Household Assets and Agricultural Transition in Chitwan, Nepal*

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Introduction

The purpose of this study is to assess the effects of migration and household assets at the household level on agricultural and energy transitions in the context of the socioeconomically changing agricultural region, Chitwan, Nepal, over ten years between 1996 and 2006. In addition to direct effects, household assets which consist of five capitals are also considered as moderators affecting the relationship between migration and agricultural transition. Agricultural transition has two sides: agricultural intensification and de-intensification. In the face of socioeconomic changes in a region where agriculture is the main business, out-migration's social and financial remittances and household assets would give two main options for rural farming households. One is to intensify what they have been doing, which is farming, and the other is to change the mode of production, which is the transition from farming to non-farming.

As the review on the relationship between migration and environment by Hugo (2008) implies, this is important to explore due to three reasons. First of all, the effect of the outflux of migrants on the environment of origins has not been studied enough compared to the influx of migrants. Second, most of the studies focus on the direct relationship between migration and environment, but few have studied how migration affects the transition in what people actually do as a result of migration over time, which could bridge the relationship between migration and environment (Demeny, 1990). Third, few studies have looked at the relationship at the household level. Most studies have used aggregate data, and are thus unable to examine the micro-level mechanisms that underpin agricultural transition at the household level.

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Since Chitwan is heavily dependent on agriculture, agricultural transition has several environmental impacts on ecosystem services. In general, ecosystem services are a set of systems sustaining nature so that it integrates all the countless functions supporting human lives (Daily, 1997). Thus, any positive or negative impact on those functions would be resulted in the decreased or increased ability of those functions, and subsequently, it would affect human lives in return. Previous studies show that social capital, such as collective power at the community level, could protect the ecosystem of a given region from the tragedy of the common property (Pretty and Ward, 2001; Katz, 2000; Ostrom, Burger, Field, Norgaard, and Policansky, 1999; Gibson and Koontz, 1998). Agricultural transition, however, might weaken social capital because people would not share common interests anymore when their ways of living, which has been dependent on the environment, change. For example, as increasing numbers of people are reducing the size of farming land and possibility seeking non-farm opportunities, they would have less common interests in environment as they did before. As a consequence, collective power at the community level, which could protect against negative environmental consequences, would decline significantly, especially when this happens in a short period and where there are few proper regulations.

In this paper, I am looking at four aspects of agricultural transition since the transition is a multifaceted process constantly interacting with household resources. The results from this analysis would shed light on the discussion of development, especially in the context of developing countries, by overcoming the limitation from only focusing on a dichotomous transition, such as farming or non-farming. To explore diverse aspects of agricultural transition, agricultural intensification and de-intensification would be examined separately in detail. For agricultural intensification, the use of chemical fertilizer and the number of poultry would be examined. Using chemical fertilizer for better crop production and raising poultry, such as chicken, ducks or pigeons, to sell, is one of the options for livelihood among rural households with potential environmental impacts. For agricultural de-intensification, the

transition out of farming and the transition to the first salary employment would be examined. In the context of rapidly urbanizing societies, working in non-farming sector is one of the options for better livelihood. Thus, looking at the complete transition out of farming as well as finding a job in non-farm sector would complement each other for better understandings of rural livelihood diversification.

Theoretical Consideration

There has been increasing recognition of the importance of the interrelationship among environment, migration, and development over the last few decades. Even though relatively little attention has been given to the multidirectional relationships between them (Hugo, 2008), the effect of migration on environment might have been more explored than the opposite direction (Hugo, 2008; Suhrke, 1994). However, as the review by Hugo (2008) implies, the examination of the effect of migration on environment is heavily focusing on internal migration, and much less on international migration despite a significant impact of it. Aside from the type of migration, most studies look at the influence of mass influx of migrants on the environment of destinations (Hugo, 2008), not the outflux of migrants and return of migrants on the environment of origins, especially at the household level. Furthermore, as Hugo (2008) reviewed, most of the studies are focusing on direct results, such as deforestation or desertification. Demeny (1990) points out that from an ecological perspective, those findings of negative consequences of population growth on environment are, in many cases, against development. But the difficulty is that we need to achieve both development and the conservation of environment. He argues that for the findings of ecological changes to be relevant to public policy and to be productive in every sense, they need to be integrated in broader conceptual models including human behavioral responses. In addition, they should be considered in the context of time and be ranked in terms of relative importance for the sake of collective action. Looking at the transitions in what people at the household level actually do as a result of out-migration, therefore, is important

because it complements the link between migration and its environmental consequences. The focus of this study is this understudied area: how migration impacts human lives, focusing on agricultural transition in the context of the socioeconomically changing agricultural region of Chitwan, Nepal.

Migration is an important event in that it constantly interacts with the lives of people in destinations as well as in origins. In other words, it is a complicated social phenomenon since countless on-going factors at macro and micro levels increase or decrease the rate of migration, and the ever-changing migration patterns affect those factors in return (Massey, Arango, Kouaouci, Pellegrino and Taylor, 1993 and 1994). Understanding and integrating these interactions is a big challenge for any study because there are so many aspects to be examined to figure out the sheer effect. Facing this challenge, this study only looks at migration as the main cause and agricultural transition as the outcome.

Migration can change the ways people live. However, it is important to recognize that decision of migration is often made at the household level (Connell and Conway, 2000). This means that to understand the relationship between migration and human behaviors that impact the environment, the relationship should be understood in the frame of the livelihoods of individuals and households who continuously try to adjust themselves not only to the changing environment, but also to socioeconomic, political and other on-going transformations (Foresight, 2011). This perspective would be well explained by the perspective of new economics and the livelihood approach. Both views fit in the explanation with the focus on the ability of a household minimizing risks and maximizing what they have for the future.

The perspective of new economics focuses on diversifying income sources. According to this view, the migration decision could be considered as the coping strategy at the household level to diversify risk, which is mainly income source. To overcome two major limitations of the neoclassical economics perspective, which are ignoring the context of individual choices and assuming a perfect rationality of an individual, new economics

consider the context, which is family or household (Jennissen, 2007; Massey et al., 1993). Thus, the decision of migration depends not only on an individual, but also on other family members surrounding the individual. Also, the decision of migration is understood as to diversify the income sources of the family. In less developed countries, such as Nepal, income sources are less stable compared to the ones in developed countries. This is because insurance systems, such as crop insurance and unemployment insurance, are not well developed in less developed countries, and because future markets and capital markets cannot be guaranteed due to unstable economic conditions. As a result, people living in a country like Nepal are more likely to migrate to developed areas to diversify and secure income sources. Thus, this view would explain why so many people in Chitwan, Nepal migrate internally and internationally.

The livelihood approach mainly considers various types of potential resources, not just money, a household would utilize for their current and future livelihood. It emphasizes that the terms, such as “poor” and “low socioeconomic status”, do not fully describe the overall financial standing or wealth of a household (Sherbinin et al., 2008). For example, a household could be poor in financial capital, but rich in social capital (Sherbinin et al., 2008; Reardon and Vosti, 1995). Therefore, diverse aspects of household resources should be considered independently. According to the framework by Ellis (2000), the wealth of a household comprises five forms of capital: natural capital (e.g., local forest resource), social capital (e.g., network), human capital (e.g., education), physical capital (e.g., agro-machines), and financial capital (e.g., money). The combinations of these five types of capital build up the wealth of a household. Simply having any of these types of capital, however, does not mean that a household can use it effectively. An important constraint is whether or not households have the ability to liquidate one capital for another capital (Sherbinin et al., 2008; Reardon and Vosti, 1995). In other words, how easy a household can access to those five capitals and how easy a household can transform one capital to another are also important to understand the livelihood of a household especially in rural area. For example, a

household that tries to sell their land to educate their children is substituting their physical capital with human capital to eventually enhance their financial capital by giving the opportunity for their children to work non-farm. In sum, the livelihood approach explains that households are constantly juggling their current capitals for a better future throughout their lives. From this perspective, agricultural transition can be seen as choices among numerous livelihood diversification strategies with effects on living standards as well as sustainability of surrounding environment (Ellis, 2000).

Agricultural transition as a response to migration: Without doubt, out-migration of any household member reduces the available labor force in a household for agricultural activities or even for other non-farming activities. In short-term, this reduced labor force would affect the current decision making of a household for livelihood until the migrating household members return. As a response, I expect that one way a farming household would try is to intensify farming since a household still needs to secure the current income source with less labor force after migration. Beyond the compensation, they might want to have better agricultural productivity to lift their living standard even with less labor since resources or tools for agricultural intensification are available anytime. Therefore, the first set of hypotheses is that household assets and migration at the household level would increase the likelihood of agricultural intensification.

On the other side, people might try to change their mode of production, partially or completely, rather than intensifying farming as a response to out-migration. In general, the decision to the mode of production depends on the life cycle of a household head, especially who has done farming for a long time as his or her life work (Leonard, Deane and Gutmann, 2011). Besides the consideration of the life-cycle of the head, the existence of young household members would encourage a household head to consider various options of income sources for the future consumption and corresponding production. But young generations tend to leave farming due to his or her career, lifestyle change, or financial decision (Gale, 2003). Out-migration would stimulate this tendency of young generations at

the beginning, but eventually majority of people regardless of age, through the social and financial remittances. Thus, as a given region develops and the society creates more non-farm opportunities, households would be more likely to abandon farming.

In sum, agricultural intensification might not happen, and households might be more likely to change the mode of production, from farming to non-farming, when 1) farming does not guarantee the best profits, and there are sufficient number of off-farm work opportunities requiring a certain level of education besides on-farm opportunities, 2) a decision-maker of a household is relatively young or highly educated. Therefore, the second set of hypotheses is that household assets and migration at the household level would increase the likelihood of the change in the mode of production out of farming.

Moderating factors - human, natural, physical and financial capitals: As discussed, migration is seen as one of the external factors that mediate the relationship between household assets and household livelihood in the perspective of livelihood approach. But the dynamic nature of migration makes it more than an external factor: migration can play a major role in affecting household livelihood directly through social and financial remittances. More than that, it could affect the ways of utilizing household assets, which are composed of five capitals; human, natural, physical, financial, and social capitals. In general, households with migrants would be lack of manpower for a certain period of time, affluent in financial status, and more acceptable of new ideas and thoughts. These characteristics would interact with household assets, and consequently, it would affect agricultural and energy transitions. In other words, how a rural household would decide to use remittances from migration would vary by what they have at a given time.

For the explanations of the moderating effects, I would focus on the capitals that were measured in the dataset, Chitwan Valley Family Study. In fact, social capital cannot be measured with any variables in the dataset, so social capital would be disregarded for the analysis. Social capital could be measured, for instance, by questions about having a friend or any family member outside a given household who gave up farming and working in non-

farming sector. Unfortunately, this type of information is impossible to get from the dataset used for this dissertation, so it remains to be examined in the future.

First, human capital would moderate the relationship between migration and two transitions. Human capital consists of household size and educational attainment. In general, rich in human capital would encourage a household to exit farming rather than stay in farming. However, there could be some variations. Many household members in working age, between 15 and 60 in general, would encourage a household to exit farming, but not to completely stay out of it because the household could invest some of manpower in farming and the rest in non-farming activities at the same time. This pattern would be strengthened with migration experience which brings social and financial remittances. On the other hand, many old household members would work in a way that makes a household to retire from farming. Migration would not play a significant role in this case due to the lack of manpower in a household. Therefore, when it comes to household size, being rich in human capital would be associated with high chance of agricultural de-intensification.

For education, highly educated persons would find non-farming occupations more attractive than farming-related occupations (Willmore, Cao, and Xin, 2011). This is so since those people would want to get the best out of their investment in education, and non-farming occupations in most cases would guarantee higher payment and more stable income than farming. This is more likely to happen under the condition that there are enough non-farm working opportunities outside a household or when the access to those opportunities is not difficult. Therefore, high level of education would be associated with high chance of agricultural de-intensification. Further, when a migrating household has accumulated sufficient remittances, it would boost a household to pursue the transition. On the other hand, if there are not enough off-farm working opportunities and the access to those opportunities is relatively difficult, it would be more attractive to invest in farming than non-farm activities. In this case, high level of education could mean better knowledge about modern agricultural products and techniques, better understandings about agricultural

market economy in a given region, and better management of farming and harvested agricultural products. Then migration experience would rather support the transition to agricultural de-intensification than the counterpart.

Second, natural capital would moderate the relationship between migration and the agricultural transition. Natural capital consists of land and environmental perceptions. Environmental perceptions measure how a household perceive their surroundings compared to the past focusing on water quality, crop production, and crop damage by insects, diseases, etc. How farmers perceive the conditions of land has significant impacts on agricultural transition (Raut et al. 2010; Paudel and Thapa, 2004). This is so because agriculture is highly dependent on the environment so that it is very difficult to keep farming with degrading ecosystem services. As a result, it would make a household to consider other options besides continuing farming. This means that negative environmental perceptions would be associated with agricultural de-intensification. This pattern would be boosted with migration experience since migration would provide relevant resources for the transition. When the perception is positive, on the one hand, migration would be more likely to support agricultural intensification since farming would be more promising option with less risk. When the perception is negative, on the other hand, migration would help a household to get away from farming.

Another component of natural capital is land. When a household owns a land that produces enough for their livelihood, social and financial remittances from migration would work in a way that encourages agricultural intensification. It would be less risky for households to pursue already stable income generating opportunity, which is farming in this case. If a household owns non-profitable land or does not own land at all with accumulated resources from migration, there would be better chance for the household to pursue non-farming opportunities. Thus, natural capital works in different ways by 1) whether a household owns land or not, and 2) by what type of land, bari or khet, a household possesses. In the context of Nepal, khet land, irrigated lowland, is considered to be good

quality farm land suitable for rice cultivation while bari land, upland, is considered as relatively low quality farm land (Bhandari, 2004). Therefore, having khet land with migration experience would be associated with agricultural intensification, and a household with bari land would be less likely to do so. And having any type of land with migration experience would more likely to be associated with agricultural intensification compared to a household without land.

Third, physical capital would moderate the relationship between migration and the transitions. Physical capital consists of housing quality, agricultural equipment and modern equipment. Housing quality would reflect financial status of a household in general as a symbol of status. So when a household has good housing quality with migration experience, the household would be more likely to change their mode of production, from farming to non-farming. However, the direction might be the opposite in that farming might be more attractive under certain conditions. My speculation is that the pattern is inclined towards agricultural de-intensification since the overall pattern of a society under rapid socioeconomic changes is de-intensification in most cases.

Migration experience would encourage agricultural intensification when a household has much agricultural equipment for the best use of their current investment. When a household owns much modern equipment, however, the household is more likely to move out of farming. The reason is that having many modern equipment could imply that a household already has lower threshold for accepting new ideas and thoughts than other households with few modern equipment.

Fourth, financial capital would moderate the relationship between migration and the transitions. Financial capital consists of the number or value of livestock and poultry. These are considered as financial capital since they can be liquidated to or used directly as money in the context of agricultural society. Also having many of them would indicate that a household is in favor of agriculture since livestock and poultry represent agricultural assets that farming households invest their resources in. Therefore, being rich in financial capital

with migration experience would more likely to be associated with agricultural intensification rather than de-intensification. Based on these considerations, two main hypotheses and following sub-hypotheses are derived.

Hypotheses

Agricultural intensification: use of chemical fertilizer and number of poultry.

Household assets:

HA1: Rich in human capital is associated with less use of chemical fertilizer and raging more poultry.

HA2: Rich in natural capital is associated with less use of chemical fertilizer and raging more poultry.

HA3: Rich in physical capital is associated with more use of chemical fertilizer and raging more poultry.

HA4: Rich in financial capital is associated with more use of chemical fertilizer and raging more poultry.

Interaction effects:

HA5: Migration at any level is associated with the use of chemical fertilizer. The direction of this association is contingent on household assets; human, natural, physical, and financial capitals.

Human capital:

HA5-1: rich in manpower: migration would be associated with less use of chemical fertilizer and raising more poultry.

HA5-2: high education: migration would be associated with less use of chemical fertilizer and raising less poultry.

Natural capital:

HA5-3: negative environmental perceptions: migration would be associated with more use of chemical fertilizer and raising less poultry.

HA5-4: own khet land: migration would be associated with less use of chemical fertilizer and raising more poultry.

HA5-5: own bari land: migration would be associated with more use of chemical fertilizer and raising less poultry.

Physical capital:

HA5-6: rich in agricultural or modern equipment: migration would be associated with more use of chemical fertilizer and raising more poultry.

Financial capital:

HA5-7: rich in poultry or livestock: migration would be associated with more use of chemical fertilizer and raising more poultry.

Agricultural de-intensification: transition out of farming and transition to the first salary employment.

Household assets:

HB1: Rich in human capital is associated with higher chance of agricultural de-intensification.

HB2: Rich in natural capital is associated with less chance of agricultural de-intensification.

HB3: Rich in physical capital is associated with agricultural de-intensification.

HB3a: Rich in agricultural equipment is associated with less chance of agricultural de-intensification.

HB3b: Rich in modern equipment is associated with less chance of agricultural de-intensification.

HB4: Rich in financial capital is associated with higher chance of agricultural de-intensification.

Interaction effects:

HB5: Migration at any level is associated with the transition out of farming. The direction of this association is contingent on household assets; human, natural, physical, and financial capitals.

Human capital:

HB5-1: rich in manpower: migration would be associated with higher chance of exit farming.

HB5-2: high education: migration would be associated with higher chance of exit farming.

Natural capital:

HB5-3: negative environmental perceptions: migration would be associated with higher chance of exit farming.

HB5-4: own khet land: migration would be associated with lower chance of exit farming.

HB5-5: own bari land: migration would be associated with higher chance of exit farming.

Physical capital:

HB5-6: rich in agricultural equipment: migration would be associated with lower chance of exit farming.

HB5-7: rich in modern equipment: migration would be associated with higher chance of exit farming.

Financial capital:

HB5-8: rich in poultry or livestock: migration would be associated with lower chance of exit farming.

HB6: Migration at any level is associated with the transition to the first salary employment. The direction of this association is contingent on household assets; human, natural, physical, and financial capitals.

Human capital:

HB6-1: rich in manpower: migration would be associated with higher chance of the transition to the first salary employment.

HB6-2: high education: migration would be associated with higher chance of the transition to the first salary employment.

Natural capital:

HB6-3: negative environmental perceptions: migration would be associated with higher chance of the transition to the first salary employment.

HB6-4: own khet land: migration would be associated with higher lower of the transition to the first salary employment.

HB6-5: own bari land: migration would be associated with higher chance of the transition to the first salary employment.

Physical capital:

HB6-6: rich in agricultural equipment: migration would be associated with lower chance of the transition to the first salary employment.

HB6-7: rich in modern equipment: migration would be associated with higher chance of the transition to the first salary employment.

Financial capital:

HB6-8: rich in poultry or livestock: migration would be associated with lower chance of the transition to the first salary employment.

Data and Method

The dataset used for this study is the Chiwan Valley Family Study (CVFS) which has been collected for more than 17 years since 1996 in Chitwan, Nepal. The data collection is a multifaceted project composed of several datasets. By using the 1991 Nepal census data as a sampling frame, 171 neighborhoods were systematically selected from three strata the initial stage of data collection considering the distance to the most developed urban city in Chitwan, Narayanghat, and the representation of each of the five major ethnic groups living in the survey area (Axinn et al, 2011). Over time, several datasets with different topics have been collected based on the sampled neighborhoods, and four of them will be used for this study; 1) Household Registry, 2) Household Agriculture and Consumption survey, 3) Individual Questionnaire and Individual Life History Calendar, and 4) Neighborhood History

Calendar.

The Household Registry dataset will mainly be used for the primary analysis focusing on monthly migration at any level. This dataset was collected from February, 1997 to June, 2007, over 126 months. This is the individual level data having the information about the roster of all household members, monthly record of living arrangements, marital status, and childbearing experience of each household member. In 1996 original study, 1,582 households and 4,646 individuals were surveyed. Despite the rich information about migration in the Household Registry, however, the one major drawback of the dataset is that it is impossible to distinguish internal migration from international migration, which is considered to be crucial in the relationship between migration and human activities as discussed before. To complement this drawback, Individual Life History Calendar dataset will be used for the secondary analysis.

The Household Agriculture and Consumption Survey was collected in 1996, 2001, and 2006. This is a household level data. Each survey year includes detailed information about farming, livestock, household items, perceptions on changes in environment, physical attack by insects, pests, and diseases, and interviewer's observations of housing. The Individual Questionnaire dataset will be used to have educational attainment of each household member, and the Neighborhood History Calendar dataset will be mainly used to control for contextual factors.

In sum, the Household Registry and Life History Calendar are used for migration information, and the center of the dataset is the Agricultural Consumption Survey. The Individual Questionnaire is used only when the interaction between migration and education is tested to save the number of cases for the analysis.

Using these datasets, discrete-time event history analysis model is used for the analysis of the transition out of farming and the transition to the first salary employment. The analysis for the former is at the household level, and the analysis for the latter is at the individual level. For the analysis of the use of chemical fertilizer and the number of poultry, multilevel model

is used. For the analysis of the use of chemical fertilizer, only two survey points, 2001 and 2006, are used since the amount of chemical fertilizer used by a household was not measured in 1996. For the analysis of the number of poultry, all three years are used and year is included as dummy variables as a control in the models. As a result, each household occupies three cases in the dataset created for the analysis with different values for variables in each year.

There is a possible clustering effect at the neighborhood level. All households in the same neighborhood receive the same neighborhood history calendar measures, these measures are not independent. To address this issue, I will use estimation techniques specifically designed for clustered data; PROC GLIMMIX in case of dichotomous dependent variable and PROC MIXED in case of continuous dependent variable in SAS. These techniques have been used successfully in similar analysis (Yabiku, 2004; Barber, Murphy, Axinn, and Maples, 2000), and it will be of great use in my analysis as well.

The amount of chemical fertilizer and number of poultry: the amount of chemical fertilizer is measuring the amount of chemical fertilizer used by a household in 2001 and 2006, not in 1996. The unit is kilograms. Number of poultry is measuring the number of chickens, ducks, and pigeons a household raises at each time point. Pigeon is included since there are some households raising large number of pigeons for sales.

The transition out of farming and the transition to the first salary employment: when a household did farming in 1996 and did not farming in 2001, it is considered as the transition out of farming and coded as 1. When a household did farming in 1996 and 2001, but gave up farming in 2006, it is coded as 1 as well. Another possibility is that a household creates a new household through household fission, and the new household did not farming in 2001 or 2006. In this case, it is considered as the transition out of farming for parent's household and coded as 1.

If a respondent did not experience any salary employment before 1996 and did not have

salary job in 1996, he or she is included in the sample. Accordingly, the event is the first salary employment from 1997 to 2008.

Migration: Since migration brings new values, ideas, and experiences as well as financial capital, which is linked to all five capitals in the livelihood approach, it cannot be treated as a single capital. It is more likely a source or a consequence of those capitals, and that is the main reason that migration is crucial in the study of rural livelihoods.

Duration of migration: accumulated duration of migration of all household members. The Household Registry data was began since 1997, the migration history before 1996 cannot be acquired from this data. That information is from 1996 Agricultural Consumption Survey. The questionnaire asks if there are any household members who are staying away from home for most of the time in the past 6 months. If there is, the questionnaire asks how long it was. This variable might include the migration duration of the same household member more than twice if the member migrated and came back more than twice.

Control variables: The independent variables at the household level are grouped based on the livelihood approach using four capitals; human, natural, physical capital, and financial capital.

Human capital

Household size: household size is composed of three groups, number of young members age less than 15, number of members in working age between 15 and 65, and number of old members age more than 65.

Education: the highest educational attainment of the oldest household member in a household and the highest educational attainment of the youngest household member.

Natural capital

Own bari and khet land: if a household owns bari land, it is coded as 1. Otherwise, it is 0. If a household owns khet land, it is coded as 1. Otherwise, it is 0.

Water quality: it is 0 if a household thinks that water quality did not get better or worse compared to three years ago. If a household thinks that water quality got a little bit worse, it

is -1, and if it got a lot worse, it is -2. If a household thinks that water quality got a little bit better, it is +1, and if it got much better it is +2. Therefore, it is a continuous variable.

Production quality: it is 0 if a household thinks that production quality did not get better or worse compared to three years ago. If a household thinks that production quality got little, somewhat, or a lot worse, it is -1, -2, or -3, respectively. If a household thinks that production quality got little, somewhat, or a lot worse, it is +1, +2, or +3. Therefore, it is a continuous variable. This variable was not measured if a household was not doing farming.

Physical damage: it is 0 if a household thinks that there was no damage by insects, pests, and diseases. If a household thinks that there was damage, and it was a little or a lot, it is +1 and +2, respectively. Therefore, it is a continuous variable. This variable was not measured if a household was not doing farming.

Physical capital

Equipment: there are two types of equipment. One is agricultural equipment which includes cart, tractor, pumpset, gobar gas plant, and others. And the other is modern equipment which includes radio, television, bicycle, and motorcycle. Both measures how many equipment a household possesses. The range of the index is, therefore, from 0 to 4 and from 0 to 5, respectively.

Housing: this variable is an index measuring the quality of housing. It considers the number of stories and the materials of wall, roof, and floor. One story of a house adds one point to the index, so the range is from 1 to 5. For materials used to build a wall, concrete adds 6 point, brick 5, stone 4, wood 3, mud 2 and cane with mud 1. For materials used to build roof and floor, concrete adds 4 point, brick 3, wood 2, and mud 1. The range of the index is, therefore, from 4 to 19. Since it requires a decent financial ability to have good housing quality, it can also be considered as physical and financial capital.

Financial capital

Livestock: this index is used in the study by Regmi (1999). Each animal among cattle, buffalo, goat, sheep, and pig, gets different score considering the age and the economic

value of an animal. Thus, the higher the number, a household possesses more and better livestock.

Poultry: this measured the number of poultry, including chickens, ducks, and pigeons, a household raises.

Controls

Farming or not: it measure if a household does farming or not.

Household fission: it measures if a household experienced household fission between survey years. It is coded as 1 if it happened, and otherwise 0.

Distance to Narayanghat by a bus: it measures minutes by bus to Narayanghat, which is the most developed city in Chitwan valley.

Results

Agricultural Intensification

1) chemical fertilizer use: the first analysis is looking at agricultural intensification; the use of chemical fertilizer between 2001 and 2006. This analysis is to test the effects of household assets and migration on the amount of chemical fertilizer (kg) used at the household level controlling for the neighborhood-level variation. The results are summarized in <Table 1>. Model 1 is the model without education information, and Model 2 includes it. In both models, migration does not have a direct significant effect on the amount of chemical fertilizer.

<Table 1> about here.

All four capitals show significant effects. First, human capital, especially educational attainment of the oldest member in a household is positively associated with the amount of chemical fertilizer use. In model 2, one year increase in the years of education of the oldest household member adds about 1.6 kg of chemical fertilizer. However, education level of the youngest member is not significant at *p*-value .10 level. This might be due to the fact that

young generations tend to stay away from farming as a society develops and old generations tend to stay in farming no matter what, so more education for old generation results in more use of modern agricultural technologies. Second, environmental perceptions, particularly on production quality, affect the use of chemical fertilizer. The result in model 1 shows that the better production quality a household perceives, the less chemical fertilizer they use. This indicates that farming households tend to use chemical fertilizer in the face of degrading crop production. Third, being rich in physical capital increases the amount of chemical fertilizer used by a household as well. In model 1, one additional agricultural equipment, such as tractor, pump set, and gobar gas plant, increases the amount of chemical fertilizer used by about 7.4 kg. This result reveals that farming households that already invested a lot in what they do, farming, tend to keep investing more. Fourth, the result of livestock replicates the same pattern. One additional livestock increase the amount of chemical fertilizer use by 3.8 kg, which implies that purchase power of a household matters for the use of chemical fertilizer use as well.

Model 3, 4, 5, 6 are testing interactions between migration and each of four capitals. The interactions with human and natural capitals are significant at *p*-value .10 level. Model 4 shows significant interactions between migration and human capital, especially man power. Many household members in working age repress the positive effect of migration on the amount of chemical fertilizer while many household members in old age boost the negative effect of migration. For example, when there is only one working-age household member and duration of migration at the household level is twenty four months, about 10 kg adds to the amount of chemical fertilizer use. When, on the other hand, there is four working-age household members and duration is the same, 3.4 kg adds to the amount. On the contrary, when there is only one old household member and duration is twenty four months, 1.2 kg of chemical fertilizer adds to the amount. But when there are four old household members and duration is the same, a household uses 32 kg less of chemical fertilizer. These results imply

that migration might work in different ways through available man power in a household. When there is plenty of man power available for farming, a household still tends to increase the amount of chemical fertilizer use as duration of migration increases. When there is not much man power available for farming, however, migration decreases the amount of chemical fertilizer use considerably.

Model 5 shows the results of the interaction between migration and natural capital, especially possession of khet land. When a household owns khet land, the longer the duration of migration at the household level, the less chemical fertilizer they use. On the contrary, when a household does not own khet land, the longer the duration of migration, the more chemical fertilizer they use. Khet land is irrigated low land and considered to be more productive than bari land. Not possessing khet land but still farming implies that a household is most likely a tenant, not a landlord, or possessing less quality land. Thus, the results demonstrate that households without good quality land try to maximize crop production to pay the rent and to make living out of it at the same time so that they might care less about the sustainability of land, which is not theirs, in the near future.

2) number of poultry: the second analysis examines another aspect of agricultural intensification; the number of poultry raised by a household. This analysis is to test the effects of household assets and migration on the number of poultry by using multilevel model integrating all three survey years. The results are presented in <Table 2>.

<Table 2> about here.

The result demonstrates that migration does have a direct effect on the amount of chemical fertilizer. In model 1, one additional month in the duration of migration at the household level decreases the number of poultry raised by a household by about .20. To rephrase it, if a household has a migrant who are away for twenty months, the household reduces the number of poultry by four. In sum, the longer the duration of migration, the less

poultry a household raises. This result might indicate that households with migrants tend to stay away from labor-intensive activities, such as raising poultry, and get dependent on the remittances from migrants as the duration of migration increases.

In addition, it turns out that human and physical capitals have significant effects on the number of poultry. First, human capital, such as man power and education, has positive association with the number of poultry. In model 2, one additional household member in working age increase the number of poultry by about 3.1 though it is not significant at .10 level of significance in model 1. This reflects the labor intensive nature of raising poultry. And one year increase in the years of education of the oldest household member adds about 1.6 poultries. This, as in chemical fertilizer use, might be due to the agriculture-friendly attitudes of old generations, and their efforts to diversify income source.

Second, the result of environmental perception is the opposite of my expectation in model 1. The better water quality a household perceives, the more poultry they raise. However, this result is not consistent in model 2. Third, being rich in physical capital increases the number of poultry as well. In both model 1 and 2, modern and agricultural equipment work in the same direction, but agricultural one shows stronger effect. In model 1, one additional agricultural equipment, such as tractor, pump set, and gobar gas plant, adds about 27 poultries to a household. Again, as in chemical fertilizer use, this result emphasizes the fact that households that already invested considerable amount of their resources in farming tend to keep investing more. Last, distance to the nearest modernized city, Narayanghat, shows a significant effect on the number of poultry. The further from the city, the less number of poultry a household raises. This could indicate that distance to the market to sell poultry is also an important factor to raise additional poultry.

Model 3, 4, 5, 6 are testing interactions between migration and each of four capitals. The interaction with human capital is significant at *p*-value .10 level. Especially the number of household members in working age and the education level of the oldest household

member, among all the components of human capital, show significant results. When there are few household members in working age, migration is positively associated with the number of poultry. On the contrary, when there are many working-age household members, migration is negatively associated with the number of poultry. This result could imply that a household might choose or be forced to stay in farming when they do not have enough man power to diversify their income source and become dependent on the remittances from migrants. In addition, when the oldest household member is highly educated, the household raises less poultries. On the other hand, when the oldest household member is not well educated, the household raises more poultries. This reflects the positive relationship between education and the transition out of farming, which we will see in the next analysis.

Agricultural De-intensification

1) transition out of farming: the third analysis is looking at agricultural de-intensification. This analysis is to test the effects of household assets and migration on the transition out of farming at the household level by using discrete-time event history analysis approach. The results are presented in <Table 3>. The results are presented as odds ratios, so a coefficient greater than one represents a positive effect that accelerates the rate of the transition, while a coefficient less than one represents a negative effect that delays the transition.

<Table 3> about here.

In both model 1 and 2, there is no direct effect of duration of migration controlling for frequency on the transition out of farming at the household level. However, household assets, all four capitals, show significant results. First, human capital demonstrates strong effects on the transition. In model 1, one additional household member in young and working age decrease the likelihood of the transition out of farming by 13% and 12%, respectively. On the other hand, one additional old household member increases the likelihood by 41%. This

implies that available man power in a household play a very important role in diversifying income sources. Put it differently, the results of young and working-age household member indicates that a household tend to stay in farming when they have enough man power to do farming and other activities at the same time. There is education effect as well. The results in model 2 show that one additional year in education increases the likelihood of the transition out of farming by 5% and 4%, respectively. Education of both the youngest and the oldest members has positive association with the transition.

Among the components of natural capital, possessing khet land, which is irrigated low land, decreases the likelihood of the transition out of farming. This is expected in that the better land quality is, the more likely a household would stay in farming. Physical capital, especially housing quality, shows significant result as well. One unit increase in housing quality is associated with 9% increase in the likelihood of the transition in model 1. This might be due to the fact that people tend to keep farming as their main work when their livelihood is not threated by anything. Good housing quality could reflect the fact that what they have been doing, farming, has been successful. The result of financial capital also supports this view. In model 1, one unit increase in livestock is associated with 31% decrease in the likelihood of the transition.

Model 3, 4, 5, 6 are testing interactions between migration and each of four capitals. The interactions with human and physical capitals are significant at *p*-value .10 level. First, the interaction between migration and human capital, especially the number of household members in working age, shows significant result. For example, when there is one household member in working age and duration of migration is fixed at twenty four months, the household is about 20% less likely to experience the transition out of farming. On the other hand, when there is four working-age household members with the same duration of migration, the household is about 7% more likely to experience the transition. This is the opposite of the expectation. The reason of the decrease in the likelihood of the transition

when a household is lack of man power might reflect the high degree of dependency of a household on remittances from migrants when there are few members who can work outside.

The result of the interaction between migration and physical capital, especially modern equipment, shows significance as well. For example, when a household possess one modern equipment with twenty four months of duration of migration, the household is about 18% more likely to experience the transition out of farming. On the contrary, when a household possess four modern equipment with the same duration, the household is about 79% more likely to experience the transition out of farming. This result implies that the extent to which a household is exposed to modern technology could be one of the key factors for them to choose the transition.

2) transition to the first salary employment: the last analysis is looking at another aspect of agricultural de-intensification. This analysis is to test the effects of household assets and migration on the transition to the first salary employment by using event history model. This is an analysis at the individual level, so individual characteristics are also examined together with household assets and migration. And unlike the other three analyses, migration at the individual level as well as at the household level are explored. To take full advantage of using life history calendar dataset, migration information is from life history calendar, not from household registry dataset. As a result, we can differentiate domestic migration from international migration at both levels. In addition, interactions between migration and household assets are not tested since this is an individual-level analysis.

The results are presented in <Table 4>. Model 1 includes migration and household assets. Individual characteristics are added in model 2, and all the predictors are in model 3. Duration of international migration, both at the individual and household levels, is significant at p-value .10 level in model 1 and 2. However, when individual characteristics and household assets are controlled in model 3, it becomes non-significant. Overall, the results show that individual characteristics mostly decide the transition to the first salary

employment, and both domestic and international migrations do not affect the transition.

<Table 4> about here.

Household assets and migration are not significant at *p*-value .10 level in model 3. Some of the individual-level predictors are significant at *p*-value .01 level. First, female is about 91% less likely to experience the transition to the first salary employment. This reflects the fact that most farming works are still female dominant while non-farm jobs, such as salary jobs, are male dominant in the context of Chitwan, Nepal. Second, one additional year in individual education increases the likelihood of the transition by 11%. This is expected in that mid or high level of education is one of the most prominent requirements needed for salary jobs. Third, father's school experience increases the likelihood of the transition to the first salary employment of a respondent by 83%. Put it differently, a respondent who has an educated father is more likely to have a salary job. This could indicate the possibility that a respondent is considerably exposed to non-farm works due to his father's experience in non-farm sector, or that the financial status of his or her family is relatively better than other families so that the family could afford extra education for the respondent. Last, the transition to the first salary employment is most likely to happen before age 30, especially between 20 and 25.

Conclusion

This study examines the effects of migration and household assets at the household level on agricultural transition in the context of socioeconomically changing region, Chitwan, Nepal. Diverse aspects of agricultural transition which consists of agricultural intensification and de-intensification are examined by using the datasets from Chitwan Valley Family Study.

Household assets show significant associations with agricultural transition while migration does not have direct effects on the transition in general. There are a few important

findings from the results for agricultural intensification. First, whether or not a household intensifies farming depends on available man power in a household when there are migrating household members. Second, the presence of highly educated household members in old age has tendency to intensify what they have been doing, farming. Third, how a household perceives the surrounding environment they are dependent on decides their livelihood strategy in the future. Fourth, households that already invested a lot in farming tend to stay in farming and intensify it.

There are also numerous important findings from the results for agricultural de-intensification. First, abundant man power in a household tends to keep the household stay in farming and diversify their income source. Second, high level of education fastens the transition out of farming. Third, the stability of their current livelihood might be important for rural households to keep farming. Last, individual characteristics are more important than household assets for an individual to participate in non-farm sector.

In the big picture, the important issue is that agricultural transition has been happening in rapid pace over the last two decades in the context of Chitwan, Nepal. As discussed, it could disintegrate collective power to protect the ecosystem services they are dependent on without proper regulations. Nepal is one of the poorest countries in the world, so overall economic development has been the ultimate first goal of the government for a long time. The transition from farming to non-farming has been inevitable, and there is high chance that the trend would continue as the society develops. The implication of this study is that understanding this social transition and its environmental impacts are as important as economic development. Because understanding how people react to their surroundings with the resources they possess would be the first step towards economic development. Further, how to manage different interests of different groups as the consequence of the transition should be one of the main goals for the sustainable development of the country.

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<Table 1> Multilevel Analysis Results of Household Assets and Migration on the Amount of Chemical Fertilizer Use (kg)

Variables	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Beta	S. E.	Beta	S. E.	Beta	S. E.	Beta	S. E.	Beta	S. E.	Beta	S. E.
Migration												
Duration	-0.05	0.16	-0.05	0.17	0.51 †	0.31	0.54 †	0.32	-0.05	0.28	-0.07	0.21
Frequency	-1.58	2.70	-1.07	2.86	-0.83	2.85	-1.30	2.70	-1.58	2.71	-1.29	2.71
Human capital												
# of young	0.67	1.77	1.02	1.99	0.14	2.47	0.56	1.77	0.62	1.77	0.59	1.77
# of working	1.54	1.76	1.08	2.07	3.30	2.55	1.28	1.77	1.57	1.76	1.59	1.77
# of old	-1.94	4.35	-1.63	4.91	9.42	6.22	-2.11	4.35	-1.83	4.36	-2.00	4.36
Edu of the youngest			0.20	0.74	0.21	0.92						
Edu of the oldest			1.62 *	0.75	1.97 *	0.98						
Natural capital												
Own bari	7.05	5.50	6.12	6.05	6.18	6.01	10.41	6.62	7.12	5.51	7.05	5.49
Own khet	3.92	5.99	-1.19	6.82	-2.53	6.80	14.26 *	7.12	3.94	6.00	4.06	5.99
Water quality	-4.55	3.63	-6.46	4.18	-6.66	4.18	-5.35	4.54	-4.50	3.64	-4.62	3.63
Production quality	-3.69 *	1.56	-3.57 *	1.76	-3.63 *	1.75	-4.47 *	1.91	-3.60 *	1.57	-3.76 *	1.56
Physical damage	2.52	4.67	-1.93	5.30	-0.73	5.30	2.35	5.81	2.57	4.68	2.44	4.67
Physical capital												
Modern equipment	4.42	2.97	2.99	3.39	2.41	3.39	4.54	2.97	5.07	3.64	4.43	2.97
Agro equipment	7.39 †	4.15	8.24 †	4.51	8.67 †	4.51	8.01 †	4.16	10.58 *	5.24	6.84	4.16
Housing	0.70	0.78	0.27	0.91	0.09	0.91	0.57	0.79	0.43	0.93	0.68	0.78
Financial capital												
Livestock	3.81 *	1.59	4.85 *	1.88	4.91 **	1.88	3.76 *	1.59	3.75 *	1.59	3.81 *	1.83
Poultry	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	-0.01	0.01
Controls												
HH fission	-31.45 **	9.81	-31.53 **	10.61	-30.16 **	10.61	-32.23 **	9.83	-31.70 **	9.83	-31.53 **	9.81
Chem.fert. in 2001	0.68 **	0.03	0.68 **	0.03	0.69 **	0.03	0.68 **	0.03	0.68 **	0.03	0.68 **	0.03
Dist. to Narayanghat	0.08	0.07	0.05	0.07	0.04	0.07	0.07	0.07	0.08	0.07	0.08	0.07

Interactions of migration																						
with Human capital																						
# of young					0.03		0.06															
# of working					-0.09	†	0.05															
# of old					-0.46	**	0.15															
Edu of the youngest					-0.01		0.02															
Edu of the oldest					-0.01		0.02															
with Natural capital																						
Own bari								-0.20		0.19												
Own khet								-0.58	**	0.21												
Water quality								0.03		0.13												
Production quality								0.04		0.05												
Physical damage								-0.03		0.18												
with Physical capital																						
Modern equipment											-0.04		0.10									
Agro equipment											-0.12		0.12									
Housing											0.01		0.02									
with Financial capital																						
Livestock																	0.00		0.05			
Poultry																	0.00	†	0.00			
Intercept	-13.48		13.27		-4.94		14.85	-13.70		15.68	-20.09		14.01	-13.34		13.79	-12.77		13.49			
AIC	14,742.10				11,946.20			11,955.60			14,744.50			14,751.60			14,757.00					
N	1,251				1,013			1,013			1,251			1,251			1,251					

Note: † $p < .10$; * $p < .05$; ** $p < .01$, two tailed.

<Table 2> Multilevel Analysis Results of Household Assets and Migration on the Number of Poultry

Variables	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Beta	S. E.	Beta	S. E.	Beta	S. E.	Beta	S. E.	Beta	S. E.	Beta	S. E.
Duration of migration	-0.20 *	0.09	-0.18 **	0.06	0.21	0.16	-0.12	0.18	0.30	0.31	-0.20	0.14
Human capital												
# of young	-3.02	2.53	0.00	1.74	0.33	1.95	-3.01	2.53	-3.03	2.53	-3.02	2.53
# of working	-0.24	2.50	3.14 †	1.78	4.79 *	2.02	-0.14	2.50	-0.12	2.50	-0.24	2.50
# of old	-0.94	6.07	5.56	4.26	6.01	4.81	-0.86	6.07	-0.36	6.07	-0.94	6.07
Edu of the youngest			0.65	0.71	1.12	0.80						
Edu of the oldest			1.63 *	0.78	2.18 *	0.86						
Natural capital												
Own bari	12.59	8.61	7.05	5.90	7.44	5.89	14.69	9.33	12.48	8.60	12.59	8.61
Own khet	2.42	9.22	5.84	6.36	5.60	6.35	4.45	9.90	2.62	9.21	2.42	9.22
Water quality	10.47 *	4.78	-2.28	3.36	-2.09	3.35	14.53 **	5.45	10.48 *	4.78	10.47 *	4.78
Physical capital												
Modern equipment	13.35 **	3.93	7.79 **	2.82	7.45 †	2.82	13.43 **	3.93	15.67 **	4.35	13.35 **	3.93
Agro equipment	27.16 **	6.10	23.26 **	4.18	23.29 **	4.18	26.97 **	6.10	32.01 **	6.73	27.16 **	6.10
Housing	-0.77	1.05	-0.19	0.75	-0.08	0.75	-0.77	1.05	-0.22	1.22	-0.77	1.05
Financial capital												
Livestock	-1.73	2.45	-2.39	1.74	-2.41	1.73	-1.85	2.45	-1.89	2.44	-1.74	2.60
Controls												
Farming or not	4.97	13.25	9.44	9.49	9.73	9.48	4.92	13.25	5.32	13.24	4.97	13.25
HH fission	-3.12	13.05	1.62	9.33	1.43	9.32	-3.35	13.05	-3.74	13.05	-3.12	13.07
Dist. to Narayanghat	-0.20 *	0.10	-0.11 †	0.07	-0.11 †	0.07	-0.20 *	0.10	-0.19 *	0.10	-0.20 *	0.10
Interactions of migration *with Human capital*												
# of young					-0.01	0.04						
# of working					-0.06 †	0.04						
# of old					-0.03	0.09						
Edu of the youngest					-0.02	0.02						

Edu of the oldest					-0.03	†	0.02									
with Natural capital																
Own bari								-0.11		0.18						
Own khet								-0.09		0.18						
Water quality								-0.18		0.12						
with Physical capital																
Modern equipment											-0.13		0.09			
Agro equipment											-0.20		0.12			
Housing											-0.02		0.03			
with Financial capital																
Livestock														0.00		0.05
Year 1996	14.73	†	8.11	19.34	**	5.88	17.89	**	5.89	14.89	†	8.11	14.27	†	8.11	14.73	†	8.11
Year 2001	11.38		7.25	12.70	*	5.17	12.19	*	5.17	11.33		7.25	11.44		7.24	11.38		7.25
Intercept	9.23		18.98	-28.01	*	13.81	-37.08	**	14.27	7.76		19.11	-1.91		19.82	9.24		19.09
AIC	63331.30			51369.10			51367.00			63334.00			63329.10			63333.30		
N	4,623			4,007			4,007			4,623			4,623			4,623		

Note: † $p < .10$; * $p < .05$; ** $p < .01$, two tailed.

<Table 3> Event History Analysis Results of Household Assets and Migration on the Transition out of Farming

Variables	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Odds	S. E.	Odds	S. E.	Odds	S. E.	Odds	S. E.	Odds	S. E.	Odds	S. E.
Migration												
Duration	1.00	0.01	1.00	0.01	0.99	0.01	1.00	0.01	1.00	0.01	1.00	0.01
Frequency	1.04	0.06	1.03	0.07	1.02	0.07	1.04	0.06	1.03	0.06	1.04	0.06
Human capital												
# of young	0.87 *	0.06	0.90 †	0.06	0.97	0.08	0.87 *	0.06	0.87 *	0.06	0.87 *	0.06
# of working	0.88 *	0.06	0.87 †	0.07	0.76 **	0.09	0.88 *	0.06	0.88 *	0.06	0.89 *	0.06
# of old	1.41 **	0.12	1.16	0.14	1.17	0.18	1.41 **	0.12	1.41 **	0.12	1.41 **	0.12
Edu of the youngest			1.05 *	0.02	1.06 †	0.03						
Edu of the oldest			1.04 †	0.02	1.02	0.03						
Natural capital												
Own bari	0.91	0.19	0.87	0.20	0.87	0.20	0.84	0.23	0.91	0.19	0.91	0.19
Own khet	0.57 **	0.19	0.56 **	0.21	0.54 **	0.21	0.53 **	0.23	0.58 **	0.19	0.57 **	0.19
Water quality	0.96	0.11	0.98	0.12	0.97	0.12	1.00	0.14	0.96	0.11	0.96	0.11
Physical capital												
Modern equipment	1.13	0.09	1.09	0.10	1.10	0.10	1.13	0.09	0.99	0.12	1.13	0.09
Agro equipment	1.18	0.13	1.07	0.14	1.04	0.15	1.17	0.13	1.20	0.17	1.18	0.13
Housing	1.09 **	0.03	1.11 **	0.03	1.11 **	0.03	1.09 **	0.03	1.12 **	0.04	1.09 **	0.03
Financial capital												
Livestock	0.69 **	0.06	0.68 **	0.07	0.68 **	0.07	0.69 **	0.06	0.69 **	0.06	0.70 **	0.07
Poultry	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Controls												
HH fission	17.20 **	0.20	17.44 **	0.23	19.09 **	0.24	17.40 **	0.20	17.36 **	0.20	17.08 **	0.20
Dist. to Narayanghat	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Interactions of migration *with Human capital*												
# of young					1.00	0.00						

# of working							1.00	**	0.00									
# of old							1.00		0.00									
Edu of the youngest							1.00		0.00									
Edu of the oldest							1.00		0.00									
with Natural capital																		
Own bari										1.00		0.01						
Own khet										1.00		0.01						
Water quality										1.00		0.00						
with Physical capital																		
Modern equipment													1.01	†	0.00			
Agro equipment													1.00		0.00			
Housing													1.00		0.00			
with Financial capital																		
Livestock																1.00		0.00
Poultry																1.00		0.00
Time	0.74		0.18	0.81		0.20	0.79		0.20	0.74	†	0.18	0.73	†	0.18	0.75		0.18
Intercept	0.04	**	0.66	0.09	**	0.45	0.12	**	0.48	0.12	**	0.43	0.11	**	0.45	0.10	**	0.42
Gen. Chi Square	1,757.05			1,525.57			1,574.57			1,751.42			1,774.99			1,752.90		
N	2,536			2,179			2,179			2,536			2,536			2,536		

Note: † $p < .10$; * $p < .05$; ** $p < .01$, two tailed.

<Table 4> Event History Analysis Results of Household Assets and Migration on the Transition to the First Salary Employment

	Model 1		Model 2		Model 3	
	Odds	S. E.	Odds	S. E.	Odds	S. E.
Migration						
Domestic, individual-level	1.03	0.10	0.87	0.10	0.85	0.10
International, individual-level	1.53 *	0.17	1.38 †	0.17	1.28	0.17
Domestic, household-level	0.99	0.06	1.05	0.07	1.03	0.07
International, household-level	0.95	0.13	1.14	0.13	1.11	0.13
Individual Characteristics						
Gender (ref. male)			0.09 **	0.25	0.09 **	0.25
Education			1.09 **	0.03	1.11 **	0.03
Mother school ever			1.23	0.27	1.30	0.27
Father school ever			1.82 **	0.21	1.83 **	0.21
Mother salary work before			1.13	0.22	1.14	0.23
Father salary work before			1.12	0.20	0.97	0.20
Human capital						
# of young	0.86 *	0.06			0.99	0.06
# of working	1.02	0.05			1.00	0.06
# of old	0.81	0.15			0.85	0.16
Natural capital						
Own bari	1.09	0.19			0.85	0.20
Own khet	1.32	0.23			0.94	0.24
Water quality	0.97	0.12			0.95	0.13
Physical capital						
Modern equipment	1.34 **	0.10			1.12	0.10
Agro equipment	0.92	0.13			0.81	0.14
Housing	1.02	0.03			0.98	0.03
Financial capital						
Livestock	0.99	0.05			0.95	0.05

Poultry	1.00		0.00				1.00	0.00
Controls								
Farming or not	1.48		1.46				1.63	1.53
Household fission	1.16		0.31				1.44	0.32
Distance to Narayanghat	1.00		0.00				1.00	0.00
Time								
Age between 15 and 20	6.33	**	0.37	2.30	*	0.38	2.13	† 0.39
Age between 20 and 25	5.25	**	0.32	2.78	**	0.32	2.58	** 0.34
Age between 25 and 30	2.63	**	0.31	2.04	*	0.32	1.97	* 0.32
Age between 35 and 40	0.58		0.42	0.73		0.44	0.72	0.42
Age between 40 and 45	0.25	*	0.53	0.40	†	0.54	0.39	† 0.53
Age between 45 and 50	0.19	**	0.59	0.27	*	0.60	0.26	* 0.59
Age between 50 and 55	0.10	**	0.83	0.13	*	0.84	0.12	* 0.83
Age over 55	0.05	*	1.38	0.04	*	1.41	0.04	* 1.37
Intercept	0.00	**	1.52	0.01	**	0.36	0.01	** 1.60
AIC	1151.94			1025.68			962.72	
N	13,215			13,215			13,215	

Note: † $p < .10$; * $p < .05$; ** $p < .01$, two tailed. Reference for time dummy variables is age between 30 and 35.