In Section 4, the total household income is analyzed. Two important income sources, i.e., crop income and non-agricultural income, are discussed separately in sections that follow.

4 Level and Distribution of Household Income

4.1 Level of Household Income

We follow the standard definition of household income (Grosh and Glewwe 2000), which is defined as the sum of wage/salary receipts including the imputed value of in-kind payment such as meals and rice, the non-agricultural self-employment earnings (gross revenue minus actually paid costs), agricultural self-employment earnings (sum of the value of output minus actually paid costs including the imputed value of in-kind payment), and net receipts of non-earned income (in case of payment such as taxes and license, it has a negative sign). In the study region, non-cash transfers are frequent. The most important among them are the value of paddy produced by farmers and consumed by themselves and the value of in-kind payment to workers. Market prices within each

village were used to impute the value of these transactions.

Table 4.1 shows the level of household income thus estimated. Overall averages are 183,000 Kyats per household and 36,000 Kyats per person.⁷ If we convert them by market exchange rate at 650 Kyats/US\$, they become \$280 per household and \$55 per person per year. They are indeed low but not much different from the average villages in rural Myanmar. If we convert them by rice prices in Yangon market at 56 Kyats/kg, they become 3300 kg per household and 640 kg per person per year, which are not so miserable among the low income countries in the developing world, although we have to be careful in this calculation because the domestic rice price was much below the international price in Myanmar.

Household income is the highest in Village COAST, followed by Villages DRY1 and DRY2.⁸ Village DRY3 has the lowest income. Both DELTA1 and DELTA2 have income less than the overall average. HILL1 and HILL2 are in the middle. The ranking is similar when per-capita income is compared. Among household types, non-farm, agricultural laborer households are associated with the lowest income, followed closely by "Non-farm, with Farmland" households. The highest income per capita was recorded for non-farm, non-agricultural households.

Across villages and household types, farm households in DRY1, DRY2, and COAST are much better-off than in other villages. The income level of farm households in DELTA1 and DELTA2 is again lower than the overall average. This is against the view that irrigation investment in paddy production will contribute to the rapid improvement in farmers' income. Non-farm, non-agricultural households in DRY1 and COAST are much better-off than in other villages. Non-farm, agricultural laborer households are worse-off than farm households and than non-farm, non-agricultural households in general. Exceptions are found in HILL1 where non-farm, non-agricultural households are worse-off than agricultural laborer because non-agricultural earning opportunities are limited in this village.

4.2 Income Inequality and Poverty

Inequality measures of total household income are shown in Table 4.2. Among the villages, Villages

⁷ In the table, a simple number of household members was used to convert figures into per-capita terms. The use of adult equivalence is left for further exercise.

⁸ Samples in Village COAST include an exceptionally rich household. It belongs to the non-farm, non-agricultural household category and runs a transport business using their own vehicles. However, excluding this household does not alter the relative ranking among villages in Table 4.1. Also, since this household is demographically large, per-capita income of this household does not seem to be an outlier.

COAST and DRY2 are associated with the highest inequality level. Two villages in the delta and two villages in the hilly regions have the lowest inequality level. DRY1 and DRY3 are in between. It seems that there is a tradeoff between higher average income at the village level and intra-village variation of income. Among household types, farm households and non-farm, non-agricultural households not only have higher income on averages but also their income is associated with large inter-household variation. We investigate the source of these variation, focusing on each income source below.

Income poverty measures characterize the lower part of income distribution. In Myanmar, there is no official poverty line. Because of multiple exchange rates and the non-availability of disaggregated household expenditure data, it is not feasible to apply the World Bank's poverty line of one PPP\$ per day. In this study, we adopt our own poverty line that is equivalent to 400 kg of rice per person per year. Assuming per capita rice (and its equivalents) consumption 200 kg per person per year, the poverty line here implies that 50% of their income is spent on basic foods. Our impression is that this poverty line is close to the one used by Garcia et al. (2000) but likely to be much lower than the WB's \$1/day poverty line.

Based on this poverty line, our estimate for the poverty headcount index for the sample households (without weighting to reflect sampling) was 42.8% (Table 4.2). The comparison of villages shows an interesting contrast with the ranking of per-capita income shown in Table 4.1. Among the top three high income villages (DRY1, DRY2, and COAST), only DRY1 and COAST have poverty rates lower than the overall average. In DRY2, because of high inequality, poverty rate is also high despite its high average income. Within the delta, DELTA1's poverty rate is higher than the average while DELTA2 has the lowest poverty rate among the eight, due to DELTA2's very low inequality level. DRY3, the village with the lowest average income is also associated with the highest poverty rate. Other poverty measures such as poverty gap index and squared poverty gap index also show a similar pattern.

4.3 Household Income by Sources

Table 4.3 shows household income classified into five major income sources: (1) self-employment income from agriculture, (2) agricultural wage income (daily hired), (3) agricultural wage income (seasonally hired), (4) non-agricultural income, and (5) unearned income transfer (net receipts of non-earned income). Among household types, by definition, "Farm" households have the highest income from agricultural self-employment and "Non-farm, Agri. labor" households have the highest income from daily hired farm wage and from seasonally hired farm wage. More interestingly, non-

agricultural income is a major source of income for all types of households. Even the dependence of "Farm" households on non-agricultural income is as high as 21%.

The composition of income is strikingly different among villages. Self-employment income from agriculture is the highest in Villages DRY1 and DRY2 and the lowest in DRY3. Although not shown in the table, intra-village variation of this source of income is also high.

Seasonally-hired farm labor income is important in Village DELTA2. In this village, income from this source is as high as the daily hired farm labor income.

The level of non-agricultural income also varies widely among villages. By comparing Tables 4.1 and 4.3, it is clear that villages with higher agricultural self-employment income and with higher non-agricultural income are associated with higher per-capita income. Therefore, a more disaggregated analysis of these two income sources is necessary. This is the task of the next two sections.

5 Land Allocation and Agricultural Income

5.1 Cropping Pattern of Sample Farmers

The self-employment income from agriculture is the sum of crop income, livestock income, agricultural machinery rental income, land rent income, and backyard crop income. Among them, the crop income accounted for as high as 98.6% of the total. Therefore, in this section, land allocation among various crops and determinants of crop income are investigated.

Because sample households grow various crops, we divide them into 6 categories:

Paddy: This is a staple food with heavy policy interventions (Section 2). Among them, the distinction between summer paddy, which has expanded recently with irrigation and is intensive in input use, and other types of paddy (mainly, monsoon paddy grown on designated paddy fields) is important.

Pulses: These are important food. Among pulses, production of green gram and black gram has been expanded rapidly in recent years, driven by price incentives derived from export by private traders.

Oilseed crops: Edible oil is essential in Myanmar diet. Sesame and groundnut are traditionally the most important oilseed crops. Their cultivation is concentrated in the dry zone.

Vegetables: Various kinds of vegetables are grown in Myanmar. No direct intervention by the state.

Industrial crops: In the study villages, sugarcane, cotton, and rubber are grown. Farmers are obliged to deliver specified quantities to state-owned enterprises at the procurement price.

Others: In the study villages, non-paddy cereals and fruits are important crops classified as "Others" in this paper.

Table 5.1 shows the average farm size and cropping patterns. The size of paddy field per farm household⁹ is larger in Villages DELTA1 and DELTA2. There is no paddy field in Village DRY2. The total farm size is larger not only in the delta villages but also in Villages DRY2, DRY3, and HILL1. Cropping intensity is quite high, especially in DRY2 where complicated intercultivation is practiced.¹⁰

Among the major crop groups, paddy occupies more than 60% in three paddy-based villages (DELTA1, DELTA2, and DRY1). Among them, DELTA1 is characterized by the least diversified cropping pattern: monsoon paddy followed by summer paddy. In contrast, in DELTA2 and DRY1, not all the paddy fields were cropped with summer paddy but some fields were cropped with pulses (DELTA2) and vegetables (DRY1). All the other five are associated with diversified agriculture. Among them, paddy shares were higher in DRY3 and COAST than in the other three.

5.2 Profitability of Crops

In Table 5.2, crop income per household is shown. Crop income per farm household is the highest in DRY2. DRY3 and DELTA1 have the lowest crop income per household. Normalized by the farm size, crop income per farm area is higher in DRY1 and HILL2 followed by DRY2. DRY3, DELTA2, and DELTA1 have the lowest crop income per acre. By comparing Tables 5.1 and 5.2, it seems that paddy cropping is associated with lower income and vegetables (and oilseed crops and industrial crops to some extent) are associated with higher income per acre.

The association is observed more clearly *within* villages. We calculated intra-village correlation coefficients between the average crop income per acre of the farm (denoted as x) and cropping

⁹ In this section, farm households without a quotation mark indicate households with positive crop acreage during the survey year. To indicate households who are registered as farm households, we denote "Farm" households.

¹⁰ In calculating crop acreage, a field intercultivated with multiple crops are divided proportionally to the number of plants.

patterns (share of the acreage under each crop group to the gross cropped area). First, in all villages, the coefficient correlation between x and the paddy share was negative. It was statistically significant in DELTA2, DRY1, DRY3, HILL2, and COAST. There is no meaningful variation in DELTA1, since most farmers grew monsoon paddy and summer paddy only, while no paddy was grown in DRY2. In DELTA2, the coefficient correlation between x and the pulses share was 0.448. In DRY1, the coefficient correlation between x and the vegetables share was 0.555. Therefore, in the major paddy growing regions, farmers who did not grow much paddy on paddy field during the summer season and grew more commercial crops instead were better-off. This indicates that the current policy of maximizing paddy output puts a heavy burden on farmers in the major paddy-growing regions. The reason of intra-village variation is explored in the final section.

In the other five villages that are non-paddy-based, the coefficient correlation between x and the vegetables share was 0.551. However, in these regions, it is not always the case that increasing paddy acreage competes with vegetables directly, because vegetables are usually grown on farmland not designated as paddy fields. Even then, the allocation of labor and efforts in non-paddy crops should be adversely affected when paddy acreage is increased. In DRY3, where such conflicts are the largest, the coefficient correlation between x and the paddy share was -0.529. Therefore, in the minor paddy-producing regions as well, the current policy of maximizing paddy output puts a heavy burden on farmers.

5.3 Structure of Production Costs

Then why some crops deliver high income per acre while others do not? To investigate this, we collected detailed information on the cost of production of major crops from the subset of sample farmers. The questionnaire includes detailed accounting of the use of daily hired labor, seasonally hired labor, family labor, hired and family-owned animals, hired and family-owned machinery, formal and informal credits used for production, etc. Table 5.3 summarizes this information for the crop in a village when more than five observations were collected. Although not relevant for income calculation, estimating profits through subtracting opportunity costs of owned factors is important in evaluating the crop profitability. In other words, crop income discussed above is the sum of profit (operator's surplus) and the imputed value of owned factors.¹¹

In case of paddy in major paddy-producing regions (Panel A of Table 5.3), the contrast between summer paddy (SP) and monsoon paddy (MP) is worth mentioning. In Village DELTA1, although output value per acre is much higher for SP than for MP, value-added, income, and profit per acre are

similar. This is because SP in DELTA1 is irrigated by pumps, which is intensive in the use of diesel oil. Because of this, SP is not very attractive for farmers, although it is attractive for local administrators because of higher yields per acre. In Village DELTA2, profitability of MP, late MP, and SP are similar. In Village DRY1, because output value per acre is much higher for SP than for MP, value-added, income, and profit per acre are also higher than for MP. This is because SP in DRY1 is irrigated by canals, for which farmers pay little. When sufficient observations are available, the cost of production data were divided into large-scale farmers and small-scale farmers. In no case, large farmers are able to produce higher value-added or income or profit per acre than small farmers, indicating the absence of a positive scale economy.

In the table, final rows show the profitability figures when all the output is evaluated at market prices. In other words, the difference between these and those above shows a direct effect of the procurement system. Because market prices are higher than the procurement price, the figures in final rows are mostly larger than the figures above. Nevertheless, the difference is very small. This is because the survey year was a trough year of domestic market prices of paddy. If we re-evaluate the profitability using market trend prices, the income and profits per acre from paddy production become much higher (Fujita 2003). Since domestic prices of current inputs such as fertilizer, diesel, and chemicals were close to their international prices, the upward adjustment of imputation price for paddy suggests the impact of repressing domestic rice prices below the international price level.

In contrast to the cases in major paddy-growing regions, paddy production in minor regions is more like a losing job (Panel B of Table 5.3), except in COAST, where higher paddy prices due to the geographic isolation improved the profitability. In DRY3, where monsoon paddy is grown under erratic rainfall but supplemented by irrigation from small reservoirs, income per acre is positive but much smaller than those observed in villages in Panel A. In HILL1, where monsoon paddy is grown on the coastal edge of a lake, income level is similar to DRY3 but profits are negative. The worst situation is found in HILL2, where monsoon paddy is grown on tiny paddy plots in hill valleys or as an upland field crop, income per acre is close to zero on average. Growing paddy in this village is a loss of efforts but the paddy output maximization policy gives farmers a pressure to continue paddy production. The upward adjustment of imputation for paddy, as in the main paddy regions, improved the profitability of paddy cultivation but still far short of reaching parity with non-paddy crops (see below).

In Panel C of Table 5.3, the cost of production per acre is shown for non-paddy crops. Almost all the crops in the table are associated with income per acre much higher than those from paddy crops.

¹¹ We do not estimate the factor payment to land at all. This is left for further analysis.

Among them, pulses in DELTA2 and oilseed crops and vegetables in DRY1 compete directly with summer paddy because they are also grown on paddy fields. By growing more of these crops instead of growing paddy to the limit, farmers are able to earn more from farm management.

6 Labor Allocation and Non-Agricultural Income

The non-agricultural income sources observed among the sample households are diverse. We divide them into 11 categories:

Type 1: Self-employed as fisherman (primary sector)

Type 2: Self-employed in collecting forest products (primary sector)

Type 3: Household enterprises in agro-based manufacturing

Type 4: Self-employed in rice mills

Type 5: Self-employed as artisan (carpenter, craftsman)

Type 6: Self-employed in trade business (agricultural broker, livestock trader, shopkeeper, vender)

Type 7: Self-employed in transport business

Type 8: Employee as daily laborer (construction. etc)

Type 9: Employee in shops/factory/company

Type 10: Employee as public servant including teacher

Type 11: Others

The majority of the workforce included in the sample households are employed in agriculture as their main occupation (Table 6.1). The overall percentage of those employed in non-agriculture is 15.2%. The share is higher than the overall average in DRY1 and COAST. If we look at secondary jobs, non-agricultural jobs are more frequent (the percentage of those employed in non-agriculture is 52.6%).

In Table 6.2, non-agricultural income per household is shown. As was already discussed, non-agricultural income is the highest in COAST, followed by DRY1, DRY2, and HILL1. In COAST, Type 7 (transportation) is the most important non-agricultural activity, followed by Type 6 (trade). In DRY1, trade is the most important, while in HILL1, Type 3 and Type 4, i.e., two types of agro-based manufacturing, are the major source of non-agricultural income.

The inter-village contrast is associated with inter-village difference in labor allocation. From Tables 6.1 and 6.2, Table 6.3 was compiled, which shows non-agricultural income per worker. It is clear that among non-agricultural jobs, Type 4 (rice mills), Type 7 (transportation), and Type 9 (employees in factory/shop/office) are associated with higher income per worker on average. Per-worker income from Type 10 (public service) does not seem to be particularly high but its flow of income is very steady. Therefore, these jobs are generally sought for by villagers.

In many other developing countries,¹² it is observed that lucrative and stable non-agricultural jobs are associated with higher education. Table 6.4 gives the distribution of those employed in non-agricultural sector by the completed years of education. From our sample as well, it is shown that those employed in the non-agricultural sectors are more educated than those employed in farming. Among non-agricultural activities, those engaged in Type 10 (public service) are the most educated, as expected. This category is followed by Type 9 (employees in factory/shop/office) and Type 4 (rice mills). These are exactly those jobs with higher income per worker or stable income.

As a preliminary analysis, a probit model for the probability of individuals employed in these attractive subsectors (either primary or secondary) was estimated with village fixed effects and individual characteristics (age, sex, and schooling) as explanatory variables. In the first model, Types 4, 7, 9, 10 are regarded as attractive while in the second model, Types 4, 5, 6, 7, 9, 10 are regarded as attractive. Table 6.5 shows its preliminary results using all individuals whose age is more than or equal to 15. The effect of education is positive and statistically significant. The effect of age has an inverted-U shape. Females are disadvantaged in obtaining attractive jobs.

Significant coefficients on village dummies indicate that living in COAST raises the probability of obtaining these jobs and living in DELTA2 or DRY3 reduces the probability. Coefficients on village dummies show that all the study villages in the "center" (DELTA1 to DRY3) are associated with low availability of non-agricultural, lucrative jobs in comparison to the other three villages in the "periphery" (HILL1 to COAST). Considering that labor allocation is determined at the household level, it is possible that this regression result is subject to omitted variable bias. Household attributes will be incorporated in the next version of this paper.¹³

¹² See Kurosaki (2001) for the case of rural Pakistan and references within.

¹³ Matching of individual attributes and household attributes is incomplete. We will revise regression results as soon as the complete matching is available.

7 Discussion

In the previous sections, we investigated the behavior and welfare of rural households in Myanmar under transition from a planned economy to a market economy, using cross-section data obtained from a sample household survey conducted in 2001 covering about 600 households in eight villages with diverse agro-ecological environments. We interpret the results as showing that the household income level is higher in villages in the periphery (HILL1, HILL2, and COAST) than in the center under the stronghold of the central authority (the rest). We call this the first paradox. The availability of non-agricultural jobs and the intensity of paddy output maximization policies explain the contrast. The contrast is the most clearly shown between DELTA1, a village on the Ayeyarwady Delta which experienced complete transformation from a single-paddy cropping to a double-paddy cropping system, and COAST, a village not only on the periphery from the capital but also close to the national boundary where non-agricultural job opportunities are flourishing.

Among the peripheral villages, the income level in HILL2 was the lowest, comparable to the level in those villages in the center. But this was mainly due to crop failures in vegetables. From other indicators of village economy, such as housing, household assets, debt positions, and rural wages, the income level of this village in a normal year seems to lie between HILL1 and COAST, possibly closer to COAST.

Among the villages in the center, situations in DELTA2 were similar to DELTA1 but not to the extent experienced there. The difference was due to more recent introduction of summer paddy promotion and the availability of a lucrative alternative to paddy, i.e., pulses. The dry zone in Myanmar has a huge potential in agricultural growth because of its favorable land endowment suitable to various commercial crops. The reason for DRY1 and DRY2 villages to have their income level as high as that of COAST could be attributable to villagers' success in capturing these opportunities. In DRY1, the success was achieved in spite of the government's policy to maximize paddy output. The correlation analysis showed that farmers in this village had lower farm income than fellow villagers when they grew more paddy. DRY3 had the lowest household income as well as farm income among the study villages. This was partly due to crop failures but even with normal harvest, we would expect its income level still at the bottom among the all study villages. It was obvious from other indicators that the welfare level in DRY3 was the lowest. In this village also, the correlation analysis showed that farmers' income was reduced when they grew more paddy.

In all the paddy growing villages, the negative impact of paddy policies on farmers' income was observed, but it was more damaging to paddy-based irrigation agriculture in the delta regions

DELTA1 and DELTA2), because paddy farming is farmers' lifeline there. The second paradox is that crop income is lower for farmers and villages who grow more paddy using irrigation and intermediary inputs intensively. Garcia et al. (2000) already noted that the average income was lower in the irrigated villages with newly adopted, high-cost irrigated paddy farming. Even after the initial, unstable stage of the adoption of a new technology, this situation has continued. If farmers are given more freedom in crop choices as well as more market information, or, if paddy/rice policies are revised in a direction of more emphasis on farmers' welfare, crop income will go up substantially even without innovation in technology or further investment in irrigation.

Then the fundamental question is why this situation with regional as well as inter-household disparity is sustained. The direct cause of this situation is a low domestic price of paddy due to the national policy of paddy output maximization. Nevertheless, as was shown in the previous sections, the impacts of the policy distortion were not the same across regions and across households. A principal-agent framework between local administrators and farmers would help understanding the situation. As shown in Appendix, when local administrators suffer from information asymmetry and have only imperfect measures to enforce the state's cropping plan to farmers, the farmers' actual cropping pattern will deviate from the state's optimal plan. Larger the deviation, less burden on farmers' income. The size of the deviation (and therefore the loss of income due to policy distortions) depends on factors such as farmers' productivity, opportunity utility, political relation of the village with the local administration, and the strength of local administrators' preference for higher paddy output and lower price.

Regarding the last factor, it should be noted that there exists a huge pool of landless, non-farm households in Myanmar villages. In villages with little development of non-agricultural activities, these households need to depend on farm wage work. A higher paddy price is likely to ruin their lives directly. Without development of non-agricultural activities, this conflict puts a constraint on the way local administrators can behave when they make informal contracts with farmers. Here lies a fundamental contradiction --- because of the stagnation in paddy-based farming, non-agricultural activities do not flourish either, implying that local administrators feel more strongly the political constraint from non-farm households and the paradoxes are maintained. Among our study villages, those with active non-agricultural earning opportunities grow more vegetables and other non-paddy crops. Whether or not they are characterized by different political institutions at the village level and whether or not the agency framework can explain the intra-village variation are questions left for further research.

Appendix: An Agency Model for Paddy Policies in Myanmar

We model the cropping decisions problem under Myanmar's paddy policies as a principal-agent relation between a farmer (the agent) who decides on x (how much acreage to be assigned to paddy crops) and a local administrator (the principal) who can enforce paddy procurement perfectly but can affect the farmer's cropping decisions only imperfectly. The principal's objective function is

$$(A-1) \quad Y = F(x) + pbx^* - Aa^2,$$

where $F(x)$ is a social benefit function to the local administrator when the farmer's cropping pattern is x where $F'' < 0$, $F' > 0$ for small x , and $F' < 0$ for large x ; p is the price of paddy in the national market, which is assumed to be exogenous to the model; b is the procurement ratio, which is assumed to be fixed for the region; x^* is the cropping plan associated with the procurement contract; and A is the unit cost of the principal's effort a to detect and punish farmers deviation from the cropping plan. In the absence of agency problems, the principal can enforce its first best cropping pattern x^{P*} , which satisfies $F'(x^{P*}) + pb = 0$. We assume that x^{P*} is not enforceable due to agency problems.

The agent's objective function is

$$(A-2) \quad y = f(x) - pbx^* - a(x-x^*)^2,$$

where $f(x)$ is a profit function where $f' < 0$, $f' > 0$ for small x , and $f' < 0$ for large x ; and the last squared term shows the agent's welfare loss due to the deviation from the designated cropping pattern, such as the potential denial of the future cultivation rights (see Section 2).

The principal's optimization problem is to maximize Y with respect to x^* and a subject to the agent's incentive compatibility constraint (ICC) that

$$(A-3) \quad x = \operatorname{argmax}_x f(x) - pbx^* - a(x-x^*)^2,$$

and the agent's participation constraint (PC) that y is greater than or equal to y_0 , which is the agent's reservation utility. The ICC implies that

$$(A-3') \quad f'(x) = 2a(x-x^*),$$

which shows that unless x^* satisfies $f'(x^*)=0$ (we denote this cropping pattern by x^{A*} , which is the first

best solution for the agent) or $a=0$, the principal's desired cropping plan is not adopted by the farmers. The case $a=0$ could occur when A is too large so that the principal does not attempt to detect and punish farmers deviation from the designated plan. In such a case, procurement is non-distortionary. Considering the Myanmar's situation, we assume $x^{A^*} < x^{P^*}$ so that $f'(x^{P^*}) < 0$, implying that the local administrator wants farmers to produce more paddy than they want in the absence of the procurement system. Since the optimal cropping plan of the farmer is a function of the principal's effort according to equation (A-3'), we denote this as $x^A(a)$. Since the choice of x^* does not affect x directly in this simple model, the principal can choose the level of the procurement parameter x^* to satisfy PC as an equality. This equality can be solved to obtain an implicit function $x^P(a)$. Now the principal's objective function is to maximize with respect to a

$$(A-1') \quad Y = F(x^A(a)) + pbx^P(a) - Aa^2,$$

leading to the first order condition

$$(A-4) \quad F'(\cdot)x^A'(a) + pbx^P'(a) - 2Aa = 0.$$

This equation implicitly determines the principal's optimal effort level a^* . With the assumptions made in the above, the information-constrained solution is characterized by $x^{A^*} < x^A(a^*) < x^P(a^*) < x^{P^*}$. The divergence between the actual cropping pattern $x^A(a^*)$ and the local administrator's first best cropping pattern x^{P^*} is likely to become wider as A becomes larger (the local administrator has less authority on the farmer), y_0 becomes larger (higher opportunity utility for the farmer), f' becomes smaller (the farmer has more comparative advantage in growing non-paddy crops), and F' becomes larger (the local administrator's preference for higher paddy output and lower price is stronger). The divergence between the actual cropping pattern $x^A(a^*)$ and the local administrator's designated cropping pattern $x^P(a^*)$ behaves similarly with respect to A , f' , and F' . But direction of change is ambiguous with respect to y_0 .

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Table 2.1: Myanmar's Economy and Agriculture

	1985/86	1990/91	1995/96	1996/97	1997/98	1998/99	1999/2000	2000/01
Growth rate of real GDP	2.9	2.8	6.9	6.4	5.7	5.8	10.9	13.6
Growth rate of agricultural sector	2.2	2.0	5.5	3.8	3.0	3.5	10.5	9.5
Agricultural sector's share in GDP	39.7	38.7	37.1	36.2	35.2	34.5	34.4	33.1
Agricultural sector's share in export	42.4	31.8	46.0	36.1	30.3	28.0	17.9	18.9
Agricultural sector's share in workforce			64.1	63.4	62.7			
Total irrigated area (million ha)	3.0	2.9		4.6		5.1		6.0
Share of irrigated area under paddy (%)	70.1	74.8		82.3		76.6		76.5

Note: "Agricultural sector" includes crops subsector only (it does not include livestock, fishery, and forestry).

Source: CSO (2002).

Table 3.1: Study Villages

Name in the paper	State/Division	Township	Villagetract	Topology	Irrigation	Major crops
DELTA1	Ayeyarwady Div	Myaungmya	Kyonethout	Deltaic agri.	Pump	Paddy
DELTA2	Bago Div	Waw	Acarick	Deltaic agri.	Rainfed+Canal	Paddy, pulses
DRY1	Mandalay Div	Kyaukse	Pyiban	Dry zone	Canal	Paddy, vegetables
DRY2	Magway Div	Magway	Kanpyar	Dry zone	Rainfed	Upland crops
DRY3	Magway Div	Taungdwingyi	Wetkathay	Dry zone	Rainfed+Tank	Upland crops, paddy
HILL1	Shan State	Nyaungshwe	Linkin	Hilly region	Rainfed	Vegetables, paddy, sugarcane
HILL2	Shan State	Kalaw	Myinmahti	Hilly region	Rainfed	Vegetables, paddy
COAST	Tanintharyi Div	Myeik	Engamaw	Coastal agri.	Rainfed	Paddy, rubber

Source: The authors' survey (ibid for the tables below).

Table 3.2: Sample Households

Village	Total number of households			Number of sample households					
	"Farm"	"Non-Farm"	Total	"Farm"	"Non-Farm"			Sub-total	Total
					With farmland	Agri. labor	Non-agri.		
DELTA1	232	283	515	67	1	17	15	33	100
DELTA2	213	243	456	60	0	30	10	40	100
DRY1	118	101	219	65	6	18	13	37	102
DRY2	326	336	662	24	0	12	4	16	40
DRY3	334	176	510	24	2	12	2	16	40
HILL1	544	298	842	26	0	9	3	12	38
HILL2	422	75	497	34	0	2	4	6	40
COAST	647	520	1167	41	5	7	8	20	61
Total	2836	2032	4868	341	14	107	59	180	521

Table 3.3: Education and Demographic Characteristics of Sample Households

	Average household size	Average number of workforce per household	Average age of the household head	Education level of household heads				Demographic composition of households					
				No education	Monastery education	Modern schools		Children (0-14)		Adults (15-59)		Old (60-)	
						(%)	Average schooling years	Male	Female	Male	Female	Male	Female
By village													
DELTA1	5.1	2.5	42.5	3.0	57.0	40.0	4.2	1.1	0.9	1.3	1.5	0.1	0.1
DELTA2	5.6	2.6	43.6	0.0	36.0	64.0	4.1	1.0	1.0	1.8	1.6	0.1	0.1
DRY1	4.7	2.2	42.5	0.0	18.6	81.4	5.1	0.8	0.8	1.4	1.6	0.1	0.2
DRY2	5.3	3.1	47.6	2.5	22.5	75.0	4.6	0.8	0.5	1.5	1.9	0.2	0.3
DRY3	5.7	2.9	47.6	5.0	7.5	87.5	4.8	0.8	1.0	1.8	1.9	0.2	0.3
HILL1	6.0	3.3	49.2	21.1	44.7	34.2	3.2	1.0	0.7	1.8	1.9	0.3	0.3
HILL2	5.6	2.9	45.0	2.5	17.5	80.0	4.6	1.2	1.0	1.7	1.5	0.1	0.2
COAST	6.7	2.9	51.1	0.0	36.1	63.9	5.4	1.1	1.1	2.1	1.9	0.3	0.3
By household type													
Farm	5.6	2.8	48.0	2.9	32.8	64.2	4.9	0.8	0.8	1.7	1.8	0.2	0.3
Non-farm, with Farmland	5.1	1.9	36.9	0.0	64.0	85.7	3.5	1.1	1.1	1.4	1.4	0.0	0.1
Non-farm, Agri. labor	5.2	2.5	38.8	4.7	32.7	62.6	3.9	1.2	1.0	1.3	1.5	0.1	0.1
Non-farm, Non-agri.	5.3	2.3	42.3	0.0	35.6	64.4	4.9	1.3	1.1	1.4	1.5	0.0	0.1
Non-farm, sub-total	5.2	2.3	39.8	2.8	32.2	65.0	4.2	1.2	1.0	1.3	1.5	0.1	0.1
Total	5.5	2.7	45.1	2.9	32.6	64.5	4.6	1.0	0.9	1.6	1.7	0.2	0.2

Table 4.1: Household Income Level

	Total household income (Kyats)		Income per capita (Kyats/person)				
			Mean for each household type				
	Mean	(Standard deviation)	Mean	(Standard deviation)	Farm households	Non-farm, Agri. labor	Non-farm, Non-agri.
By village							
DELTA1	134,455	(112,152)	30,039	(27,474)	32,598	19,594	31,375
DELTA2	155,468	(109,319)	29,750	(20,652)	30,036	26,778	36,948
DRY1	208,929	(196,409)	49,234	(54,539)	55,027	22,045	64,796
DRY2	216,930	(273,511)	44,046	(55,411)	60,503	17,390	25,268
DRY3	85,741	(77,524)	16,468	(15,788)	18,421	13,739	19,050
HILL1	194,807	(145,299)	36,447	(27,269)	40,634	29,742	20,280
HILL2	169,477	(140,675)	32,147	(25,250)	32,331	9,198	42,058
COAST	311,359	(584,350)	43,981	(59,040)	44,067	30,708	65,847
By household type							
Farm	208,096	(284,937)	39,354	(40,445)			
Non-farm, with Farmland	127,506	(114,555)	26,427	(18,722)			
Non-farm, Agri. labor	107,309	(73,799)	22,503	(13,290)			
Non-farm, Non-agri.	192,488	(266,237)	43,686	(65,452)			
Total	183,464	(253,208)	36,036	(40,573)			

Table 4.2: Income Inequality and Poverty Measures

	Inequality measures for total household income			Headcount poverty measures for per-capita household income
	Mean log deviation	Theil coefficient	Gini coefficient	
By village				
DELTA1	0.338	0.269	0.399	0.508
DELTA2	0.238	0.187	0.336	0.294
DRY1	0.375	0.332	0.442	0.326
DRY2	0.661	0.554	0.564	0.539
DRY3	0.355	0.295	0.415	0.691
HILL1	0.269	0.245	0.389	0.411
HILL2	0.271	0.265	0.388	0.475
COAST	0.517	0.693	0.543	0.383
By household type				
Farm	0.434	0.419	0.461	0.391
Non-farm, with Farmland	0.374	0.320	0.429	0.457
Non-farm, Agri. labor	0.207	0.191	0.334	0.522
Non-farm, Non-agri.	0.348	0.449	0.450	0.448
Total	0.376	0.454	0.481	0.424

Table 4.3: Household Income by Sources

	Average income levels (Kyats per household)					Composition excluding "Unearned income transfer" (%)				
	Self-employment income from agriculture	Agricultural wage income (daily hired)	Agricultural wage income (seasonally hired)	Non-agricultural income	Unearned income transfer	Self-employment income from agriculture	Agricultural wage income (daily hired)	Agricultural wage income (seasonally hired)	Non-agricultural income	Total
By village										
DELTA1	82,771	16,896	3,055	31,733	-5,089	61.6	12.6	2.3	23.6	100.0
DELTA2	89,189	21,754	16,641	27,884	-2,757	57.4	14.0	10.7	17.9	100.0
DRY1	128,434	23,179	1,775	55,541	-6,604	61.5	11.1	0.8	26.6	100.0
DRY2	150,008	22,618	0	44,304	400	69.2	10.4	0.0	20.4	100.0
DRY3	53,027	22,655	1,133	8,927	-7,761	61.8	26.4	1.3	10.4	100.0
HILL1	105,061	44,209	0	45,536	-5,667	53.9	22.7	0.0	23.4	100.0
HILL2	118,969	19,770	0	30,739	-3,271	70.2	11.7	0.0	18.1	100.0
COAST	103,408	27,145	3,502	177,305	-1,280	33.2	8.7	1.1	56.9	100.0
By household type										
Farm	153,208	10,437	299	44,152	-5,891	73.6	5.0	0.1	21.2	100.0
Non-farm, with Farmland	19,612	29,980	0	77,914	-2,772	15.4	23.5	0.0	61.1	100.0
Non-farm, Agri. labor	802	67,560	20,168	18,779	660	0.7	63.0	18.8	17.5	100.0
Non-farm, Non-agri.	14,787	16,258	2,533	158,910	-3,385	7.7	8.4	1.3	82.6	100.0
Total	102,642	23,353	4,625	52,844	-4,178	55.9	12.7	2.5	28.8	100.0

Table 5.1 Cropping Patterns of Sample Households

	Number of households#	Average farm size (FS) in acres			Average gross cultiv. area (GCA) in acres	Cropping intensity = GCA/FS	Acreage share of major crop groups (%)							
		Paddy fields	Other farmland	Total			Paddy, total	Summer paddy	Other paddy	Pulses	Oilseed crops	Vegetables	Industrial crops	Other crops
DELTA1	67	8.93	0.04	8.97	15.08	1.73	99.5	42.3	57.2	0.1	0.0	0.1	0.0	0.2
DELTA2	60	11.99	0.12	12.10	17.14	1.44	74.0	8.6	65.4	25.5	0.4	0.0	0.0	0.1
DRY1	71	4.38	1.00	5.38	8.75	1.64	62.5	22.5	40.0	1.8	16.2	17.4	0.8	1.3
DRY2	24	0.00	10.45	10.45	21.42	2.00	0.0	0.0	0.0	35.6	46.7	0.2	0.0	17.4
DRY3	26	6.09	3.43	9.51	12.27	1.30	45.6	1.1	44.5	15.9	30.9	2.6	0.2	4.7
HILL1	26	1.42	9.01	10.44	9.18	1.10	15.4	11.4	4.0	9.7	12.2	6.4	22.3	34.1
HILL2	32	1.01	3.53	4.53	5.24	1.41	32.1	0.0	32.1	6.9	9.4	50.6	0.0	1.0
COAST	42	4.38	4.18	8.56	8.10	0.95	51.9	1.0	50.9	0.3	0.0	2.0	33.7	12.1

Only those households with positive crop acreage during the survey year are included.

Table 5.2 Crop Income per Household by Crop Groups

	Average crop income per household				Value share in total crop income attributable to major crop groups (%)							
	Level in Kyats	(Standard deviation)	Kyats/acre [FS]	Kyats/acre [GCA]	Paddy, total	Summer paddy	Other paddy	Pulses	Oilseed crops	Vegetables	Industrial crops	Other crops
DELTA1	100,607	(92,437)	11,222	10,574	96.3	47.3	49.1	0.2	0.0	0.5	0.0	3.0
DELTA2	157,039	(107,048)	12,974	9,164	60.8	3.9	56.9	38.4	0.6	0.0	0.0	0.2
DRY1	179,207	(182,317)	33,305	20,489	35.3	15.4	19.9	1.5	0.9	57.0	0.3	5.1
DRY2	269,885	(339,297)	25,825	12,599	0.0	0.0	0.0	4.7	84.0	0.0	0.0	11.3
DRY3	91,162	(94,754)	9,582	7,431	21.1	0.6	20.4	16.3	42.7	18.0	0.1	1.9
HILL1	137,780	(123,029)	13,200	15,017	6.4	5.1	1.3	4.2	2.5	28.3	43.9	14.7
HILL2	150,979	(141,289)	33,313	28,820	-0.3	0.0	-0.3	8.8	3.4	87.1	0.0	1.0
COAST	118,398	(123,697)	13,840	14,611	47.7	1.5	46.2	1.3	0.0	10.7	32.1	8.1

Table5.3: Production Cost Structure and Profitability of Major Crops

	A. Paddy in Major Paddy-Producing Regions																
	DELTA1						DELTA2					DRY1					
	MP total	small	large	SP total	small	large	MP total	small	large	Late MP	SP	MP total	small	large	SP total	small	large
Number of observations (nos)	67	34	33	66	35	31	36	18	18	8	13	33	17	16	25	13	12
Area under the crop (acres)	8.62	4.37	12.99	6.47	3.13	10.24	9.37	5.43	13.30	8.17	3.12	4.06	1.83	6.43	2.72	1.54	4.01
Output value per acre	17615	17697	17531	27526	26203	29020	18071	20779	15363	17156	16603	29171	27926	30493	42093	46244	37597
Current input per acre	4736	4537	4940	13765	12716	14948	2956	3381	2530	2892	3067	10273	9169	11446	12686	13403	11908
Seed	(1558)	(1576)	(1541)	(2375)	(2368)	(2382)	(1224)	(1270)	(1179)	(1376)	(1126)	(2827)	(2932)	(2716)	(2806)	(2946)	(2654)
Farm yard manure	(144)	(127)	(161)	(39)	(34)	(44)	(741)	(879)	(603)	(385)	(385)	(528)	(272)	(801)	(327)	(287)	(371)
Fertilizer	(2702)	(2528)	(2882)	(8599)	(7558)	(9774)	(805)	(992)	(619)	(534)	(867)	(6405)	(5551)	(7313)	(8813)	(9343)	(8238)
Other chemicals	(39)	(33)	(45)	(174)	(185)	(161)	(125)	(195)	(55)	(73)	(62)	(240)	(217)	(266)	(594)	(751)	(424)
Diesel oil	(293)	(274)	(312)	(2578)	(2571)	(2587)	(61)	(46)	(75)	(524)	(627)	(271)	(197)	(350)	(145)	(77)	(220)
Value added per acre	12880	13160	12591	13762	13487	14072	15116	17398	12833	14264	13537	18898	18757	19047	29408	32841	25689
Paid factor costs per acre	5754	5062	6467	4739	4199	5348	5753	5880	5626	5074	3181	9468	10826	8025	13043	15891	9958
Daily hired labor	(4094)	(3665)	(4535)	(1928)	(1670)	(2218)	(2873)	(3657)	(2089)	(2913)	(1814)	(4874)	(4896)	(4851)	(6875)	(8146)	(5498)
Seasonally hired labor	(929)	(674)	(1191)	(953)	(525)	(1436)	(2533)	(1904)	(3162)	(1240)	(1164)	(197)	(0)	(407)	(12)	(0)	(24)
Hired animals	(62)	(122)	(0)	(66)	(122)	(3)	(16)	(0)	(32)	(213)	(0)	(2129)	(3172)	(1020)	(2101)	(3608)	(467)
Hired machinery	(255)	(297)	(211)	(1329)	(1638)	(979)	(141)	(200)	(83)	(633)	(192)	(2258)	(2740)	(1746)	(3290)	(3005)	(3598)
Actual payment of interest	(416)	(305)	(530)	(464)	(244)	(712)	(190)	(119)	(260)	(76)	(11)	(10)	(19)	(0)	(766)	(1131)	(370)
Income per acre	7125	8098	6123	9023	9288	8723	9363	11519	7207	9190	10355	9430	7931	11022	16365	16950	15731
Imputed factor costs per acre	6100	6932	5243	8933	9028	8825	6166	6806	5526	4454	6965	2396	2621	2157	3628	3624	3632
Family labor	(2861)	(3684)	(2013)	(3519)	(4563)	(2341)	(2080)	(2334)	(1826)	(1222)	(2973)	(865)	(1048)	(672)	(1292)	(1839)	(699)
Own animals	(2502)	(2764)	(2231)	(1725)	(2042)	(1367)	(3591)	(3900)	(3281)	(2856)	(3804)	(1301)	(1573)	(1012)	(2155)	(1621)	(2734)
Own machinery	(738)	(484)	(999)	(3688)	(2422)	(5117)	(496)	(572)	(419)	(377)	(188)	(230)	(0)	(474)	(181)	(164)	(200)
Profit per acre	666	246	1098	90	259	-101	3197	4712	1681	4735	3390	7034	5310	8865	12737	13326	12099
All output at market price																	
Value added per acre	14483	14729	14229	13762	13487	14072	16112	18650	13575	15920	13537	21625	21378	21889	29715	33432	25689
Income per acre	8728	9667	7762	9023	9288	8723	10360	12770	7949	10846	10355	12157	10551	13864	16672	17541	15731
Profit per acre	2269	1816	2736	90	259	-101	4193	5964	2423	6392	3390	9761	7930	11707	13044	13917	12099

Notes: (1) Figures in parenthesis are the breakups of the first row in the row group without parenthesis.

(2) When the number of observations is larger than 20, observations are divided into "small" (\leq median) and "large" ($>$ median) by the size of area under the crop.

(3) "MP" indicates Monsoon Paddy and "SP" indicates Summer Paddy.

Table5.3: Production Cost Structure and Profitability of Major Crops (continued)

	B. Paddy in Minor Paddy-Producing Regions							
	DRY3	HILL1	HILL2		COAST			
	Paddy all types	Paddy all types	MP on paddy fields	MP on upland fields	MP total	small	large	SP
Number of observations (nos)	13	9	7	9	27	14	13	3
Area under the crop (acres)	5.16	2.43	1.37	1.97	4.30	2.37	6.38	1.12
Output value per acre	11865	31238	27061	16829	24842	26725	22814	40190
Current input per acre	3003	12001	13600	11117	4353	4627	4057	15480
Seed	(1407)	(2009)	(1641)	(707)	(1327)	(1473)	(1169)	(2286)
Farm yard manure	(891)	(1186)	(5366)	(4202)	(692)	(391)	(1016)	(1790)
Fertilizer	(640)	(5923)	(6172)	(5759)	(1856)	(2134)	(1557)	(8942)
Other chemicals	(65)	(2519)	(421)	(449)	(444)	(629)	(244)	(1063)
Diesel oil	(0)	(365)	(0)	(0)	(34)	(0)	(71)	(1400)
Value added per acre	8862	19237	13461	5713	20489	22098	18756	24710
Paid factor costs per acre	3136	13366	11141	5507	7479	8819	6036	2100
Daily hired labor	(1813)	(10194)	(5359)	(3240)	(3019)	(3772)	(2209)	(700)
Seasonally hired labor	(250)	(0)	(0)	(0)	(2828)	(2892)	(2758)	(0)
Hired animals	(649)	(1955)	(5434)	(964)	(466)	(627)	(292)	(0)
Hired machinery	(162)	(776)	(0)	(0)	(1005)	(1399)	(579)	(1400)
Actual payment of interest	(264)	(441)	(348)	(1304)	(162)	(129)	(198)	(0)
Income per acre	5726	5870	2320	205	13010	13278	12721	22610
Imputed factor costs per acre	3562	7711	8783	6984	14896	14285	15555	16349
Family labor	(1044)	(5201)	(6371)	(5026)	(8814)	(8341)	(9324)	(9549)
Own animals	(2517)	(1380)	(2412)	(1957)	(5988)	(5944)	(6036)	(6800)
Own machinery	(0)	(1130)	(0)	(0)	(94)	(0)	(195)	(0)
Profit per acre	2164	-1840	-6463	-6778	-1887	-1007	-2834	6261
All output at market price								
Value added per acre	8994	21625	14783	6269	23755	25132	22272	24710
Income per acre	5858	8259	3641	762	16276	16312	16236	22610
Profit per acre	2296	548	-5142	-6222	1379	2027	681	6261

Table5.3: Production Cost Structure and Profitability of Major Crops (continued)

Crop	C. Non-paddy crops													
	Pulses			Oilseed crop			Vegetables					Industrial crops		
	Black gram	Green gram		Sesame		Groundnut	Chili	Potato			Cabbage	Cauliflower	Sugarcane	Rubber
Village	DELTA2	DRY2	DELTA2	DRY1	DRY2	DRY3	DRY1	HILL1	HILL2	DRY3	HILL2	HILL2	HILL1	COAST
Number of observations (nos)	15	8	14	15	13	9	15	5	5	5	6	6	11	11
Area under the crop (acres)	5.58	4.13	3.73	4.18	5.49	1.91	1.63	0.44	0.98	0.54	1.11	1.01	3.92	8.62
Output value per acre	30648	12052	20630	6468	32563	56881	170141	502420	174245	118000	105619	101638	58588	20536
Current input per acre	5467	4657	4630	1457	9489	12963	15640	213635	90651	34810	31554	32988	14529	1252
Seed	(4660)	(1798)	(3676)	(888)	(2019)	(8795)	(1751)	(121900)	(16368)	(13300)	(7804)	(19136)	(5279)	(0)
Farm yard manure	(67)	(0)	(72)	(287)	(2093)	(1284)	(1532)	(13402)	(33483)	(7185)	(12200)	(5040)	(1038)	(0)
Fertilizer	(159)	(1808)	(357)	(282)	(4185)	(1338)	(9017)	(22480)	(12330)	(10825)	(7687)	(5899)	(6103)	(0)
Other chemicals	(417)	(1051)	(525)	(0)	(1193)	(1546)	(1096)	(55223)	(28469)	(3500)	(3864)	(2913)	(0)	(1252)
Diesel oil	(165)	(0)	(0)	(0)	(0)	(0)	(2243)	(630)	(0)	(0)	(0)	(0)	(2108)	(0)
Value added per acre	25181	7395	16000	5011	23074	43919	154500	288785	83595	83190	74065	68649	44059	19284
Paid factor costs per acre	3598	4822	2128	3205	5071	2657	15384	21028	29761	5194	12365	5917	11173	4774
Daily hired labor	(1390)	(3991)	(956)	(1053)	(3597)	(2657)	(8802)	(11304)	(19647)	(4354)	(6190)	(2374)	(5945)	(2212)
Seasonally hired labor	(2160)	(0)	(978)	(313)	(136)	(0)	(1257)	(0)	(0)	(0)	(0)	(0)	(0)	(2405)
Hired animals	(0)	(332)	(0)	(1673)	(505)	(0)	(2176)	(225)	(4158)	(640)	(2808)	(1989)	(2399)	(0)
Hired machinery	(48)	(157)	(148)	(167)	(0)	(0)	(3149)	(9030)	(1800)	(200)	(0)	(0)	(906)	(158)
Actual payment of interest	(0)	(342)	(46)	(0)	(833)	(0)	(0)	(469)	(4156)	(0)	(3367)	(1553)	(1923)	(0)
Income per acre	21583	2573	13872	1805	18003	41262	139116	267757	53834	77996	61700	62732	32886	14510
Imputed factor costs per acre	7047	1961	6803	2075	2833	9038	7310	216272	11850	8460	10937	10159	11104	12632
Family labor	(2606)	(844)	(2912)	(454)	(1039)	(3010)	(4155)	(213952)	(7910)	(3120)	(8131)	(9537)	(9778)	(12555)
Own animals	(4144)	(1116)	(3891)	(1622)	(1794)	(6028)	(2243)	(240)	(3940)	(5340)	(2806)	(622)	(871)	(0)
Own machinery	(296)	(0)	(0)	(0)	(0)	(0)	(912)	(2080)	(0)	(0)	(0)	(0)	(455)	(77)
Profit per acre	14536	612	7069	-270	15170	32224	131806	51486	41984	69536	50763	52573	21782	1877
All output at market price														
Value added per acre	25338	7395	17328	5011	23074	43919	154500	288785	83595	83190	74065	68649	46876	19284
Income per acre	21740	2573	15200	1805	18003	41262	139116	267757	53834	77996	61700	62732	35703	14510
Profit per acre	14693	612	8397	-270	15170	32224	131806	51486	41984	69536	50763	52573	24599	1877

Table 6.1 : Labor Allocation by Sample Households

	Agriculture			Non-Agricultural Works											Total number of workers	
	Self-empl.	Seasonally hired	Daily hired	Type1	Type2	Type3	Type4	Type5	Type6	Type7	Type8	Type9	Type10	Type11		Sub-Total
By main occupation																
DELTA1	62.5	3.1	21.6	0.0	0.0	1.2	0.0	0.4	3.5	1.2	1.5	0.0	0.8	4.2	12.8	259
DELTA2	59.5	9.3	19.7	3.0	0.0	0.7	0.0	0.7	2.2	0.4	0.0	0.7	0.0	3.7	11.4	269
DRY1	55.3	2.0	22.8	0.0	0.0	0.0	0.0	0.0	5.3	1.6	0.4	0.4	2.0	10.2	19.9	246
DRY2	54.0	0.0	31.0	0.0	0.0	0.8	0.0	0.0	1.6	0.8	0.8	3.2	1.6	6.3	15.1	126
DRY3	66.4	0.8	26.1	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.8	1.7	1.7	6.7	119
HILL1	70.3	0.0	24.2	0.0	2.3	0.0	0.8	0.0	0.8	0.0	0.8	0.0	0.8	0.0	5.5	128
HILL2	85.3	0.0	9.5	0.0	0.0	1.7	0.0	0.9	0.0	0.0	0.0	0.9	0.9	0.9	5.3	116
COAST	52.5	2.2	9.3	1.6	0.0	3.3	2.2	1.1	7.7	6.6	3.3	1.1	2.7	6.6	36.2	183
Total	61.5	3.0	20.3	0.8	0.2	1.0	0.3	0.4	3.3	1.5	0.9	0.8	1.2	4.8	15.2	1446
By Secondary occupation if any																
DELTA1	8.9	0.8	35.0	31.7	0.0	0.0	0.8	0.8	6.5	3.3	3.3	0.0	0.0	8.9	55.3	123
DELTA2	0.0	1.1	46.7	15.6	3.3	2.2	0.0	5.6	14.4	1.1	1.1	0.0	0.0	8.9	52.2	90
DRY1	7.0	0.0	37.2	1.2	0.0	3.5	1.2	1.2	17.4	3.5	3.5	0.0	0.0	24.4	55.9	86
DRY2	6.9	0.0	32.8	0.0	0.0	3.4	0.0	5.2	0.0	1.7	31.0	0.0	0.0	19.0	60.3	58
DRY3	2.2	2.2	57.8	4.4	0.0	0.0	0.0	0.0	0.0	0.0	8.9	0.0	0.0	24.4	37.7	45
HILL1	11.3	0.0	50.7	0.0	9.9	16.9	5.6	1.4	1.4	2.8	0.0	0.0	0.0	0.0	38.0	71
HILL2	2.4	0.0	54.8	2.4	2.4	0.0	2.4	0.0	4.8	4.8	2.4	0.0	0.0	23.8	43.0	42
COAST	10.6	0.0	21.2	0.0	0.0	3.0	7.6	4.5	18.2	4.5	4.5	0.0	0.0	25.8	68.1	66
Total	6.5	0.5	40.4	9.8	1.9	3.6	2.1	2.4	8.8	2.8	5.9	0.0	0.0	15.3	52.6	581

Note: The figures show the percentage distribution of workforce engaged in each category.

Table 6.2 : Non-Agricultural Income per Household by Activity Types

	Non-Agricultural Works (Kyats/household)											Total
	Type1	Type2	Type3	Type4	Type5	Type6	Type7	Type8	Type9	Type10	Type11	
By main occupation												
DELTA1	6,815	60	450	600	6,105	9,276	3,628	2,475	0	1,180	1,145	31,733
DELTA2	7,305	480	1,122	0	3,015	8,742	910	390	0	0	5,920	27,884
DRY1	196	0	824	980	368	29,348	5,139	2,973	956	3,780	11,005	55,541
DRY2	0	85	1,034	0	1,406	1,650	6,068	12,109	900	3,540	17,512	44,304
DRY3	900	0	0	0	0	2,738	0	1,041	0	1,050	3,198	8,927
HILL1	0	6,000	16,494	14,753	411	958	2,790	2,426	284	1,421	0	45,537
HILL2	2,000	20	9,480	0	4,456	4,985	1,613	1,688	0	1,560	4,938	30,739
COAST	3,279	197	8,325	32,518	5,320	20,991	58,061	13,684	1,771	3,049	30,111	177,305
Total	3,355	572	3,448	5,190	2,925	12,451	9,468	4,050	484	1,899	9,005	52,844

Table 6.3 : Non-Agricultural Income per Worker by Activity Types

	Average Non-Agricultural Income per Worker (Kyats)											
	Type1	Type2	Type3	Type4	Type5	Type6	Type7	Type8	Type9	Type10	Type11	Total
DELTA1	14,814	6,000	15,000	60,000	305,240	54,565	45,350	24,750	0	59,000	4,404	27,594
DELTA2	22,829	12,000	28,050	0	37,688	41,626	45,500	13,000	0	0	34,824	30,641
DRY1	20,000	0	28,000	100,000	37,500	103,223	74,879	75,812	97,500	77,104	23,386	56,652
DRY2	0	1,700	13,783	0	18,750	33,000	80,912	25,492	36,000	70,800	38,914	34,748
DRY3	18,000	0	0	0	0	36,500	0	6,942	0	21,000	11,630	14,878
HILL1	0	22,800	36,870	112,120	15,600	18,200	35,333	30,733	0	54,000		41,200
HILL2	80,000	800	126,400	0	178,250	99,700	16,125	67,500	0	62,400	12,344	42,398
COAST	100,000	12,000	56,422	220,400	40,562	49,249	236,115	75,886	108,000	37,200	49,642	87,223
Total	20,809	15,695	42,770	159,071	63,503	63,598	117,450	37,021	84,100	54,973	27,119	47,798

Table 6.4 : Employment in Non-Agricultural Activities and Education Status

Years of completed education	Non-Agricultural Works											Total
	Type1	Type2	Type3	Type4	Type5	Type6	Type7	Type8	Type9	Type10	Type11	
By main Occupation												
0	10.8	5.4	2.7	0.0	2.7	21.6	8.1	5.4	2.7	5.4	35.1	37
1	14.3	0.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0	14.3	57.1	7
2	5.0	5.0	5.0	0.0	0.0	15.0	0.0	30.0	0.0	0.0	40.0	20
3	16.7	0.0	8.3	0.0	0.0	33.3	8.3	0.0	8.3	0.0	25.0	12
4	1.7	0.0	8.6	1.7	5.2	34.5	6.9	1.7	5.2	0.0	34.5	58
5	0.0	0.0	6.7	6.7	0.0	33.3	13.3	0.0	13.3	0.0	26.7	15
6	11.8	0.0	5.9	5.9	0.0	0.0	29.4	5.9	5.9	0.0	35.3	17
7	0.0	0.0	20.0	10.0	10.0	10.0	0.0	10.0	10.0	0.0	30.0	10
8	0.0	0.0	0.0	0.0	0.0	60.0	40.0	0.0	0.0	0.0	0.0	5
9	0.0	0.0	0.0	0.0	11.1	11.1	33.3	0.0	0.0	22.2	22.2	9
10	0.0	0.0	6.7	6.7	0.0	6.7	6.7	13.3	6.7	26.7	26.7	15
More than 10	0.0	0.0	0.0	0.0	0.0	14.3	0.0	0.0	7.1	64.3	14.3	14
Total	5.0	1.4	6.4	2.3	2.7	21.9	9.6	5.9	5.0	8.2	31.5	219
By secondary occupation if any												
0	34.1	3.4	5.7	3.4	4.5	9.1	6.8	12.5	0.0	0.0	20.5	88
1	36.4	9.1	9.1	0.0	0.0	9.1	0.0	0.0	0.0	0.0	36.4	11
2	22.2	3.7	3.7	3.7	0.0	22.2	3.7	14.8	0.0	0.0	25.9	27
3	19.0	0.0	0.0	0.0	0.0	33.3	9.5	4.8	0.0	0.0	33.3	21
4	8.2	5.9	10.6	2.4	3.5	18.8	3.5	14.1	0.0	0.0	32.9	85
5	23.1	7.7	0.0	7.7	0.0	7.7	7.7	7.7	0.0	0.0	38.5	13
6	11.1	0.0	11.1	0.0	11.1	22.2	22.2	0.0	0.0	0.0	22.2	9
7	13.3	0.0	6.7	6.7	13.3	26.7	0.0	6.7	0.0	0.0	26.7	15
8	0.0	0.0	16.7	11.1	22.2	11.1	5.6	11.1	0.0	0.0	22.2	18
9	0.0	0.0	0.0	0.0	0.0	20.0	0.0	20.0	0.0	0.0	60.0	5
10	0.0	0.0	0.0	18.2	0.0	18.2	0.0	9.1	0.0	0.0	54.5	11
More than 10	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	50.0	2
Total	18.7	3.6	6.9	3.9	4.6	16.7	5.2	11.1	0.0	0.0	29.2	305
Average schooling years	1.7	2.1	3.9	5.3	4.6	4.0	4.3	3.3	5.5	9.3	3.9	3.8

Note: The figures show the percentage distribution of workforce engaged in each category, except for the last column.

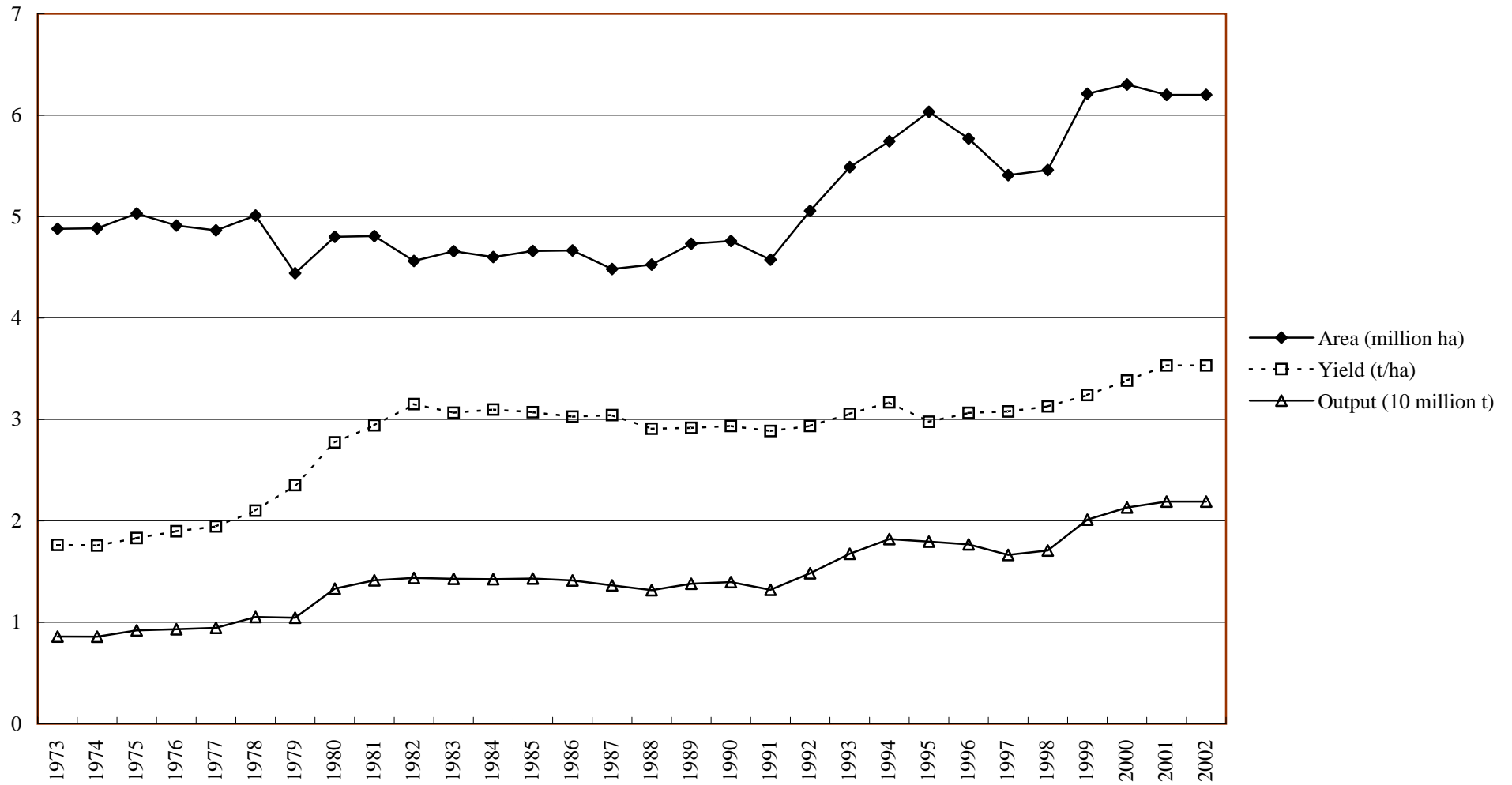
Table 6.5 Determinants of Having Attractive Non-Agricultural Jobs

	Prob. of having Type 4, 7, 9, 10		Prob. of having Type 4, 5, 6, 7, 9, 10	
	Coef.	z-stat	Coef.	z-stat
Intercept	-2.552	-5.86 ***	-3.128	-9.24 ***
Dummy for villages				
DELTA2	-0.571	-2.32 **	0.076	0.53
DRY1	-0.158	-0.77	0.173	1.19
DRY2	0.104	0.45	-0.013	-0.07
DRY3	-0.419	-1.43	-0.403	-1.81 *
HILL1	0.243	1.08	0.068	0.37
HILL2	0.032	0.13	-0.109	-0.55
COAST	0.341	1.80 *	0.555	3.77 ***
Individual attributes				
Age	0.073	3.59 ***	0.102	6.65 ***
Age-squared/100	-0.084	-3.26 ***	-0.117	-6.15 ***
Sex (male=1, female=2)	-0.644	-5.25 ***	-0.225	-2.74 ***
Schooling years	0.085	4.85 ***	0.044	3.09 ***
NOB	1890		1890	
LR test for zero slope	102.6 ***		115.6 ***	
Log likelihood	-295.4		-580.4	
Pseudo R-squared	0.148		0.091	

Notes: (1) Estimated by Probit model using maximum likelihood estimation.

(2) Statistically significant at 1% (***), 5% (**), and 10% (*).

Figure 2.1: Paddy Production Trends in Myanmar



Source: FAOSTAT.