An Analysis of Social Mobility in a Village Community: The Case of a Philippine Village[*]

(running title: Social Mobility in Village Community)

by

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Abstract

We apply the notion of transition probabilities and multinomial logit models to analyze the patterns of household class mobility in a Philippine village. We find that better access to land facilitates accumulation in agriculture. Schooling has positive effects on upward mobility in both agriculture and non-agricultural sectors. Macroeconomic growth has positive effects on upward mobility in non-agricultural sector, and its quantitative effects are large relative to those of household characteristics. We find little indication of farm households being responsive to prices or non-agricultural opportunities. The life-cycle stages have significant effects. The number of children has ambiguous effects on accumulation.

JEL classification: D10, D31, J24, J62, O12, O15, Q12
Key words: economic mobility, class analysis, social stratification, Philippines, household behavior

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1. Introduction

In this paper, we will apply the concept of transition probability to a longitudinal household data set collected in a Philippine village in order to characterize the patterns of social mobility[1], to examine the sources of mobility, and to draw some policy implications from the analysis.

Despite the relative paucity of relevant data, there have been a few empirical studies that focus on economic mobility in developing countries in recent years. Generally, these empirical studies employ a transition matrix approach to characterize the mobility process, which typically can do two things: first, to measure the *degree* of mobility (how much mobility?); and secondly, to assess the *direction* of change (e. g., is inequality increasing?). Adelman, Subbarao and Vashishitha (1985) and Adelman, Morley, Schenzler and Warning (1994) looked at income mobility of households in India and Brazil, respectively, at the national level. The income dynamics in India in the late 1960s were found to be in the direction of decreasing inequality while the Brazilian data during the 1970s showed increasing inequality. Adelman *et al* (1994) also simulated life-time income based on the Brazilian data and found that income mobility mitigated the initial income inequality to some extent. Swaminathan (1991a and 1991b) used a panel data set collected in a South Indian village and examined household wealth mobility and occupational mobility, both of which were found to have low degree of mobility. Dreze, Lanjouw and Stern (1992) also investigated mobility processes in an Indian village; after comparing income and occupational mobility in the village they found that income mobility tended to show much higher degree of mobility than occupational mobility, and argued that income mobility might not be a good indicator of the change in economic welfare over time among rural households.

[1] In general, there are two distinct aspects of mobility: inter-generational mobility and intra-generational (or life-cycle) mobility. In the present paper, we will solely focus on the latter.

What we seem to know relatively little about empirically, however, is the *sources* of mobility: i. e., why is it that some households move up or down while others do not? In none of the empirical studies mentioned above did the data set allow the authors to investigate the sources of mobility in much detail. The present paper intends to extend the focus of mobility study to the sources of household mobility. Among the recent theoretical literature, Eswaran and Kotwal (1986 and 1989) developed a household model that endogenously derives agrarian class formation given exogenous wealth (land) endowments. The present paper is complementary to the Eswaran and Kotwal's model in the sense that it focuses on changes in the household wealth in the longer run.

The rest of paper is organized as follows. The next section (section 2) will briefly describe the study village and the data set. Section 3 will describe the class structure in the village and its changes in the past thirty years. Section 4 will characterize the class mobility processes with transition matrices. Section 5 will present some stylized facts about the household behavior as relates to social mobility and a conceptual model of household decision making. Section 6 will derive the empirical logit specification of household class mobility. Section 7 will present the estimation results. And Section 8 will draw some conclusions and policy implications and discuss some limitations of the present study.

2. The Village Setting and the Data

Our study village is located in the central part of Pangasinan province on Luzon island in the Philippines. The village is located roughly 170 km north of Manila. While the village did not have a telephone line, 67% of households had access to electricity in 1994. The size of the village is roughly 1 square mile. The village had roughly 250 households in the early 1960s, about 300 households in the early 1970s, about 350 households in the early 1980s and roughly 480 in 1994.

The principal food crop in the village is rice. Also cultivated during our data period were sugar, tobacco, vegetables (corn, mongo, tomatoes, beans and eggplants) and a variety of fruits (e.g., mango). Most of the farmers adopted high yielding rice varieties during the mid- to late-1970s. Unlike some other parts of central Luzon, however, the village farmers have not been able to acquire the maximum benefit from the adoption of the high yielding rice varieties due to the insufficient irrigation[2].

In this village, house-to-house censuses were conducted six times between 1962 and 1994: 1962, 1966, 1971, 1976, 1981 and 1994. Our data include information on household demographics and some asset holdings such as land but not on income (thus the use of social class categories to measure mobility). [3]

3. Class Structure in the Village

In the subsequent analysis, we will categorize village households into four socio-economic classes. Our notion of "class" is based on the degree of access to agricultural land and occupation type of the main income earner of the household[4]. It has been observed that there are marked differences in the degree of economic security and socio-political behavior among different classes of households. Following Anderson (1964), we will use the following class categories in the present study: Small-Owner; Tenant-Farmer; Landless-Irregularly-Employed; and Regularly-Employed[5].

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[2] The irrigation system that was constructed in the 1920s became virtually defunct since the late 1970s due to the mining activities south of Baguio, which is located north of the village.

[3] Household censuses between 1962 through 1981 were collected by James N. Anderson, an anthropologist at University of California at Berkeley, and 1994 census was carried out by the author. The comparable information collected for the census includes the following: household demographics (age, schooling, current residence, occupation and rough proportion of household support, if any, for current family members as well as fertility and mortality in the family), major assets (land holding, size and value of house, animal, major household appliances), agricultural activity (farm size, type and production of major crops), residential history of household, and social relationships such as sponsors for children's wedding and baptism.

[4] During the period between 1962 and 1981 roughly 95%, and 83% in 1994, of the main income earners were household heads.

[5] The following descriptions rely heavily on Anderson (1963).

Small Owner

These households owned small parcels of agricultural land. Land holdings by the village residents are quite small; during our data period, the maximum size was 9 hectares and average was between 1 and 2 hectares[6]. Although the size of holdings was very small by Philippine standards , they were still relatively secure among village households, and formed the highest status group among the farm households residing in the village. Their land holdings were large enough to feed and support their families relatively well by local standards.

Tenant-Farmer

Households in this category owned little[7] or no land, but they had access to land through land tenancy contract. Their farm size tended to be smaller than that of the small owners' and the share of the produce of the land was often insufficient to support the family by minimum local standards without supplementary activities or earnings. However, they still enjoyed a certain margin of security against hard times by virtue of the traditional system of mutual obligations between tenants and landowners, which the landless households (the next category) did not.

Landless-Irregularly-Employed

This category consists of landless-laborer households. They had little or no access to agricultural land nor any secure employment and thus were economically the most insecure in the village. They formed the bottom group in the village status hierarchy. Their occupations varied widely among different households and over time, but they shared the common characteristic of

[6] There were a very small number (six of them as of the early 1960s) of what Anderson called "medium land owner" households who lived *outsid*e the village (mostly in the nearest township) but owned land in the study village as well as in other neighboring villages. They formed a distinct socio-economic class of its own that lay above small owners'. However, since they are not village residents and thus our census data excludes these households, they will not be included here.

[7] The cut-off line is set at one third of a hectare.

economic insecurity and low level of economic welfare. Occupations of this type include: seasonal agricultural labor (e. g., planting and harvesting) and occasional non-agricultural workers (e. g., house building, selling vegetables in the market, hired tricycle driving, carpentry, etc.). Through different seasons of the year, these households supported themselves by moving from one of these occupations to another. Quite often these households received some support from relatives, especially during the later part of the rainy season ("lean season") when opportunities for economic activities dry up while the rice price goes up substantially[8].

Non-Agricultural Regularly-Employed

In addition to the above, there is a distinct group of households who derive primary income from secure non-agricultural employment or enterprise. Some of the households in this group also owned agricultural land and thus acted as proprietors earning land rent at the same time. Main occupations in this category were: school teaching, full time employment in the township or in Manila, military service, and so on. A small fraction of this group consisted of owners of non-agricultural businesses, such as rice mill operators or transport operators. Also included in this class are the households deriving the major portion of their income from contract labor in foreign countries. International migration has been a noticeable phenomenon in the village since the early part of this century. While relatively small number of households depended on foreign income during the 1960s and the 1970s, the number increased dramatically during the 1980s[9]. Although all the households in this category were not uniformly wealthy, the wealthiest households in the village have always belonged to this class throughout our data period[10].

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[8] According to the village residents, between the harvest season and the "lean season" during the 1993 season, the price of rice in nearby town market went up from P5/kg to P7.50/kg.

[9] Similar processes in another Central Luzon village are documented by Banson-Bautista (1989)

[10] In order to keep a perspective, however, it is probably worth noting that the "wealthiest" households in the village are far from the "wealthiest" by the national standard and these "wealthiest" of the villagers perhaps belong to the middle-class within the class structure at the national level.

Table 1 shows the changes in the village class structure over the last three decades. First of all, we can observe that the degree of dependence on the agricultural sector for livelihood among the village households declined significantly throughout the past thirty years. This is reflected in the sharp decline in the proportion of the Small-Owner households and the relatively moderate decline in the proportion of the Tenant-Farmer households. Secondly, a part of the decline in the share of farm households was matched by some increase in the proportion of the landless Irregularly-Employed households. The proportion of this poorest section of the village community increased sharply in the early 1960s, remained stable during the late 1960s and early the 1970s, and again increased sharply in the late 1970s. During the 1980s, the share of the Irregularly-Employed class declined moderately[11]. Thirdly, also corresponding to the shrinkage of the village agricultural sector, the share of the households belonging to the Regularly-Employed class increased steadily in the past thirty years. Thus it became the largest social class category by 1994. This is partly due to the increasing number of households relying on their children who have secure non-agricultural occupations for their main income support.

The Regularly-Employed class includes most of the wealthiest households in the village. Consequently, the increase in both Regularly-Employed and Irregularly-Employed households means that both the top and the bottom ends of these non-farm households increased at the expense of the farm households. This indicates that there was larger proportion of both relatively wealthy and poor households in 1994 than in 1962. This can be seen as an indication of increasing polarization between the rich and the poor in the village hierarchy.

[11] At the same time, however, the proportion of the Irregularly-Employed *household heads* continued to increase during the 1980s. If households are classified by the occupation of the household heads rather than by the largest income supporter (which can be children), the share of Irregularly-Employed increases from 35% in 1981 to 39% in 1994 and it was by far the largest class category in 1994. This suggests that during the 1980s the impact of the increase in the Irregularly-Employed household heads was greatly mitigated by the sharper increase in the number of the children holding regular employment in the Philippines or working abroad.

4. Patterns of Household Class Mobility: Transition Matrices

Such changes in the village class structure, shown in Table 1, are the results of class mobility, migration, and household formation and dissolution. However, in the present paper we will mainly focus on the changes due to class mobility among households. In this section we will summarize the household mobility patterns between 1962 and 1994 by transition matrices, and in the later sections, we will seek to explain the household class transition probabilities with the use of multinomial logit regressions.

Transition matrices of our successive data years are presented in Table 2 through Table 6[12]. We can see that in the period between 1962 and 1981 the majority of the households did not cross the class boundary over the five year period; all the diagonal entries are greater than 0.5. During the 1981-1994 period, however, the transition probability of staying in the same class is significantly smaller except for that of the Regularly-Employed class. Although the 1981-94 transition matrix cannot be directly compared with the five-year transition matrices in the previous periods, this may still suggest that the degree of class mobility increased since the 1980s except for the Regularly-Employed class which remained quite stable. In fact, throughout our data period, the Regularly-Employed class was generally the most stable class; once one reaches this class it has been less likely to move downward than households belonging to the lower strata.

We can also examine the relative probability of upward and downward mobility. We can see the overall probabilities of upward and downward mobility by comparing the sum of upper diagonal entries (i. e., the upward mobility proportion) and the lower diagonal entries (i. e., the downward mobility proportion) given in Table 7. The sum of overall probability of downward mobility was slightly higher during the 1962-66 period and significantly higher during the 1976-81 period, while the two probabilities were roughly the same during the 1966-71 period. On the other hand, the sum of the overall probability of upward mobility was slightly higher during the

[12] Transition matrices can be analyzed in much more detail than presented here by applying the concept of Markov chain processes. This analysis can be found in Fuwa (1995 a).

1971-76 period and significantly higher during the 1981-94 period. Therefore we do not observe any clear trend over time.

However, the patterns of the probability of upward versus downward mobility of households in a given class differ among class categories. The probability of upward mobility for Irregularly-Employed households (i. e., toward Tenant-Farmer, Small-Owner, or Regularly-Employed) seems to have increased over the past three decades with the 1971-76 period showing particularly high probability. (Table 7) Upward mobility can take place either through the "agricultural ladder" or through the non-agricultural regular employment. Except for the period between 1976-81, the proportion of upward mobility going through the regular employment, rather than the agricultural ladder route, tended to increase over the past three decades. (See Table 8.)

Among Tenant-Farmer households, the probability of upward (i. e., toward Small-Owner or Regularly-Employed) and downward mobility (i. e., toward Irregularly-Employed) was very close during the 1960s and the late 1970s, while the probability of upward mobility was significantly higher during the early 1970s and the 1980s. (Table 7) Again there seems to be a general tendency for the proportion of upward mobility going through the non-agricultural route to increase over time relative to the proportion of upward mobility going through the agricultural-ladder. (See Table 8.)

The Small-Owner households faced a significantly higher probability of downward mobility (i. e., toward Tenant-Farmer or Irregularly-Employed class) throughout the 1960s and the 1970s, while the probability of downward and upward mobility was equal during the 1981-94 period. (Table 7) The probability of downward mobility among Small-Owners was always higher than that of Tenant-Farmers throughout our data period. Furthermore, the Small-Owners' probability of upward mobility was lower than that of either Tenant or Irregularly-Employed households throughout most of our data period. This indicates the consistent trend of the

dissolution of the Small-Owner class during our data period. Among the Regularly-Employed class households, the probability of downward mobility was very stable except in the 1976-81 period when this probability was twice as high as during the rest of our data period.

In this section we have seen some *patterns* of household mobility and their changes over time. In the following sections, we will examine the *sources* of household class mobility by linking the household behavior and the transition probabilities.

5. Household Behavior and Class Mobility: Stylized Facts and a Model

For a Filipino household its relative social status vis-a-vis fellow villagers is one of its major life-time concerns[13]. Anderson (1975) observed in our study village that they "aspire to higher status and seriously work at strategies that will bring about that goal." (p. 156) Such household "strategies" included the following[14].

Agricultural Strategy

While the land holding in the village was very small, some of the Small-Owner households expanded their operational holdings by renting-in additional land. These "Owner-Tenant" farmers tended to be committed farmers who were relatively more "innovative and progressive" and some of them were observed to be upwardly mobile[15]. They were also observed to have had relatively large number of children who worked on their farm.

Accumulation of Human Capital

Another route for accumulation recognized by villagers was to acquire a secure flow of

[13] For example, the perceptions of Filipino rural households in different social classes were illustrated vividly by Kerkvleit (1990).
[14] Some other aspects of household decisions that may have impact on mobility prospects are marriage and adoption of children among relatives. Anderson (1963) discusses such aspects.
[15] Anderson (1964) p. 178.

cash income through regular employment in non-agricultural sector (e. g., school teaching)[16]. Securing such employment requires schooling including, sometimes, college level.

Temporary Migration

Many households have responded to the economic opportunities outside the village by deploying household labor force (mainly young adult children) in township, in Manila and sometimes overseas[17]. While some categories of temporary migration (e.g., housemaid in Manila) from poorer segments of village households did not seem to have resulted in upward mobility, remittances from children with well paying occupations (such as regular employment in Manila or contract worker abroad[18]) contributed to household accumulation in many cases.

Reproduction

The number of children in a family can be a strategic decision variable in terms of household mobility. A larger number of children seems to have both positive and negative potential impact on the prospects for household accumulation. On the one hand, more children, at least in the initial stage, mean more mouths to feed and make it more difficult to generate the surplus above subsistence required for accumulation. On the other hand, more children may mean a larger household labor-endowment that can be utilized as on-farm family labor in the case of farmers (especially during our earlier data period when farmers were cash constrained and non-family labor hiring was done through labor exchange during the peak labor demand periods) or can be deployed as migrant workers outside the village with remittance incomes supporting the household, which could indicate positive effects on accumulation prospects.

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[16] Anderson (1975).

[17] Anderson (1975), pp. 156-162.

[18] Our village has a long history of international migration. Since the early part of this century up to late 1960s the main destinations were plantations in Guam and Hawaii. Since the late 1970s They have been replaced by construction sites in the Middle East and by domestic helper contracts in Asia and Middle East.

Based on the description above, we now construct a model of rural household behavior that captures some aspects of the class mobility observed in our village.

The Household's Problem

A household maximizes discounted utility derived from aggregate consumption and leisure:

$$max \sum_{t=0}^{T} \delta^t U(C_t, L_t^L), \quad U_C > 0 \text{ and } U_{L^L} > 0,$$

where C_t is aggregate consumption and L_t^L is leisure, respectively, at time t and is the discount factor.

The household asset consists of land and human capital stock of household members and income is generated based on the household's assets:

$$\begin{aligned} Y_t &= f(p_t^F, A_t, L_t^F) + h(H_t, Z_t) L_t^{NF} \\ &= C_t + I_t^F + I_t^H, \text{ and } C_t \geq \overline{C}(L_t), \end{aligned}$$

where Y_t is total household income at time t; $f(p_t^F, A_t, L_t^F)$ is farm profit that depends on agricultural terms of trade, p_t^F , land, A_t, and labor input, L_t^F; $h(H_t, Z_t)$ is the return of off-farm work that depends on human capital stock, H_t, degree of off-farm work opportunities, Z_t , and off-farm labor L_t^{NF}. Income is either consumed (C_t)or invested in land (I_t^F) or in human capital (I_t^H). $\overline{C}(L_t)$ is the subsistence consumption level as a function of total household labor force L_t.

The total labor endowment of the household is given by:

$$L_t = L_t^F + L_t^{NF} + l(I_t^H) + L_t^L,$$

where L_t is the total household labor force at time t, and $l(I_t^H)$ is the labor force enrolled in schools, which is linked to the level of human capital investment I_t^H. The household can control its total labor force endowment L_t through fertility decision and split or merger of households.

$$L_{t+1} = L_t + DL_t,$$

where DL_t is the change in household labor force.

Given the initial asset endowment (A_0, H_0), initial labor endowment L_0, and terminal condition, the household's problem is to choose optimal investment in land and human capital (I_t^F and I_t^H); consumption C_t; change in the total labor force DL_t and labor force deployment among on-farm work, off-farm work, schooling and leisure (L_t^F, L_t^H $1(I_t^H)$ and L_t^L).

Class Differentiation and Mobility

At any period t, it is possible to distinguish three social "class" categories based on household asset accumulation (land and human capital). These are:

(Class 1) Landless Irregularly Employed Class : $A_t=0$, $H_t<\tilde{H}$.

(Class 2) Farmer Class : $A_t>0$, $H_t<\tilde{H}$.

(Class 3) (Non-Agricultural) Regularly Employed Class : $A_t\geq 0$, $H_t\geq \tilde{H}$.

where $\tilde{H}$ is the threshold level of human capital stock that is required for an economically secure occupation (i. e., Regularly Employed status)[19].

Given the above definition of "social classes," "class mobility" is induced by changes in land ownership (A_t) and in human capital stock (H_t), which in turn is determined by household investments (I_t^F and I_t^H). Denoting the conditions for transition from class j at time t to class k at time t+1 as $TR_{jk}(t)$;

$$TR_{11}(t)=\left\{H_t<\tilde{H}, A_t=0 \text{ and } I_t^H<\left(\tilde{H}-H_t\right)I_t^F=0\right\},$$

$$TR_{12}(t)=\left\{H_t<\tilde{H}, A_t=0 \text{ and } I_t^H<\left(\tilde{H}-H_t\right)I_t^F>0\right\},$$

$$TR_{13}(t)=\left\{H_t<\tilde{H}, A_t=0 \text{ and } I_t^H\geq\left(\tilde{H}-H_t\right)I_t^F\geq 0\right\},$$

$$TR_{21}(t)=\left\{H_t<\tilde{H}, A_t>0 \text{ and } I_t^H<\left(\tilde{H}-H_t\right)I_t^F=-A_t\right\},$$

$$TR_{22}(t)=\left\{H_t<\tilde{H}, A_t>0 \text{ and } I_t^H<\left(\tilde{H}-H_t\right)I_t^F>-A_t\right\},$$

$$TR_{23}(t)=\left\{H_t<\tilde{H}, A_t>0 \text{ and } I_t^H\geq\left(\tilde{H}-H_t\right)I_t^F\geq -A_t\right\},$$

$$TR_{31}(t)\equiv 0,$$

[19]For simplicity, unlike in our empirical analysis in the later section, distinction is not made here between the 'tenant farmer' and the 'small owner' classes.

$TR_{32}(t) \equiv 0$, and

$TR_{33}(t) = \left\{ H_t \geq \tilde{H}, A_t \geq 0 \text{ and } I_t^H \geq 0, I_t^F \geq -A_t \right\}$.

Since human capital (unlike land) cannot generally be "liquidated," we assume that human capital investment (I_t^H)is non-negative. Consequently class transition from "regularly employed" class to other classes cannot occur through household investments in our framework, which is denoted as "$\equiv 0$" for $TR_{31}(t)$ and $TR_{32}(t)$. These transitions can occur, however, through the choice of total labor endowment (such as household split) or through exogenous changes (such as loss of a job that the main income supporter of the household used to hold or death of household members)[20].

6. Empirical Specification: Multinomial Logit Models

We can derive a logit model of household class mobility as a reduced form model linked to the conceptual model introduced above. Since our census was conducted in every five years during the period between 1962 and 1981[21], we assume that at any time period t the household maximizes its utility over the next five year horizon (but not beyond) by setting optimal investment in land (I_t^F) and human capital (I_t^H) and the change in labor endowment (DL_t) and its allocation (L_t^F, L_t^H), given land (A_t), human capital stock (H_t) and total household labor endowment (L_t) at the beginning of period t. We then define the indirect utility function (or value function) in a usual manner:

$$max \sum_{s=t}^{T} \delta^s U\left(C_s, L_t^L\right) \equiv V\left(t, A_t, H_t, L_t, Z_t, p_t^F\right),$$

where period "T" means a date five years from period t in terms of calendar time.

Our conceptual model is a simplified one and, in reality, household indirect utility is affected by factors other than specified by the conceptual model. Consequently, the household

[20]Fuwa (1995 b) discusses various mobility patterns under this theoretical framework.

[21] In fact, the first data interval, i. e., 1962-1966, was four years but we will treat this as if this were five year interval.

investment choices that lead to household class mobility are also affected by factors other than those specified above. We assume that the household indirect utility function takes the additive separable form consisting of the portion dependent on the observed variables specified in our conceptual model and the portion that is only observed by the agent herself (but not by researchers). Thus, the "real" indirect utility function that agent i's investment and labor deployment choices are based on is:

$$\upsilon_t^i = V\left(t^i, A_t^i, H_t^i, L_t^i, Z_t, p_t^F\right) + \varepsilon_t^i .$$

The unobserved portion ε_t^i is likely to reflect variation among households in such factors as "ability" of household labor force, relative taste for leisure versus consumption, and so on. If we view the observed class transition from period t to T as a result of the household choice in an attempt to maximize the household utility, when we observe that a household moved from class j in period t to class k in period T then it implies:

$$\upsilon_t^i = \upsilon_{t\,|\,\text{class k at T}}^{i\,|\,\text{class j at t}} = V_{jk}\left(t^i, A_t^i, H_t^i, L_t^i, Z_t, p_t^F\right) + \varepsilon_{jkt}^i$$

$$> \upsilon_{t\,|\,\text{class l at T}}^{i\,|\,\text{class j at t}} = V_{jl}\left(t^i, A_t^i, H_t^i, L_t^i, Z_t, p_t^F\right) + \varepsilon_{jlt}^i, \text{ for } l \neq k,$$

where $\upsilon_{t\,|\,\text{class l at T}}^{i\,|\,\text{class j at t}}$ is the *alternative specific indirect utility function*: which is the value of υ_t^i subject to the investment and labor endowment decision at period t (i. e., I_t^F, I_t^H and DL_t) leading to the class transition from j to l (for the class transition from j to k, the constrained value function $\upsilon_{t\,|\,\text{class k at T}}^{i\,|\,\text{class j at t}}$ is the same as the unconstrained value function υ_t^i since the movement from class j to k is the optimal choice given the state variables).

While this model is deterministic in terms of the agent's point of view, since the ε_{jkt}^i term is unobserved from researchers' point of view we can define the household transition probability[22] as follows:

[22]We can view the household class transition analogous to the "occupational choice" situation with a finite choice set: each combination of investment decisions (I_t^F and I_t^H) for $TR_{jk}(t)$ above can be interpreted as occupational choice.

$$P^{i}_{jkt} \equiv \text{Prob(household moves from class j in period t to class k in period T)}$$

$$= \Pr ob\left(\upsilon^{i}_{t\,|\,\text{class j at t}\atop\text{class k at T}} > \upsilon^{i}_{t\,|\,\text{class j at t}\atop\text{class l at T}} \right), \text{ for } l \neq k.$$

$$= \Pr ob\left(V^{i}_{t\,|\,\text{class j at t}\atop\text{class k at T}} + \varepsilon^{i}_{t\,|\,\text{class j at t}\atop\text{class k at T}} > V^{i}_{t\,|\,\text{class j at t}\atop\text{class l at T}} + \varepsilon^{i}_{t\,|\,\text{class j at t}\atop\text{class l at T}} \right)$$

By denoting the set of state variables as a vector and assuming that the indirect utility can be approximated by the linear relation;

$$\mathbf{X}^{i}_{t} \equiv \left\{ t^{i}, A^{i}_{t}, H^{i}_{t}, L^{i}_{t}, Z_{t}, p^{F}_{t} \right\}',$$

$$V^{i}_{t\,|\,\text{class j at t}\atop\text{class k at T}} \approx \mathbf{X}^{i\prime}_{t}\boldsymbol{\beta}_{jk},$$

the transition probability can be written as:

$$P^{i}_{jkt} = \Pr ob\left(\mathbf{X}^{i\prime}_{t}\boldsymbol{\beta}_{jk} + \varepsilon^{i}_{tjk} > \mathbf{X}^{i\prime}_{t}\boldsymbol{\beta}_{jl} + \varepsilon^{i}_{tjl} \right), \text{ where } \varepsilon^{i}_{tjl} \equiv \varepsilon^{i}_{t\,|\,\text{class j at t}\atop\text{class l at T}}.$$

If we assume that the unobserved portion of indirect utility ε^{i}_{tjl} is independently identically distributed type I extreme value (across individual i), then the transition probability takes a multinomial logit form[23]:

$$P^{i}_{jkt} = \frac{\exp\left(\mathbf{X}^{i\prime}_{t}\boldsymbol{\beta}_{jk} \right)}{\sum_{l=1}^{M} \exp\left(\mathbf{X}^{i\prime}_{t}\boldsymbol{\beta}_{jl} \right)},$$

where M is the total number of social class categories. Under the assumption of serial independence, the likelihood function is:

$$L(\boldsymbol{\beta}|\mathbf{X}) = \prod_{t=1962}^{1976} \prod_{i=1}^{N(t)} \prod_{k=1}^{M} \prod_{j=1}^{M} \left[\frac{\exp\left(\mathbf{X}^{i\prime}_{t}\boldsymbol{\beta}_{jk} \right)}{\sum_{l=1}^{M} \left[\exp\left(\mathbf{X}^{i\prime}_{t}\boldsymbol{\beta}_{jl} \right) \right]} \right]^{y^{i}_{k}(T)\cdot y^{i}_{j}(t)},$$

where $y^{i}_{j}(t)$ is an index taking value one if household i belongs to class j in period t and zero otherwise, $y^{i}_{j}(T)$ is the same index for the period five years after period t, and N(t) is the total

[23]This is due to McFadden (1973). Proofs can be also found in Amemiya (1985) and Maddala (1983).

number of observations in period t.

In this framework, only relative magnitudes of indirect utility among alternative investment and labor deployment choices (i. e., $\mathbf{X}_t' \boldsymbol{\beta}_{jk}$ for $k \in [1,M]$) can be identified, but not the absolute level. Therefore, for each origin class j, we normalize the coefficient vector $\boldsymbol{\beta}_{jj}$ (i. e., the coefficients for probability of staying in the same class j) to be 0 and estimate the following equations using maximum likelihood estimation.

$$\log\left(\frac{P_{jk}}{P_{jj}}\right) = \mathbf{X}_t' \boldsymbol{\beta}_{jk} \text{ (for } k \neq j) \text{ and } \boldsymbol{\beta}_{jj} = 0, \text{ for each origin class j.}$$

The empirical Specification for class (j) and explanatory variables ($\mathbf{X}_t$) are as follows:

Class Categories

- Class 0: Landless – Irregularly Employed
- Class 1: Tenant Farmer
- Class 2: Small – Owner
- Class 3: Non – agricultural Regularly Employed

Explanatory Variables $\mathbf{X}_t$*:*

number of children
human capital stock: total sum of years of schooling of the couple plus average years of schooling among children of age over 10
size of land cultivated by Tenant Farmer Class household (ha)
size of land owned by Small Owner household (ha)
age of household head and age of household head squared
national GDP growth rate (annual average over 5 year transition period)
real wage rate (averaged over the 5-year transition period):
for Irregularly-Employed and Regularly-Employed Class only
agricultural terms of trade[24] (average over 5 year transition period) :
for Tenant Farmer and Small Owner Class only

[24]Measured by the ratio of rice price to the weighted average of CPI and an index of farm expenditure. The index of farm expenditure was constructed as the weighted average of farm wage index and fertilizer price index. The weighting for the cost side was based on the data from Hayami *et al.*

Since our 1994 census was thirteen years apart from the 1981 census and transition probabilities for different time lengths are not directly comparable, our econometric estimation focused on the five-year transitions observed between 1962 and 1981, and thus had to exclude the observations from the 1981/1994 transition. An another rationale for this exclusion is the drastically different economic environment and different household behavior between the 1962-81 period and the period after that. The former period is characterized by relatively high and sustained aggregate economic growth and the latter period by the major stagnation in the mid-1980s and onward. Also during the 1980s temporary international migration to Middle East and Asia increased dramatically with possibly quite different mobility implications.

7. Estimation Results

7-1. Coefficient Estimates

The estimation results of our logit regressions are presented in Table 9. For each origin class j, we examine the effects of household characteristics at the initial year as well as of macroeconomic variables during the period on the probability of moving from class j to class k relative to the probability of staying in class j over the next five year period.

Origin Class: Landless Irregularly-Employed

Panel 1 of Table 9 shows the cases when the household belonged to the Irregularly-Employed class in the initial year. Other variables being equal, households with more children were more likely to become Tenant-Farmers rather than remaining in the same class, but the number of children had no significant effect on the transition probabilities for other destination classes. As argued above, the number of children can have both positive and negative potential impact on the prospects for household accumulation. Since our statistical models are reduced-

form estimates, the results indicate the relative balance between these forces. Our result shows that for the Irregularly-Employed households, the larger number of children had a positive net effect on the probability of becoming a Tenant-Farmer but little net effects on the other transition probabilities.

The stock of human capital, measured by the sum of the couple's total years of schooling plus the average years of schooling among children of over age 10, seems to have a significant positive impact on the prospects of moving from the Irregularly-Employed to the Small-Owner class and, likewise, from the Irregularly-Employed to the Regularly-Employed class, but not to the Tenant-Farmer class. This is as expected for the move toward the Regularly-Employed since schooling is an important qualification for many of the occupations included in this class category. As for the transition to the Small-Owner class, since our measure of the human capital stock includes that of both the couple and children, it could reflect the possibility of children contributing to the household accumulation through remittances. Our result is also consistent with the notion that the schooling not only gives knowledge but also enhances learning efficiency[25] and thus may matter even in the case of climbing up the agricultural ladder.

The life-cycle position of the household head also appears important for the prospect of household accumulation. Using the likelihood ratio test, we reject the joint hypothesis that both age and age-square coefficients are zero at 1% level of significance, suggesting the existence of quadratic-shaped effects of stage in the life cycle. Figure 1 depicts the change in transition probabilities over the life-cycle, holding all the other covariates constant (at the 1971 average level). The stability of households in this class (i. e., the probability of staying in the Irregularly-Employed) appears to increase with age until the mid-50s, while the probability of moving from the Irregularly-Employed to the Tenant-Farmer or to the Regularly-Employed status tends to be higher during the 20s and early 30s than in later years. It is plausible that the preference for non-

[25] For a recent evidence, see Rosenzweig (1995).

farm occupation is higher among the younger population than the older. A possible story for the higher Irregularly-Employed to Tenant (upward) transition in the younger ages is that many sons of farm households tend to seek out non-farm opportunities (in the nearby city or in Manila) in their late teens and 20s, and after failing to land a secure non-agricultural job, they return to farming and become tenants (possibly inheriting a part of the land-tenancy from their fathers at that point)[26]. When those sons of farmers do not actively seek non-agricultural jobs in their youth, they may start their households as Irregularly-Employed by helping their parents on their farm, and they may not inherit some of the tenancy rights from their parents until in their 20s or early 30s. For the Irregularly-Employed to Regularly-Employed transition, the higher transition probability in their 20s to early 30s may be due to the relatively high spatial mobility during young age. Some of the Irregularly-Employed are more successful in landing a secure job in metropolitan area when they are relatively young and flexible than when they were older. However, the upward turn of the Irregularly Employed-to-Regularly-Employed transition curve in the late stage of the life-cycle (after the 50s) might reflect the fact that some of the Irregularly-Employed households (who invested in children's human capital) are supported by their children who have achieved secure employment, including international contract work, through remittances in their later stages of the life.

In contrast, the probability of making the transition from the Irregularly-Employed to the Small-Owner category takes an inverted U-shape with a peak at around age 40. This seems to resemble the life-cycle income profile. Household accumulation increases over age and peaks in the middle age when they have accumulated some surplus over the years as well as when their children become fully economically active as a labor force in the household.

Among the exogenous economic variables, aggregate GDP growth rate seems to have had significant effects on transition probabilities but the wage rate seems to have little effects. Our

[26] This and other interpretations of quantitative results in this section are based on Anderson (1963, 1975), personal conversations with Anderson, as well as the author's field work in 1994 .

result indicates that GDP growth rate had a significantly positive effect on the transition probability of moving from the Irregularly-Employed to the Small-Owner or to the Regularly-Employed class relative to the probability of staying in the same class, but did not have a significant effect on the probability of moving to the Tenant-Farmer class. This result is consistent with the (vague but intuitive) notion that a dynamically growing economy provides opportunities for upward mobility. While the rise in real wage rates is expected to have positive effects on the prospects for household accumulation, there is no indication in our results (at the 10 % level) that real wage rate (measured by unskilled wage rate in industrial sector in the area of Manila and its suburbs, deflated by CPI[27]) had significant effects on any of the transition probabilities.

Origin Class: Tenant-Farmer

Panel 2 of Table 9 shows the logit estimation results of the transition probabilities for the cases where the household belonged to the class of Tenant-Farmer in the initial year. The number of children had a positive net impact on the transition from the Tenant-Farmer to the Regularly-Employed class. This may reflect the positive effects of having larger family labor endowment to work on the farm being more than offsetting negative effects of high level of subsistence consumption constraints. However the number of children does not seem to have had a significant net effect, either positive or negative, on the transition probabilities of becoming Irregularly-Employed or a Small-Owner. Again this may reflect the fact that the larger number of children can have both positive and negative effects on accumulation and these effects may have canceled out. A larger human capital stock had a significantly positive effect on the probability

[27] Perhaps agricultural wage rate, rather than unskilled industrial wage rate, may be conceptually a better measure. However, it turns out that the real agricultural wage rate was highly correlated with the GDP growth rate and also that many of Irregularly-Employed household members were casual laborers in non-agricultural sector, such as carpentry and passenger-tricycle driving. So we decided to use the unskilled industrial wage rate as a proxy for the aggregate index of wage rates faced by this class of households.

of becoming a Small-Owner and Regularly-Employed, but not Irregularly-Employed. Therefore, education does not seem to matter for the transition between the Irregularly-Employed and the Tenant-Farmer classes either way.

As expected, the amount of agricultural land cultivated by the household had some impacts on the prospects for climbing up the agricultural ladder. A larger farm size had a negative (significant at 12% level) effect on the probability of becoming Irregularly-Employed and significantly positive effects on the probability of becoming a Small-Owner. However, a larger size of cultivated land does not appear to have had a significant effect on the prospects of mobility toward the Regularly-Employed status. This may suggest that a large farm size partly reflects the household's tendency toward commitment to (or preference for) farming[28] and thus indicates a lesser tendency to become Regularly-Employed outside agriculture, which may offset the potential positive effects of a larger land endowment on human capital investment.

The household life cycle effect is significant for the Tenant class as well. The likelihood ratio test indicates that the age of the household and its square terms are jointly significantly different from zero at the 1% level. Figure 2 shows the estimated pattern of change in transition probabilities over the life-cycle holding all the other covariates as constant (at the 1971 average level). Again the stability seems to increase over age and peaks during the 40s. The transition probability of becoming Regularly-Employed from a Tenant-Farmer tends to be relatively higher in the 20s and early 30s than in the later ages. This may be due to the higher spatial mobility for employment during the younger ages. Particularly during the construction boom under the early martial law regime in the early 1970s, a large number of young tenant farmers were employed as contract workers in the metropolitan Manila area[29]. On the other hand, there appears to be little change in the transition probability of becoming either Irregularly-Employed or a Small-Owner

[28] Personal conversations with Anderson.

[29] Personal conversations with Anderson. Also there are some anecdotal stories to substantiate this point collected during the author's 1994 field work.

over the life-cycle. Nevertheless the slightly upward slope of the Tenant-to-Small-Owner transition may reflect the effect of life-time accumulation, and the similar upward slope of the Tenant-to-Irregularly Employed may reflect the fact that the Tenant-Farmers tend to give parts of their tenancy to their sons as they start forming their own households, which tends to occur after their middle age.

The aggregate GDP growth rate appears to have had no significant effects on mobility prospects within the agricultural ladder. However, it had significantly positive effects on the probability of moving to the Regularly-Employed class. Since economic growth generally creates growing economic opportunities outside the agricultural sector, our result is quite plausible. Finally, changes in the agricultural terms of trade seem to have had some impacts. The increase (i. e, favorable to the farmers) in the terms of trade seems to have had a significantly positive effect on the probability of moving (up) form the Tenant-Farmer to the Small-Owner status. The effects on the probability of becoming Regularly-Employed is likely to have been negative (since farmers would have less incentive to move out of farming and into non-agricultural occupations) but the estimated coefficient is not significant. The impact of the terms of trade on the probability of becoming Irregularly-Employed is also negative, as expected, but not statistically significant.

Origin Class: Small-Owner

Panel 3 of Table 9 shows the coefficient estimates in the cases where the initial household class category is the Small-Owner. In contrast with the previous cases, there is an indication that a larger number of children, on balance, can have a negative net impact on household accumulation; a larger number of children seems to have had significantly positive effects on the probability of moving (downward) from the Small-Owner to the Irregularly-Employed status relative to the probability of staying in the Small-Owner status. However, the net impact of the

number of children on transition probabilities for other movements are statistically not significantly different from zero.

Human capital stock of household members had some positive impacts on accumulation among Small-Owners as well. The higher the level of schooling among adult household members the less likely it is for the household to move from the Small-Owner to the Irregularly Employed status. Therefore there is again an indication that schooling has positive effects on the accumulation within the agricultural sector. However, surprisingly, the effect of education on the prospects for obtaining secure non-agricultural occupations is not statistically significant at the 10% level. Nor is the effect of education significant for the transition from the Small-Owner to the Tenant-Farmer class.

Not surprisingly, within the "agricultural ladder" in the village hierarchy, the size of owned land had significant and positive effects on the household accumulation. A larger amount of land ownership is associated with a lower probability of moving from the Small-Owner to either the Tenant-Farmer or the Irregularly-Employed status. On the other hand, the amount of land owned did not have statistically significant effects on the probability of moving from the Small-Owner to the Regularly-Employed status.

Being an Owner-Tenant (i. e., a Small-Owner farm household which expanded the size of his farm operation through additional land renting) in the initial period seems to have made it less likely to become either Irregularly-Employed or Regularly-Employed, although it did not make any significant effect on the probability of becoming a Tenant-Farmer. Generally Owner-Tenant farmers were highly committed to farming, and therefore it is not surprising that they were less likely to move to non-farming occupations.

The likelihood ratio test indicates that the age of the household head and its square terms are jointly significantly different from zero at the 3% level of significance. Figure 3 depicts the estimated pattern of change in transition probabilities over the life-cycle holding all the other

covariates as constant. It indicates that the household stability (i. e., the probability of staying in the Small-Owner class) increases monotonically over their adult life time. The transition probability of becoming Irregularly-Employed appears higher when they are young and tends to decrease over age. It is plausible that, when they are given some land from their parents, their farm operation is not stable during their initial stages of farming and that the probability of downward mobility may be relatively higher in their younger ages than in the later ages when farmers generally have accumulated experiences and thus their farm operation is much more stable. This may also reflect the tendency for young farmers to seek non-agricultural occupations (in urban sectors) and their relatively high spatial mobility in their youth. On the other hand, the transition probability of becoming a Tenant from a Small-Owner takes a inverted U-shape with the peak in the late 40s. This may reflect the fact that Small-Owner households often give part of their land to their children, thereby themselves being downwardly mobile, when the children form their own households as marriage gifts. This typically occurs in their middle age. In contrast, the transition probability of becoming Regularly-Employed appears to stay more or less constant over the life cycle.

The effects of economic environment were not statistically significant for the transition probabilities of the Small-Owner households. Neither the GDP growth rate nor the agricultural terms of trade had statistically significant effects on any of the transition probabilities. This seemingly non-response to market signals or to the non-agricultural opportunities (measured by the GDP growth rate) may indicate the relatively low level of market participation by this class (i. e., its subsistence nature) during our data period.

Origin Class: Non-Agricultural Regularly-Employed

Finally, Panel 4 of Table 9 shows the coefficient estimates for the cases where the initial household class category is Regularly-Employed. A larger number of children appears to have

had significant net effects of increasing the probability of moving from the Regularly-Employed to the Tenant-Farmer status relative to the probability of remaining in the same class, other things held constant. It did not, however, seem to have had significant effects on the other transition probabilities.

The human capital stock had significant effects on the mobility prospects of this class as well. The Regularly-Employed households with a higher level of schooling among their adult members were less likely to move to either the Irregularly-Employed or the Tenant Farmer status at the 5% level and to the Small-Owner status at the 10% level of significance. Since many occupations in this class category require educational credentials this result is to be expected.

In addition, the likelihood ratio test indicates that the age of the household head and its square terms are jointly significantly different from zero at the 1% level of significance. Unlike the other social class categories the degree of stability of the Regularly-Employed class (i. e., the transition probability of staying in the same class) does not seem to change much over the life-cycle, except for a small decrease in the early 50s which, in turn, seems to be a reflection of the increase in the probability of becoming a Small-Owner from Regularly-Employed. (see Figure 4) A possible story behind this is that some of the Regularly-Employed income earners retire from their jobs in the later stages of their career, purchase a piece of land in the village and settle down either as a owner cultivator or as a small proprietor. This tendency is typical among such occupations as a military officer and contract workers in Hawaii or in Guam. Another observable life-cycle effects on class mobility appears to be the relatively high probability of becoming a Tenant-Farmer from Regularly-Employed in the younger age. This could be the flip side of the higher mobility from the Tenant-Farmer to the Regularly-Employed class noted earlier. Those former Tenant-Farmers who had acquired non-agricultural regular employment (such as contract workers in the metro Manila area during the construction boom) came back after their tenure (or through other forms of losing their jobs) and settled down as Tenant-Farmers again. The

transition probability of becoming Irregularly-Employed appears more or less constant over the life-cycle.

Macroeconomic variables had significant effects on the transition probability from the Regularly-Employed to the Irregularly-Employed status. The higher the GDP growth rate the less likely the Regularly-Employed household was to become Irregularly-Employed. Therefore, combined with the result from the transition probability of moving from Irregularly-Employed to Regularly-Employed, a higher GDP growth rate appears to have induced upward mobility and lowered the probability of downward mobility for Regularly-Employed households. GDP growth rates, however, did not have significant effects on the probability of moving from the Regularly-Employed to either the Tenant-Farmer or the Small-Owner class.

The real wage rate (measured by skilled wage rate in industrial sector in the area of Manila and its suburbs) also had significant effects on the movement from Regularly-Employed to Irregularly-Employed; as expected, a higher real wage rate was negatively associated with the probability of moving from the Regularly-Employed to the Irregularly Employed status. Thus, in contrast with the case of Small-Owner households, the movements between Irregularly-Employed and Regularly-Employed were quite sensitive to macroeconomic environments. This indicates that the market integration was relatively higher among the households in these classes. However the real wage rate did not seem to have significant effects on the transition from the Regularly-Employed to the Small-Owner or to the Tenant-Farmer class.

7-2. Marginal Effects of Covariates on the Transition Probability

Table 11 shows the magnitudes of the marginal effects of covariates[30] in elasticity form, and we can compare the relative magnitudes of marginal effects of (statistically significant) covariates. In particular, we are able to assess the relative magnitudes of the effects of economic

[30] Since the marginal effects depend on the values of covariates as well as on the values of coefficients, marginal effects here are calculated by setting the values of covariates at the sample mean over the entire observation period.

environments (such as prices and macroeconomic growth rates) as opposed to a household's characteristics. For the Irregularly-Employed class households, the marginal effects of additional schooling is roughly twice that of an additional child in elasticity terms, and the marginal effect of GDP growth rates is roughly 5.3 to 6.5 times (depending on the destination class) that of schooling effect. For the Tenant-Farmer class, the marginal effect of additional schooling corresponds to roughly 1.3 times that of an additional child and the marginal effect of additional land cultivated corresponds to roughly half that of the schooling effect. Also, for the Tenant class, the marginal effect of a change in the real wage rate is about four times that of an additional year of schooling, and the marginal effect of GDP growth rate is 3.3 times that of schooling effect. For the Small-Owner class, the marginal effect of schooling is roughly 1.7 times that of an additional child, and the marginal effect of additional owned land has quite different values depending on the destination class; it is less than half the marginal effect of additional schooling for the movement to Irregularly-Employed, while it is 6 times the marginal effect of additional schooling for the movement to Tenant-Farmer. Finally, for the Regularly-Employed class, the marginal effect of additional schooling corresponds to roughly one to two times that of an additional child, depending on the destination class, the marginal effect of a real wage rate increase is roughly 2.4 to 4 times (depending on, again, the destination class) that of the additional schooling effect, and the marginal effect of the GDP growth rate is about 5.3 to 9 times that of the additional schooling effect.

Therefore, the general conclusions from the comparisons of the elasticities regarding statistically significant covariates are as follows. First, macroeconomic variables tend to have much larger quantitative effects (measured in elasticity) on transition probabilities than do household characteristics. Secondly, the quantitative effects of marginal changes in household characteristics on different destination classes tend to be relatively similar, except in the case of the effect the amount of owned land on the transition probability of moving from the Small-

Owner class to other classes.

8. Conclusions and Limitations

Our longitudinal data reveal that the village class structure changed drastically over the past three decades with the declining share of agricultural classes (Small-Owner and Tenant-Farmer) and increasing shares of the Irregularly-Employed and the Regularly-Employed classes. The Regularly-Employed households, being at the top of the village hierarchy, remained the most stable in terms of mobility probabilities. The mobility patterns of the Small-Owners were characterized by relatively high downward mobility through the 1960s and the 1970s. Over the years, upward mobility among Irregularly-Employed and Tenant Farmers had increasingly been through the acquisition of non-agricultural regular occupations rather than through the "agricultural ladder."

Next, we derived a multinomial logit regression model based on a conceptual model of dynamic household decision making, and our estimation results indicate the following. First of all, a better access to land is likely to facilitate the prospects for further accumulations in agriculture and thus for climbing up the agricultural ladder. Furthermore, a better access to human capital appears to facilitate the prospects for upward mobility through both agriculture and non-agricultural routes. Higher human capital stock can contribute to accumulation in agriculture through two possible routes. One route is that schooling of children increases their income earning capacity in non-agricultural sector (such as school teaching or regular job in Manila) and children's contributions to household income is invested in agriculture; the other route is that schooling can enhance learning efficiency in on-farm work (e. g., adoption of new agricultural technologies) which can augment agricultural productivity. As a whole, our results indicate that "the initial conditions matter;" a household with greater access to land or the human capital stock has a better chance of further accumulation. In terms of policy, this implies that

"redistribution before growth" [31] is desirable for the purpose of equitable growth.

Second, faster macroeconomic growth tends to facilitate upward mobility and prevent downward mobility mainly among the non-agricultural classes (i. e., Irregularly-Employed and Regularly-Employed). There is also an indication that the mobility between Tenant-Farmer and Regularly-Employed was responsive to economic growth. Moreover, the quantitative impact of macroeconomic variables on mobility tends to be quite large relative to the impact of household specific state variables. On the other hand, the transition probabilities of the agricultural classes are not generally responsive to GNP growth rates. Third, price variables had some impacts. Higher wage rates reduces downward mobility for Regularly-Employed and higher agricultural terms of trade tends to facilitate upward mobility from Tenant-Farmer to Small-Owner. However, there is little indication that Small-Owner households in our village were responsive to the price signals or economic opportunities in non-agricultural sectors. This may indicate a relatively low degree of market participation among these households during the period between 1962 and 1981.

Fourth, there is an indication that a larger number of children have positive net effects on household accumulations among the lower strata (i. e., Irregularly-Employed and Tenant-Farmer) but has opposite effects among the upper strata (i. e., Small-Owner and Regularly-Employed). This implies that the households belonging to lower social strata may have an economic incentive to have a larger number of children as a rational household strategy. Fifth, the life-cycle stages of the household head have some significant effects on the mobility prospects of households. Finally, in terms of the elasticity of transition probability with respect to changes in the state variables, the changes in the macroeconomic environment generally tend to have relatively larger magnitude of effects on probabilities than the changes in the household characteristics tend to have. Therefore, especially for the movements of Irregularly-Employed

[31] See for example Adelman (1978).

and Regularly-Employed households that indicate their responsiveness to macroeconomic variables, the changes in their economic environments through policy interventions can have significant impacts on the rural class structure.

These interpretations, however, are based on a relatively simple econometric model. One methodological limitation of the above analysis is that we have not incorporated the panel feature of the data. As Heckman (1981) argued, it can potentially be addressed by introducing either unobserved individual heterogeneity or "true state dependence." Another limitation is that our estimation has a rather rigid Markovian structure of five year transition period. In reality, however, the effects of household investment on accumulation may take more than five years to be manifested in the change in the household class position. Such aspects are not captured by our analysis. An alternative framework that directly addresses this aspect (as well as the "true state dependence") would be the duration model approach.

Furthermore, our analysis focuses on the aspects of mobility that are observed only as movements *across class boundaries*. But there is some evidence indicating that some of Regularly-Employed households attained significant degree of accumulation (upward mobility) during the last few decades[32]. Again, this aspect of mobility *within the class category* is not captured by our analysis. Finally our analysis has limitations of its being reduced form estimation. The effects of the number of children, for example, perhaps has complex effects of both positive and negative impacts on the prospect of household accumulation. Also inferences regarding household responses to economic environment (such as aggregate growth and prices) may be susceptible to the well-known "Lucas critique." One way of moving toward structural form estimation would be to apply the econometric methods of stochastic dynamic programming models, as pioneered by Wolpin (1984) and Rust (1987). In this framework the household would choose discrete set of household strategies and also form expectations on future economic

[32] For example, Umehara (1993). Our census data together with the author's own observation during the fieldwork is consistent with this conjecture.

environments to solve its dynamic programming problem, and structural parameters of such a model can be estimated[33].

[33] The general framework of this literature is discussed in Rust(1994).

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Table 1. Percentage Distribution of Households by Social Class, 1962-1994

Year	1962	1966	1971	1976	1981	1994
1. Small owner	29.0%	24.0%	17.6%	17.9%	14.1%	7.1%
2. Tenant	32.1%	28.8%	30.9%	27.1%	28.2%	20.1%
3. Irregularly employed	24.4%	28.8%	28.6%	28.3%	33.1%	29.3%
4. Regularly employed	14.5%	18.5%	22.9%	26.7%	24.5%	43.6%
Total	100%	100%	100%	100%	100%	100%
Total number of households	262	271	301	329	347	478

Table 2. Transition Matrix 1962-1966

1962 \ 1966	irreg.employed	tenant farmer	small owner	reg.employed	hh dissolution	emigration
irreg.employed	**0.531**	0.109	0.047	0.016	0.141	0.156
tenant farmer	0.131	**0.571**	0.119	0.036	0.071	0.071
small owner	0.132	0.105	**0.513**	0.079	0.066	0.105
reg.employed	0.026	0.000	0.079	**0.605**	0.132	0.158
hh formation	0.317	0.268	0.195	0.220	NA	NA
immigration	0.391	0.174	0.087	0.348	NA	NA

Table 3. Transition Matrix 1966-1971

1966 \ 1971	irreg.employed	tenant farmer	small owner	reg.employed	hh dissolution	emigration
irreg.employed	**0.564**	0.128	0.013	0.038	0.115	0.141
tenant farmer	0.115	**0.679**	0.090	0.013	0.038	0.064
small owner	0.092	0.077	**0.585**	0.108	0.062	0.077
reg.employed	0.040	0.020	0.040	**0.600**	0.060	0.240
hh formation	0.357	0.333	0.071	0.238	NA	NA
immigration	0.250	0.250	0.050	0.450	NA	NA

Table 4. Transition Matrix 1971-1976

1966 \ 1971	irreg.employed	tenant farmer	small owner	reg.employed	hh dissolution	emigration
irreg.employed	**0.547**	0.081	0.081	0.128	0.093	0.070
tenant farmer	0.118	**0.570**	0.118	0.075	0.054	0.065
small owner	0.113	0.170	**0.604**	0.075	0.038	0.000
reg.employed	0.014	0.058	0.043	**0.725**	0.043	0.116
hh formation	0.429	0.321	0.143	0.107	NA	NA
immigration	0.421	0.184	0.053	0.342	NA	NA

Table 5. Transition Matrix 1976-1981

1976 \ 1981	irreg.employed	tenant farmer	small owner	reg.employed	hh dissolution	emigration
irreg.employed	**0.531**	0.109	0.047	0.016	0.141	0.156
tenant farmer	0.131	**0.571**	0.119	0.036	0.071	0.071
small owner	0.132	0.105	**0.513**	0.079	0.066	0.105
reg.employed	0.026	0.000	0.079	**0.605**	0.132	0.158
hh formation	0.317	0.268	0.195	0.220	NA	NA
immigration	0.391	0.174	0.087	0.348	NA	NA

Table 6. Transition Matrix 1981-1994

1981 \ 1994	irreg.employed	tenant farmer	small owner	reg.employed	hh dissolution	emigration
irreg.employed	**0.357**	0.035	0.009	0.217	0.217	0.165
tenant farmer	0.153	**0.408**	0.051	0.245	0.082	0.061
small owner	0.041	0.122	**0.245**	0.163	0.306	0.122
reg.employed	0.035	0.035	0.024	**0.588**	0.165	0.153
hh formation	0.322	0.217	0.066	0.395	NA	NA
immigration	0.353	0.118	0.047	0.482	NA	NA

Table 7. Sum of Probabilities for Upward vs. Downward Mobility

Period	OVERALL		irreg-employed		tenant farmer		small owner		reg-employed	
	upward	downward	upward	downward	upward	downward	upward	downward	upward	downward
1962-66	0.406	0.473	0.172	0	0.155	0.131	0.079	0.237	0	0.105
1966-71	0.390	0.385	0.179	0	0.103	0.115	0.108	0.169	0	0.100
1971-76	0.560	0.517	0.291	0	0.194	0.118	0.075	0.283	0	0.116
1976-81	0.414	0.560	0.183	0	0.146	0.135	0.085	0.220	0	0.205
1981-94	0.720	0.410	0.261	0	0.296	0.153	0.163	0.163	0	0.094

Table 8. Upward Mobility Probabilities: Agricultural vs. Non-agricultural Routes

Period	irregularly-Employed			tenant-farmer		
	agriculture (A)	non-agriculture (B)	ratio (A)/(B)	agriculture (A)	non-agriculture (B)	ratio (A)/(B)
1962-66	0.156	0.016	9.750	0.119	0.036	3.306
1966-71	0.141	0.038	3.711	0.090	0.013	6.923
1971-76	0.162	0.128	1.266	0.118	0.075	1.573
1976-81	0.156	0.016	9.750	0.119	0.036	3.306
1981-94	0.044	0.217	0.203	0.051	0.245	0.208

Table 9. Estimated Coefficients (Logit Estimation)
(Asymptotic t statistics in parentheses) **: significant at 5% level *: significant at 10% level

1. Origin Class: Landless Irregularly Employed

Dependent Variables	Estimated Coefficients for Independent Variables β_{0k}						
	constant	number of children	education	household head age***	HH Age squared***	GDP growth rate	real wage rate
$\log\frac{P_{01}}{P_{00}}$	2.504 (0.59)	0.120* (1.76)	0.015 (0.36)	-0.144 (-1.39)	0.001 (1.18)	-0.272 (-0.68)	0.053 (0.11)
$\log\frac{P_{02}}{P_{00}}$	-16.685 (-2.14)	0.014 (0.11)	0.101* (1.78)	0.298 (1.31)	-0.004 (-1.54)	0.955* (1.74)	0.873 (1.25)
$\log\frac{P_{03}}{P_{00}}$	-5.424 (-1.40)	0.043 (0.36)	0.091* (1.86)	-0.232 (-2.27)	0.002 (2.24)	1.014** (2.42)	0.385 (0.63)

Sample Size = 243

*** Likelihood Ratio Test statistic for the joint hypothesis that age and age squared terms are both equal to zero (Chi square dist. with DF=2): 10.11 (P-value = 0.6%)

Class categories :
- Class 0: Landless – Irregularly Employed
- Class 1: Tenant Farmer
- Class 2: Small – Owner
- Class 3: Non – agricultural Regularly Employed

2. Origin Class: Tenant Farmer

dependent variables	Estimated Coefficients for Independent Variables β_{1k}							
	constant	number of children	education	cultivated land	household head age ***	HH Age squared***	GDP growth rate	ag. terms of trade
$\log\frac{P_{10}}{P_{11}}$	2.838 (0.92)	0.071 (0.94)	-0.052 (-1.19)	-0.709 (-1.58)	-0.135 (-1.28)	0.002 (1.39)	0.133 (0.48)	-0.977 (-0.85)
$\log\frac{P_{12}}{P_{11}}$	-6.436 (-1.74)	-0.066 (-0.65)	0.127** (3.18)	0.468* (1.74)	-0.068 (-0.59)	0.001 (0.86)	-0.303 (-0.91)	3.320** (2.23)
$\log\frac{P_{13}}{P_{11}}$	4.330 (1.01)	0.205* (1.79)	0.130** (2.86)	-0.621 (-1.27)	-0.479 (-3.74)	0.005 (3.67)	0.791* (1.67)	-1.564 (-1.01)

Sample Size = 303

*** Likelihood Ratio Test statistic for the joint hypothesis that age and age squared terms are both equal to zero (Chi square dist. with DF=2): 15.58 (P-value = 0.04%)

3. Origin Class: Small Owner

dependent variables	Estimated Coefficients for Independent Variables β_{2k}								
	constant	number of children	education	owned land	owner tenant (dummy)	household head age***	HH Age squared***	GDP growth rate	ag. terms of trade
$\log\frac{P_{20}}{P_{22}}$	4.745 (1.34)	0.180* (1.86)	-0.082* (-1.65)	-0.879* (-1.69)	-2.410** (-3.72)	-0.109 (-1.20)	0.001 (0.81)	0.141 (0.36)	-1.070 (-0.69)
$\log\frac{P_{21}}{P_{22}}$	-7.522 (-1.53)	0.050 (0.49)	0.038 (0.82)	-2.831** (-2.88)	0.117 (0.21)	0.187 (1.19)	-0.002 (-1.31)	0.392 (1.02)	0.817 (0.53)
$\log\frac{P_{23}}{P_{22}}$	1.571 (0.34)	0.076 (0.85)	0.054 (1.00)	-0.007 (-0.04)	-2.023** (-2.82)	-0.080 (-0.70)	0.001 (0.64)	-0.236 (-0.55)	-0.372 (-0.22)

Sample Size = 221

*** Likelihood Ratio Test statistic for the joint hypothesis that age and age squared terms are both equal to zero (Chi square dist. with DF=2): 6.93 (P-value = 3.1%)

4. Origin Class: Non-agricultural Regularly Employed

Dependent Variables	Estimated Coefficients for Independent Variables β_{3k}						
	constant	number of children	education	household head age***	HH Age squared***	GDP growth rate	real wage rate
$\log\frac{P_{30}}{P_{33}}$	11.662 (1.47)	0.089 (0.69)	-0.100** (-2.41)	0.221 (1.52)	-0.002 (-1.83)	-2.025** (-2.07)	-2.071** (-3.13)
$\log\frac{P_{31}}{P_{33}}$	-2.539 (-0.32)	0.238** (2.11)	-0.131** (-2.26)	0.025 (0.10)	-0.001 (-0.10)	0.660 (1.10)	-0.739 (-0.91)
$\log\frac{P_{32}}{P_{33}}$	-13.412 (-1.74)	-0.081 (-0.74)	-0.079* (-1.69)	0.452 (2.95)	-0.004 (-2.72)	0.041 (0.05)	0.466 (0.55)

Sample Size = 190

*** Likelihood Ratio Test statistic for the joint hypothesis that age and age squared terms are both equal to zero (Chi square dist. with DF=2): 13.22 (P-value = 0.1%)

Table 10. Summary of the Effects of Covariates on Household Accumulation

Household Class transition	explanatory variables				
	demographic	*initial wealth*		*macroeconomic*	
	number of children	education	land	GDP growth rate	wage rate/ ag. terms of trade
Irreg-Employed =>					
Tenant-Farmer	+	(+)		(-)	(+)
Small-Owner	(+)	+		+	(+)
Reg-Employed	(+)	+		+	(+)
Tenant-Farmer=>					
Irreg-Employed	(+)	(-)	(-)	(+)	(-)
Small-Owner	(-)	+	+	(-)	+
Reg-Employed	+	+	(-)	+	(-)
Small--Owner=>					
Irreg-Employed	+	-	-	(+)	(-)
Tenant-Farmer	(+)	(+)	-	(+)	(+)
Reg-Employed	(+)	(+)	(-)	(-)	(-)
Reg.-Employed=>					
Irreg-Employed	(+)	-		-	-
Tenant-Farmer	+	-		(+)	(-)
Small-Owner	(-)	-		(+)	(+)

+/- : significant at 10% level
(+)/(-): not significant at 10% level

Table 11. Elasticity of Transition Probabilities with Respect to Covariates

1. Origin class = Irregularly-Employed

	$\frac{dP_{00}}{dX}\frac{X}{P_{00}}$: Irregularly-Employed	$\frac{dP_{01}}{dX}\frac{X}{P_{01}}$: Tenant	$\frac{dP_{02}}{dX}\frac{X}{P_{02}}$: Small-Owner	$\frac{dP_{03}}{dX}\frac{X}{P_{03}}$: Regularly-Employed
child	-0.09	**0.43***	-0.03	0.09
schooling	-0.15	0.00	**0.85***	**0.74***
real wage rate index	-0.21	-0.07	1.96	0.70
GDP growth rate	-0.49	-2.01	**4.51***	**4.80***

2. Origin class = Tenant-Farmer

	$\frac{dP_{10}}{dX}\frac{X}{P_{10}}$: Irregularly-Employed	$\frac{dP_{11}}{dX}\frac{X}{P_{11}}$: Tenant	$\frac{dP_{12}}{dX}\frac{X}{P_{12}}$: Small-Owner	$\frac{dP_{13}}{dX}\frac{X}{P_{13}}$: Regularly-Employed
child	0.27	-0.07	-0.39	**0.88***
schooling	-0.67	-0.14	**1.13***	**1.13***
cult land	**-0.64***	0.09	**0.55***	-0.51
ag. terms of trade	-1.55	-0.20	**4.67***	-2.38
GDP growth rate	0.47	-0.16	-1.74	**3.76***

3. Origin class = Small-Owner

	$\frac{dP_{20}}{dX}\frac{X}{P_{20}}$: Irregularly-Employed	$\frac{dP_{21}}{dX}\frac{X}{P_{21}}$: Tenant	$\frac{dP_{22}}{dX}\frac{X}{P_{22}}$: Small-Owner	$\frac{dP_{22}}{dX}\frac{X}{P_{22}}$: Regularly-Employed
child	**0.62***	0.07	-0.16	0.18
schooling	**-1.05***	0.50	-0.02	0.80
owned land	**-0.42***	**-2.43***	0.52	0.39
owner-tenant	**-0.74***	0.21	0.20	**-0.63***
ag. terms of trade	-1.35	1.16	0.08	-0.35
GDP growth rate	0.48	1.56	-0.21	-1.34

4. Origin class = Regularly-Employed

	$\frac{dP_{30}}{dX}\frac{X}{P_{30}}$: Irregularly-Employed	$\frac{dP_{31}}{dX}\frac{X}{P_{31}}$: Tenant	$\frac{dP_{32}}{dX}\frac{X}{P_{32}}$: Small-Owner	$\frac{dP_{33}}{dX}\frac{X}{P_{33}}$: Regularly-Employed
child	0.26	**0.92***	-0.39	-0.05
schooling	**-1.17***	**-1.77***	**-1.02***	0.29
real wage rate index	**-4.30***	-1.08	1.59	0.43
GDP growth rate	**-9.33***	4.92	0.54	0.73

*: significant at 10%.