

# Determinants of Migration Participation among Rice Farmers

A Case Study in Sumatera Utara Province, Indonesia



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## SUMMARY

The author examines the determinants of seasonal migration participation among rice farmers in Sumatera Utara province. The analysis aimed at ascertaining the migration decision of agricultural labour from rice farming villages. Formal survey was conducted by interviewing the rice farmer in twelve villages that administratively attach to five sub-districts in Deli Serdang district. Eighty households are selected randomly during the survey, which is carried out at the level of the individual household. Secondary data were gathered from proper institution's reports and documents. In order to reach the aim of the study, three research questions are formulated based on three socio-economics variables: individual capital characteristics (age, gender, marriage and education status), time endowment and exogenous preference (household size, the presence of children in household and ethnicity), farm characteristics (owned land size).

The study is based on econometrical estimation, namely probit regression. The data collected in the interviews are used to examine the determining factors steering labour migration using a probit regression model. The determining factors are therefore observed whether pull or push factor affecting the migration decision. The study results show that the three characteristics of variables are affecting the decision of rice farmers to seek a secondary job in urban areas. From the human capital attributes, it is found that age of young farmers in the farm household increases the likelihood that a member participates in migration work than senior farmers, while other variables like gender, marriage and education status are less important in affecting the probability of the migration decision. The analysis of time endowment and exogenous preference variables reveal that the household size has a positive effect and the largest probability contributed to migration. Participation in urban migration jobs is negatively related to the ethnicity, presence of children below fourteen and above fifteen years old. Between the farm characteristics, it is found that the land ownership size variable is explaining a negative significance the probability of migration decision. This result suggests that individuals from wealth families who have large size of owned land remain to be engaged in on-farm activity. Short-term migrants look for seasonal changes and opportunities to circularly work (village-city-village) in order to supplement their farm income. Land as the productive asset has a higher level of capital accumulation. Further studies will be important for the understanding of key variables that impinge on seasonal migration decisions, by investigating the role of the costs of living differential and of separation from the rural family.

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# Chapter 1: Introduction

## 1.1 Background

Suharso (1976) showed that unavailability of sufficient jobs in rural areas was the major factor contributing to outmigration. It was also found that if the major source of farmer's income from agricultural sector was not sufficient and alternative sources of income were not available, then the farmers would migrate from rural to urban areas (Erwidodo 1992; Syafaat 1998). Todaro and S.C.Smith (2009) and Pernia (1993) indicated that job opportunities and better income were the major factors contributing to the decision to migrate. The existence of a modern sector was the pull-factor for educated labour to migrate to the city. However, uneducated labour was also found to migrate since informal sectors were available to provide sources of income.

Wood (1986) explained that there are several factors influencing migration to Indonesia's largest cities:

- Access to public accommodation and services in urban areas, such as secondary schools and hospitals;
- Improved transport linkages between urban and rural areas;
- Greater trading activities between port cities;
- Decreasing labour demands in the agricultural sector due to the green revolution;
- Rising consumer demand for goods produced or traded by urban-based enterprises.

Visibly absent from this list is manufacturing, which has not played a major role in inducing Indonesian rural-urban migration or urbanisation. The rapid growth of Indonesia's largest cities, which are mostly located in Java, has resulted in enormously complicated problems.

Thus far the rapid increase in urbanisation since 1970 in rural areas of Java can be interpreted as an indicator of a decline in the labour absorption capacity of peasant agriculture (Evers 1991). Although intensification (a higher cropping intensity) and extensification (an extended cultivated area) demand more labour, in Indonesia the growth of rural labour force cannot be absorbed fully by the agriculture sector. The modernisation of agriculture has shifted the labour force from agricultural production into related activities. On the one hand, field labour (*buruh tani*) was replaced by mechanisation, and on the other hand the increased agricultural output was due to new technologies, expanded activities in the collection, transport, trade, processing of agricultural product, distribution of inputs and maintenance of equipment. Inevitably, an increasing share of rural labour has to find alternatives outside agriculture.

Conversely, some studies suggest that the Indonesia's crisis in 1998 has impinged upon population movement. This crisis has affected insight sectors in entirely provinces. One of the major characteristics of the crisis is that impact varies greatly between areas and between groups. These variations have been well documented in a number of studies (Poppele, Sumarto et al. 1999). Agriculture was the main absorber of labour until recent times. Geertz (1963) coined the term 'agricultural involution' for the distinctive characteristic of *sawah* (lowland-wet

rice) agriculture in Java, which allowed population increases to be absorbed because:

- Increased labour resulted in increased productivity of *sawah* through activities such as transplanting, micro control of irrigation and weeding; and
- There was an associated culture of 'shared poverty' whereby the systems used in *sawah* were open to all to participate in and were highly labour intensive.

Moreover, agricultural workers are presumably forced into long term and short term migration because of decreasing income in the agricultural sector, in particular rice farming. Declining output price and increasing input price has created a dilemma for farmers and their households. These vulnerable and uncertain conditions may convince agriculture workers to migrate to urban areas, looking for informal sector jobs. Initially, the chain of migration involves moving to urban areas, following and living with their predecessors whom has been succeeded and established previously. Presumably, cyclical and circular migration are two types of migration, which farmers look for seasonal changes (labour demand) and opportunities to work for a few months circularly (village-city-village) in order to supplement their farm incomes. It should be reiterated here that this study focus is on seasonal migration. Furthermore, the definition of household includes all individuals who regularly take their meals together from the same kitchen, whereas exclude longer term migrants or stayers who are away from the household for 12 months or more. According to Hare (1999), the number of excluded longer-term migrants is possibly quite small, or the longer term migrants' attachment to their households may not be sufficiently strong to generate urban return.

In Indonesian studies on migration, the definition of migrant on this research is relevant with previous research by Ananta (2001). He defined a recent migrant. The measurement of seasonal migration yet covers only the recent (within five year length interval) migrant and excludes those who had migrated more than five year earlier. Those who seasonally migrated more than one year were considered as stayers or long term migrants and hence they could be as local.

## **1.2 Rice farming and rural-to-urban migration in Sumatera Utara**

Sumatera Utara province is one of the provinces rice producing in Indonesia. Deli Serdang, is one of rice producers and suppliers regions in Sumatera Utara, also as distributor to neighbour provinces, Aceh and Riau province. Moreover, based on BPS-SUMUT (2006) data, total rice land is 137 596 hectare in Deli Serdang. Total production amounted 625 982 ton. The district approximately produced rice 45.49 quintal per ha in 2003 (see *appendix 1*).

Considering rice production in Sumatera Utara, Deli Serdang is expected to add significant to potential rice autarky production in the western part of Indonesia, whereas the rural-urban migration has certainly influenced rice production and rice household income in this area. Yet, the impact of an outflow of labour on the rice economy remains unclear.

There might indicate some cases of unemployment workers found in this research area. Actual economic and non economic factors induce agriculture workers in Sumatera Utara province to migrate domestically. Hugo (2000) has cited Riau Province as long been a significant magnet for internal migrants. He also explains expansion of the agricultural workforce in this province as may be associated with in-migration from elsewhere, especially Java.

Even though, there are similar problems in other areas of Indonesia regarding rice production and rice household income, the relationship between agriculture workers in rural areas is nevertheless unique in every region thus entailing different ways of problem solving.

### **1.3 Research questions**

There are many migration studies in less developed countries ascertained that secondary work in urban area serves as a proper supplement to pertain household income and agriculture production. Then, it may become a strategy over farm household especially when prevailing over loss in production. From previous research in China and India, it is also known that migration is influenced by demographical, social and economic factors.

The survey data is obtained in Deli Serdang district, Sumatera Utara province. As noted in the beginning, agriculture sector, in particular rice farming is highly affected by rural-to-urban migration and this study is trying to ascertain the lead factor of the migration decision. In other words, the condition of people in Deli Serdang, therefore, there is a need to discover what are the determinants of rice household outmigration from rural areas.

Hence, I limited my research to merely the push and pull factors that influence the rural-urban migration decision. It then becomes a basis of my research evaluation as to whether this research study is able to explain the individual's migration behaviour in order to improve rice farming activity and household economy onwards. Then, this study attempts to answer the below research question using primary data, which is collected from a rice farmer survey in Deli Serdang. I use probit regression analysis to scrutinise the proper result. In order to answer the main research question, several sub-research questions have been formulated:

- a. Does individual characteristics (age, gender, marriage and education status) determine the member of household's decision to outmigration from rice farming village?
- b. Do time endowment and exogenous preference (household size, the presence number of children in household and ethnicity) influence the decision of household members to participate in migration work?
- c. Do farm characteristics (owned land size) affect the decision of household members regarding outmigration from village?

This study is presented as follows. The next chapter presents the theoretical setting and empirical evidence of this research. Chapter 3 describes data collection and methodology. After that, the setting of local characteristics and data analysis is reported. The report ends with a conclusion and recommendations.

## Chapter 2: Theoretical Setting and Empirical Evidence

### 2.1 Theoretical considerations

There are various research articles that can be referred for migration. The movement of labour from rural farm to urban activities involved migration framework. Its framework examines several theoretical models such as the Lewis and Todaro model and the neo-classical two sector model, human capital theory and new economics of labour migration (NELM) (Lewis 1954; Todaro 1969; Stark 1991; Taylor and Martin 2001).

Harris and Todaro's (1970) influential paper, published in the American Economic Review answered the question of why migration to the urban sector takes place despite high levels of urban unemployment. They assimilate this problem into a model of human migration by assuming that possible migrants take urban unemployment into account. Their results show clearly migration between two geographical areas usually takes place due to income differentials. However, potential migrants are rather simply comparing income levels, and measuring expected income.

Lewis-the classical two sector model explained an unlimited supply of labour from traditional sectors of less developed countries (LDCs) might be absorbed through capital accumulation and savings in an expanding modern sector (Lewis 1954). Meanwhile, Taylor and Martin (2001) assumed Lewis (1954) type-model does not propose an explicit migration model. It has explained the mechanisms unlimited supply of labour in traditional sectors of less developed countries might be absorbed through capital accumulation and savings in an expanding modern sector. Yet, migration plays an important role in the Lewis model. Therefore, Ranis and Fei (1961) supposed Lewis model may offer some insights into rural out-migrations associated with very high wage elasticities, as appears in several cases of rural-urban migration in less developed countries. Thus, migration is largely demand driven.

On the other hand, human capital migration model represents an effort to provide the migration theories. Human capital migration theory produces a number of testable hypotheses. First, this is regarding a dynamic model; the young should be more mobile than the old, in as much as they stand to reap returns from migration over a longer period of time. Second, migration between locals and migration costs should be related relatively. Many researchers have interpreted it as implying a negative association between migration flows and distance. However, consideration besides distance (especially access to information) may make distance less of a deterrent for some individuals (e.g. better educated individuals or those with "migration network," contacts with family or friends at prospective migrant destinations). Third, as Rosenzweig, Chenery et al (1988) elaborate, neutral productivity growth in an economy –e.g., equal rates of growth in the rural and urban sectors—will increase migration from low- income to high-income (urban) sectors or areas. Fourth, specific human capital variables that yield a higher return in region A than in region B should be positively associated with migration from B to A. In addition to these predictions, human capital theory implies that income (or in the Todaro case, expected income) differentials between

rural and urban areas are eliminated by migration over time (Taylor and Martin 2001).

The perspective of migration decisions are not taken by isolated factors but by larger units of related people, typically large unit of families or household families. It is landmark of the NELM. Furthermore, Taylor and Yunez-Naude (1999) views that migration decision is not the result of individual actor decision. Meanwhile, Stark (1991), Taylor and Martin (2001) also coined Individuals participate in migration, whose intend to maximise expected income of the family or household. They also assume to minimise risk and respond to sorts of market failures. Typically, rural areas of developing countries are imperfect or missing credit and insurance markets, therefore migrants play the role of financial intermediaries. They provide their households with capital, through remittances, and they also represent an 'insurance policy' offering income support in the event of crop failures or other adverse events.

The study of rural urban migration is widely considered useful both for understanding the determinant factor and the overall migration decision making process for predicting future migration flow. The actual migration is argued to be the end product of a series of decisions made by the potential migrant individual and family. Along the way, Simmons (1985) argues that unexpected events may affect potential migrants' ability to translate their plans into actual moves. Thus, migration intentions may not be closely associated with subsequent migration behaviour because of events intervening between the point in time when migration intentions are formulated and the point at which a move is actually made or not. The extrapolative power of migration intentions can be further reduced among non decision makers (De Jong, Root et al. 1985).

## **2.2 Push and pull factor of migration**

What motivates rural people to migrate? Many studies on migration in Third World countries suggest that people migrate for a variety of reasons. Whatever, the cause of migration, it does not exert its force equally: some people migrate while others decide to stay.

The role of migration in less developed countries is multipart and much debated (Taylor and Martin 2001; de Brauw and Rozelle 2008). Migration could perhaps affect the level of intensification program in rice-based agriculture and will reduce the productivity of rice and household welfare in the long run. Therefore, the predominant factors influencing migration decision need to be studied. This research intends to perceive reorientation of rice farm household and rice production strategy to maintain the high performance of agricultural sector. Rosenzweig and Stark (1989) argue household income from agricultural production often has a considerable random component due to weather and price shocks, and it has been shown that migration is positively correlated with the level of agricultural income variability.

Barrett, Reardon et al (2001) pointed out multiple motives encourage households and individuals to diversify assets, incomes and activities. They explain the first motives that traditionally comprise termed "push factors": risk reduction, response to diminishing returns in any given use, such as family labour supply in

presence of land constraints driven by population pressure and fragmented landholdings, reaction to crisis or liquidity constraints, high transaction costs that induce households to self provision in several goods and services. The second motives comprises “pull factors” including realisation strategic complementarities between activities, such as specialisation according to comparative advantage accorded by superior technologies, skills or endowments, etcetera. Hence, their research stated the “push factor perspective” is mirrored by the micro level of determinants of diversification that are driven by limited risk bearing capacity in the presence of incomplete or weak financial systems. Furthermore, these determinants create strong incentives to select a portfolio of activities in order to stabilise income flows and consumption, by constraints in labour and land markets, and by climatic uncertainty. Moreover, from the “pull factor perspective”, such as commercial agriculture or proximity to urban secondary works create opportunities for income diversification in production and expenditure linkage activities.

From the household characteristics, per capita value of the households’ production assets may affect the migration decision in at least two ways- pull and push factors. Hare (1999) stated that a higher level of capital accumulation is expected to affect individual’s labour productivity at home, and therefore to increase the reservation wage. She also pointed out that higher levels of capital accumulation may be an indicator for wealthy household. During the absence of perfect capital markets, wealthier household may be in a better position to finance members’ migratory trips. Moreover, push and pull factor conditions which related to household location toward migration decision. On the supply side, higher levels of economic development locally may imply greater opportunities at home and raise the individual’s reservation wage. On the other hand, the greater convenience access of transportation to outside rural may reduce the costs involved in undertaking a migratory trip.

### **2.3 A Model for migration**

Rural-to-urban migration is viewed as a household decision, Stark (1991) coined that migration decision by one person can be assumed in pursuit of utility maximising behaviour by household. Migration may take place for different reasons, a rational, utility maximising household will only send out migrants if this migration is expected to increase the utility of the household. On the other hand, migration may affect utility in a non-monetary way that is not included in the analysis, particularly in the form of social costs (Wouterse 2006). According to previous studies by Huffman (1980), Wouterse (2006) and Achmadi (2008), a farm household is undertaken to maximise utility which is a function of consumption own staple food (this study refers to rice) produce ( $C$ ) and home time or leisure ( $L$ ) and the exogenous preference ( $E$ ) such as individual characteristics, household structures and other exogenous variables:

The maximised utility function, which is concave and ordinal, can be illustrated as follows:

$$U = U(C, L, E), \text{ where } U_C = \frac{\delta U}{\delta C} > 0, U_L = \frac{\delta U}{\delta L} > 0 \quad (1)$$

The household is assumed to face three constraints on resources: time, income and farm production. The vector of total time endowment is allocated between time spent on staple cropping ( $F$ ), time spent on other activities and migration ( $tM$ ) and active home time ( $L$ ), which measures in days and includes leisure, other activities such as food processing and preparation, child care, wood collecting, livestock keeping, etcetera.  $M$  stands for the number of migrants in the household. Since this model is about short term migration, the less cost is expended between on-farm activity and migration work because of spell duration and short distance of migratory trip. Therefore, the household can manage the time endowment of household members, and allocated flexibly among three activities,

$$T = F + tM + L \quad (2)$$

where  $t$  is the average number of days that a migrant works in the urban area over the last five years. Equation (1) shows that utility depends on consumption, leisure and exogenous preferences. Consumption is constrained by household income, which can be represented by the following cash income constraint:

$$C = W_M M + P_S Q_S - R_S X_S \quad (3)$$

In the equation (3), the household consumption is limited by the earnings from migration work ( $W_M M$ ) and net staple crop income ( $P_S Q_S - R_S X_S$ ). Meanwhile,  $W_M$  is the total net return from secondary work in urban area; it refers to return value (wage) from urban work minus net costs (of living separated) of migration. The urban wage is assumed to be exogenous. Farm labourers can freely adjust the amount of migration work  $M$  for time allocation.  $P_S$  is the price of staple cropping output,  $Q_S$  means staple cropping output,  $R_S$  denotes input price and  $X_S$  indicates quantity of input used. Moreover, staple cropping output is a function of staple cropping work time  $F$ , which is supplied by the household labour only and non-labour inputs used such as capital  $X_S$ .

$$Q_S = f_i(F, X_S) \quad (4)$$

Rural-urban migration is considered a constrained choice requiring a certain amount of wealth in order to overcome entry barrier that exists primarily in the form of housing costs in the urban area. Transport costs hardly present a barrier to migration, because transportation to urban areas is not very costly due to the short distance between the rural place of residence and the urban area. The following entry barrier constraint is present:

$$M \leq M_{\max}(Z) \quad (5)$$

where  $M_{\max}$  is the maximum number of seasonal migrants in a household, which is a function of  $Z$ , a vector of household individual characteristics such as the number of household members whom have to be taken care of.

The optimum condition for migration can be ascertained by utility function (1), which is obtained by combining (1), (2) and (3), subject to constraint (5). Henceforth, the Lagrangian is given by:

$$\Lambda = U(W_m M + P_s Q_s(F, X_s) - R_s X_s, T - F - tM) + \lambda(M_{\max} - M), \quad (6)$$

Where  $\lambda$  refers to the marginal utility of migration. Moreover, the first order conditions for an interior solution of this Lagrange function:

$$\frac{\partial U}{\partial M} = U_C \cdot W_M - U_L - \lambda = 0 \quad (7)$$

$$\frac{\partial U}{\partial F} = U_C \cdot Q_F P_s - U_L = 0 \quad (8)$$

$$\frac{\partial U}{\partial X_s} = U_C [P_s Q_{X_s} - R_s] = 0 \quad (9)$$

Where  $U_C$  is the utility obtained from consumption, while  $U_L$  is the utility obtained from leisure. From equation (7), it follows that

$$W_M - \frac{\lambda}{U_C} = \frac{tU_L}{U_C} \quad (10)$$

The utility of migration with respect to the number of migrants that expect to be a parabolic function, as utility first increases when the number of household members migrating increases until a certain optimum is reached. In this optimum,  $\lambda$ , the marginal utility of migration, is zero. By rearranging equation (10) it follows that

$$\frac{W_M}{t} = \frac{U_L}{U_C} \quad (11)$$

In the optimum the wage per day is thus equal to the marginal rate of substitution between active home time and consumption.

## **2.4 Seasonal and temporary migration of rural labour**

De Jong and Fawcett (1981) as quoted by Yang (2000) explained that the growing labour migration is considered as temporary because, officially migrants have not replaced their *de jure* residence. Although the presence of large numbers of temporary migrants in the city has caused concern, it has not been fully taken into consideration in local economic and infrastructure planning; in part this reflects the view that temporary migrants will return to their places of origin once their labour is no longer required in the city.

The seasonal migration study was initially motivating Stark and Fan (2007), which ascertained the prevalence of a large-scale, strictly-regulated seasonal migration from Poland to Germany. In their study, seasonal migration arises as an optimal endogenous response to a comparison of costs (of living and of separation) and returns (to work). Clearly the opportunities to obtain in seasonal migration are often connected to the cyclical nature of sectoral activity. From their study, they implicitly carried out that the demand for migrant work does not fluctuate, even so individuals optimally decide to limit the duration of their migration, to involve in a seasonal rather than permanent form of migration. By taking rural-to-urban migration example, it is the fact that the separated place of work and consumption in terms of higher urban prices and lower rural prices makes it advantageous. The rural family is having tension that somehow arising from separation place a limit on the length of separation.

## **2.5 Empirical evidence**

The literature on rural urban migration in China, India and other developing countries is growing rapidly and already contains a number of individual's migration behaviour. Meanwhile, most of these studies rely upon data for a particular province or state.

The Chinese rural-to-urban migration studies have quite relevant cases to pertain Indonesian's migration study since there are some similarities of the household characteristics. In line with some literature, many studies had been concerted in determining individual's or/and household's decision to participate in urban work by categorising the factors into several variables, for instance individual preference, farm and community characteristic, and so forth. Individual preference included age, gender, education and marriage status variables. Related to these variables, the studies of actual migration have often suggested that men are more mobile than women because of the different expectations the society holds for males and females. Meanwhile, the education, marriage status and age attributes are likely to show significant impact on the intention to migrate; people with better education exhibit more intention to migrate. By contrast, growing older and being married will probably result in increased ties to the residential community, which in turn discourage people from migrating (Huffman 1980; Goldstein, White et al. 1997; Yang and Guo 1999; Zhao 1999).

Furthermore, the migration studies conducted by Yang, which explained the conceptual usefulness to distinguish individual migration from family migration; because what is the best for an individual member may not be the best for the whole family. Although individual capital characteristics are important for

individual migration, family-migration decisions are often made independently of individual human capital attributes and reflect more of the interactional context within the family (De Jong, Root et al. 1985; Yang 2000).

Age, gender and educational level are among the principal individual characteristics in some studies. Li and Zahniser (2002), Zhao (1999) and Yang (2000) have estimated the determinants of individual's migration decision. In their findings, age reduces the probability of migration, while education level does not have a significant effect. The net effect of marriage and school age children could be either positive or negative. A married individual is less likely to migrate in order to spend more time for household chores, or they may be more likely to migrate because of the additional economic responsibilities that sometimes accompany marriage (Banerjee 1991; Li and Zahniser 2002).

However, human capital does not act alone in their migration decision making. In recent studies, the importance of household and farm characteristics in affecting the migration behaviour members has been increasingly highlighted. Li and Zahniser (2002) and Zhao (1999) who find that the number of preschool children had a negative effect on migration, but the effect was not statistically significant, whereas the number of children at school had positive influences on migration. This outcome implies that children played the role of safeguarding the household's land rights by supplying a minimum intake of farm labour. Reardon, Berdegúe et al. (2001) stated average landholdings, land distributions are factor used variables, which clearly condition of household diversification decision. Latin America case study evidence suggests that as household landholdings decline, the nonfarm share in total household income increases purportedly. Hence, it obviously influences their household diversification decision. The share of rural non-farm earnings in total household income is usually highest farm sizes in Latin America case study for example. Haberfeld, Menaria et al (1999) finds for the seasonal migration of rural labour in India, that as agricultural land become scarce, households have reasonably seek compensating income in the nonfarm economy. Therefore, landless households typically depend most heavily on nonfarm earnings. Household and farm characteristics also explain the determinant of migration the household's capital portion of land is relatively less for any individual to perform agricultural labour, thus the probability of migration should increase with family size (Li and Zahniser 2002).

On the other hand, remittances are that produced by allocating family members to labour migration. It is shaped by human capital and household characteristics affecting migrants' success and motivation to remit income from urban areas. Thus, the household decision may encourage family member to migrate outwards. Due to missing credit and insurance markets, rural-urban migration activity becomes a vehicle for self-insurance and financing agricultural inputs and assets via nonfarm earnings.

## Chapter 3: Village Studies and Methodology

### 3.1 Research area

This study was conducted in Deli Serdang district in the province of Sumatera Utara. Deli Serdang's economic development is anchored on agriculture sector particularly on rice production and horticulture. Meanwhile, Medan as capital city of Sumatera Utara province and some urban areas; Lubuk Pakam and Binjai are surrounded by Deli Sedang district.

For this study, the sites were selected purposively based on land tenancy systems and the coverage of rice lowland areas in Sumatera Utara. From this area, nine sub-districts were selected to represent landholding status; ownership; and fixed-rent contract. The selection of sites was also based on the prevalence of outmigration data from BPS-Statistics Sumatera Utara Bureau. Moreover, seven villages were selected randomly as migrant and ten for non-migrant observation areas, for a total of twelve villages. To represent the diversity of outmigration prevalence (low and high), these research areas had been all selected within the sub-districts of Beringin, Kutalimbaru, Sunggal, Tanjung Morawa, and Pancur Batu.



Figure 1: Map of Sumatera Utara province and Deli Serdang district

### 3.2 Sampling and data collection

The data for this study were collected at the end of the second cropping season which fell on November 2008- February 2009. The data were gathered through a cross section method. These were recorded with the assistance of the three student enumerators from a local university. Meanwhile, migration cross section data were referred to the five-year (2005-2009) previous length of seasonal migration interval, while current cross section data is obtained for migrant and non-migrant respondents.

The random selection was conducted for 80 households which were drawn in from the twelve villages: Sidodadi Ramunia, Dalu, Sawit Rejo, Suka Maju, Suka Ramai, Suka Raya, Kuta Jurung, Sei Mencirim, Suka Aman, Wonosari, Beras Sekata, Telaga Sari. This data collection processes is representing equally for migrant and non-migrant households. Subsequently, each enumerator was sent to a different

village and selected households at an approximately equal distance from each other, in order to ensure that all peripheral areas were framed.

The pre-testing of the questionnaires was undertaken in Sidodadi Ramunia and Beras Sekata villages. These villages are administratively located under Beringin and Sunggal sub-districts. The pre-test was aimed at obtaining necessary information for the improvement of the questionnaires. The villages where the pre-test was conducted represented two different ethnic backgrounds. Initially, several household members were tended to be as questionnaire respondents; however the household head actually answered most of the questions. Furthermore, the question adjustment is made in order to have a concise and reliable questionnaire. The overview of the survey parameters covers various aspects:

1. Household roster (all members)  
This parameter gives general information about all members of household such as name, relation to head, age, sex, education level, and primary and secondary activities (including migration activity), then number of family member and nurtured children as well.
2. Migration (to migrant if returned, else head)  
Migration and non-migration household members are interviewed for gaining information source of number of family member who migrate and non-migrate to urban area, migration reason, destination, household money transfer, remittances received and reason for remitting.
3. Productive assets  
Several productive assets regarding rice farming holdings and household properties are related to this survey parameters mainly land holding status, then sort of equipment owned, year of purchase, purchase price and usage years remaining.
4. Rice farming cropping practice  
Rice farming information is focused on period of planting season, land farming size, agriculture input production; labour input used of household and hired male and female labour, which refer to type of activities. The type, quantity and price of fertilizer, insecticide, herbicide and other information on input productions applied were also collected recently. Moreover, the used and hired equipment type, duration, and cost on production activity are taken into account beside of quantity sold/harvested as well as selling market price.
5. Livestock keeping  
Farm household livestock parameters cover the type and number of animals, value of purchases and sales.

Farm households in Sumatera Utara can be generally characterized as extended family. They often include their grown-up sons with their wives and children instead of head of household and his wife. The definition of family members included the extended household who are living in the same compound and regularly having meals together. Furthermore, migrated members were included in the head of the household's catalogue in the household inventory.

Migration duration of absence, destination and reasons for migrating and remittances received by the household were recorded on migration status.

Input and output production data were quite detailed covering the type of seeds, agriculture production stages, seed bed and land preparation, planting, hauling and transplanting, hand weeding, fertilising, insecticide and herbicide spraying, and threshing/harvesting. Information about equipment use on production side, owned or rented was also collected as well as the type of fertilizer, insecticide, and herbicide used. Productive equipment was also gathered on the type of implement owned by household, the purchase price and number of years that the equipment has been used since migrant members left five years behind as well as the year of purchase. This information can be used for calculating the current value of household's productive assets.

Farm household livestock encloses the stock and flow of various animals, mainly cattle, small ruminants, and poultries. Moreover formal and informal credit and/or insurance information was not recorded due to the fact that only a small number of households were found to have availed of a loan at a certain bank in a nearby city.

From the above situation, it is therefore construed that there is a time constraint which obstructed the collection of more information. By using a time-based phenomenon such as migration for cross-section, data is expected to lead endogeneity problems. While the problem of possible endogeneity has been recognised, finding of the variables that have remained unchanged over time or where possible instruments have been used to serve as an attempt to solve it. Although households were selected as randomly as possible based on local administrative lists, nevertheless, sample selection bias has arisen possibly. This endogeneity problem has been also carried out by Wouterse (2006) in Burkina Faso.

### **3.3 Data generation**

The survey was aimed for generating and analyzing data from several data sources. Then, by using statistical method all the data are used to give explanation through tables, charts and diagrams. Head of households and household members is identified as unit of analysis according to their prime activities, which generating income from urban return and off-farm working. Rice farming household is undertaken as being categorised by land ownership status too.

Thus, household who has migrant or non-migrant member may tend to leave to urban area because of shortage factor and input use on farming side. Rice farmers' decision therefore undergoes a significant decision to raise rice production, household income and investment highly.

In order to achieve at understanding on the research problem in Sumatera Utara, it will be helpful to provide a flowchart which explains the relation between variables to answer the objective of the research.

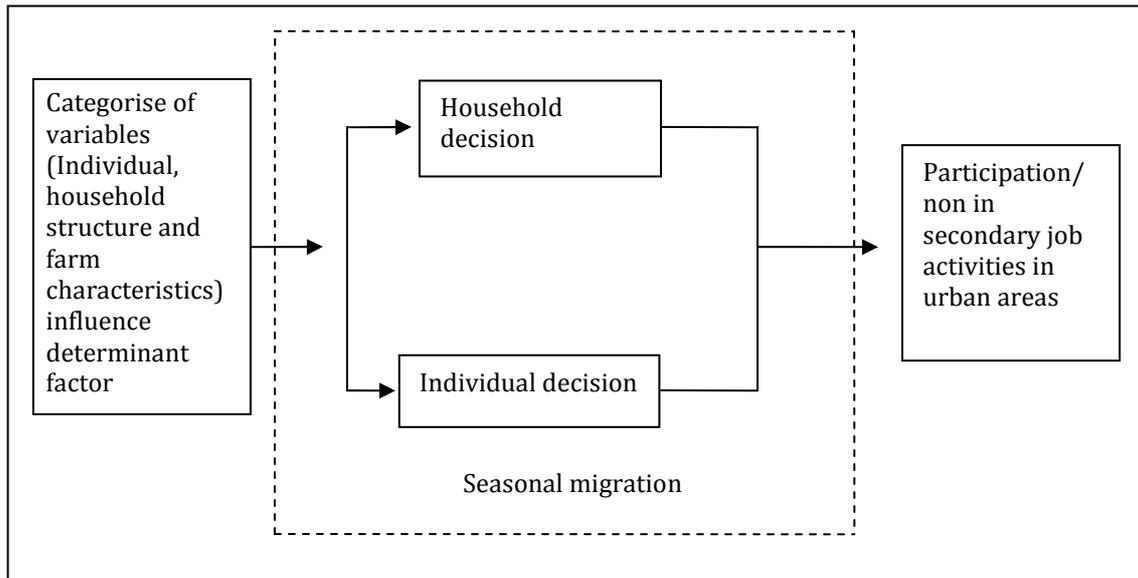


Figure 2: Channels of rural urban migration including seasonal migration decision

### 3.4 Dependent variables; migrant and non-migrant participation

This study analyses the rural urban migration on rice farming household. Farm household on having migrant member and not having migrant member is predicted probability by using dummy or binary variables. The categorical dependent variable assumes to reveal an underlying quantitative variable and uses the cumulative normal distribution.

Household's migrant member in this study is characterised as participation on secondary job through urban area destination. Their job is defined as supplementary work in addition to on-farm activities while having a primary job from the outside of rural employment. This variable is mentioned as a combination of migration work and on-farm activity, while the out-side rural employment for instance are such as those working on building construction, trading/business (self employed), tailor, automotive mechanics, industrial employee, pedicab worker and so forth. Urban work could be more interesting than rural farming activities. It may be presumed by nonexistence of credit and insurance market in this research area. In Deli Serdang district, mostly fixed land contract between land owner and lease holder tenant was clearly found in this research area. Although, some sharing of cropping system is also discovered recently, but this type of land tenure system is not taken into account in this study.

Non-migrant household members are defined as participation on on-farm employment and/or living in rural area as their main job without minor or extra earning from urban area under any conditions. Cultivating of agricultural land and/or livestock farming are sort of non-migrant household member's activities. Furthermore, Non-migrant household's members are mostly full-time on-farm family labour.

### 3.5 Independent variables

Independent variables are undertaken by theoretical framework pathway in this study. Probit model is used to find out determinants of migration. This model has a dichotomous outcome that is thought to be influenced or caused by some independent variables. Therefore, its procedure is useful to find out the determinants of migration. Adams' model specification and estimation (Adams 1989) explained the determinants of migration model. Moreover, the maximum likelihood estimation procedure uses to obtain the function. The function is expressed in the following form:

$$P[Y = 1] = F(a + b_i'X_i), i=1...9 \quad (12)$$

The case  $Y = 1$  denotes household default on having migrant, and  $X_i$  are representations for the vector of characteristics of the household and individual household member. Wardana et al (2008) stated in their previous research: socio-economic variables and their characteristics  $X_i$  give some data set of household with and without migrant, the parameters are estimated through  $a$  and  $b$ , and then  $F(a + b' X_i)$  is used to predict the probability that an individual with characteristics  $X_i$  default on having migrant. Log likelihood is obtained by using scaled deviance. The scaled deviance is used to test the significance of a probit model. Herewith the independent variables that used to explain the choice of farmer in having additional work, which are categorised as described next;

#### 1. Individual capital characteristics

- *Age (IndivAge)*; the age of individual household member who participate on migration is remained unclearly displayed. Head of household, which is as senior member, can be considered to be more risk averse. Thus, he will not probably participate to migrate to urban areas. On the other hand, due to lack of agriculture production capital from on farm side- they are strived to be risk taker in urban areas. This variable is described, with two probability; decrease and increase on migration decision. Furthermore, the expected migration probability is increasing by reaching aged optimum point. Yet, it is declining after attaining a certain point (end of productive age). In other words, young farmers are expected to have higher probability to migrate than senior farmers.
- *Gender (IndivGen)*; as representative human capital endowment regard to male and female household members as well as agriculture labour. In this research area, male household members are dominantly migrating to urban area than female members. However, female labours had an agriculture occupation as equal as male labours in on-farm activities. It is therefore expected that probability male members is higher involved on migration decision.
- *Marriage status (IndivMarrSt)*; expressed the individual household members who have married is higher than the single status members due to the married members have their dependents. Hence, the married members are willing to migrate initiatively. On the other hand, some single status members have also found leaving their village out. Lack of job availability, poor income or earned

better income, and pursue higher education level could be few foremost reasons by single member, therefore, this hypothesis can increase or decrease the probability of working in urban area.

- *Education (IndivEduSt)*; education level of migrant members are represented human capital with regard to formal educations. The fact that more migrant members who have higher education level will likely to be migrated to well-known education institution areas. Meanwhile, most of better education institutions are located in urban areas. Hence, the higher education status is relevantly higher possibility to migrate towards urban areas.

## **2. Time endowment and exogenous preferences**

- *Household size (HHSIZE)*; farm households in Sumatera Utara province can generally be described as absolute joint family. Household head, his spouse, their children, and other family relatives live and have meals together from the same kitchen. The research study has depicted approximately those 5-6 members per household. Thus, I assume that having more household members are willing household members to be migrating to urban area. In other words, the household size probability is a higher predicted than household who has only small number of burdens.
- *The children attendance  $\leq 14$  years old (NumbChild\_1)*; the presence of children below or equal to 14 years old is stated in household member decision. The participation of migration to urban area is likely to increase along with the higher number of youth. It could be caused by higher food and education expenses needed. In contrary, due to several reasons like child care, nurture education and behaviour, household head, his spouse and older siblings might remain to stay in rural area. Hence, this hypothesis is remained positive or negative expectation towards participation in urban working.
- *The children attendance  $\geq 15-20$  years old (NumbChild\_2)*; the role of household head decision and older family member is related to this child age cluster. Because this age group is categorised as young people who do not require some intervention from household's adult members. They enable to manage themselves without any interventions from their parents. Furthermore, young people are also need consumption expenditures such as food, entertainment, and clothes and pursue higher education status. Head and adult members of household are therefore going to increase the probability of participation in urban area because of adult children's consumption and education financial assistance.
- *Ethnic group (Ethnic)*; ethnicity is represent the rice farming household characteristics. In this study area, household tribe is generally dominated by Javanese. Initially, Javanese ethnic is transmigrated from Java Island. Since then, they have been working in farm activities and settling in this area about 40-50 years. They acculturate socially with native ethnic groups, Malay and Batakese. This study is assumed that Javanese is more involved on rice

farming activities, and then they are more likely to participate in migration work. Javanese and other ethnic groups are set as dummy variables. Value 1 is expressed Javanese tribe and 0 otherwise.

### 3. *Farm characteristics*

- *Owned land size (Prv\_LandSz)*; this variable refers to the size of previous owned land before five years (2005-2009) interval that is used by farm household activities. The owned land size is measured in hectares. Landownership is assumed to be negatively associated with participation in migration. Casual observation suggests that the poor household may have small size of land than rich household one but it does not mean that the land size associated with participation in migration work. In other words, a negative correlation between farm size and migration participation is hypothesised. It is therefore expected that poor household who own a smaller plot of land tend to migrate to urban area, whilst the rich farmers with larger cultivated lands are more probably remain to be engaged in on-farm activity.

*Table 1: Descriptive variables used in migration participation*

Variables	Definition	Expected sign
<b>Dependent variable :</b> Migration	Participation in migration working (binary choice) migrant=1 non migrant=0	
<b>Independent variables :</b>		
<b><i>Individual characteristics</i></b>		
IndivAge	Age of the household member	+/-
IndivGen	Gender of household member (value 1 if member is male , 0 otherwise)	+
IndivMarrSt	Marriage status of household member (value 1 if member is married, 0 otherwise)	+/-
IndivEduSt	Education of household member (value 1 if junior school and higher education level, 0 otherwise)	+
<b><i>Time endowment and exogenous preference</i></b>		
HHSize	Total number of household member	+
NumbChild_1	Number of children below or equal to 14 years old in household	+/-
NumbChild_2	Number of children between 15- 20 years old in household	+
Ethnicity	Ethnicity of household member (value 1 if member ethnic is Javanese, 0	+

otherwise)

**Farm characteristics**

Prv\_LandSz                      Previous owned land size used by rice -  
farming household

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**3.6 Analysis tools**

By analysing survey data, I have drawn the typology of farm households. The descriptive variables used in migration participation give an indication of the difference between households with migrant and without migrant members. The determinant of both types of household is formally assessed by the migration equation. Then, the two household characteristics, migration and non-migration are described by in terms of internal and external homogeneity. The separable household characteristics is aimed to prevent respondents grouped together, however they could be similar in some parameters.

Probit model is used to explain determinants of migration. This procedure is useful for situation where the model have a dichotomous outcome, which is established as dummy with 1 if respondents are migrating to urban area and 0 if respondents involve on-farm occupation. The dependent variable is thought to be influenced by several independent variables. Consequently, independent variables, which contain ratio, nominal, ordinal and interval measurement scales, are entered in regression analysis on probit model. Furthermore, the determinants of the migration model are borrowed from Adams' (Adams 1989) specification and estimation model, which assumes the categorical dependent variable reflects an underlying quantitative variable with a cumulative normal distribution. Meanwhile, the maximum likelihood estimation procedure is used to obtain non-linear binary choose model (e.g. Logit, Probit, and multinomial Logit). Previous study has shown that the probit model function is relevance for the migration decision model is described by the following formula;

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + \varepsilon \tag{13}$$

$$Mi = \alpha_1 + \alpha_2 IndivAge + \alpha_3 IndivGen + \alpha_4 IndivMarrSt + \alpha_5 IndivEduSt + \alpha_6 HHSize + \alpha_7 NumbChild_{-1} + \alpha_8 NumbChild_{-2} + \alpha_9 Ethnic + \alpha_{10} Pr\_LandSz$$

According to Achmadi's (2008) previous study, the assumption of normality, the decisions of participation or not can be expressed from standard normal cumulative density function. Furthermore, the probability of  $Y_i$  occurring ( $p=1$ ) can be calculated with following form:

$$prob(Y_i = 1) = F\left(\frac{\beta_0 + \beta_1 X_{li}}{\sigma}\right)$$

With F is the standard normal cumulative density function.

$$prob(Y_i = 1) = F\left(\frac{\beta_0 + \beta_1 X_{li}}{\sigma}\right) = \int_{-\infty}^{\left(\frac{\beta_0 + \beta_1 X_{li}}{\sigma}\right)} \frac{1}{\sqrt{2\pi}} e^{-\frac{t^2}{2}} dt$$

Where :

$Y_i$  = Dependent variable, the household members who participate in urban work is indicating by 1, and whilst 0 if the non-participated household members.

$\beta$  = Estimated probit model coefficients

$X_i$  = Independent variables consist of individual, household and farm characteristics

The probit model coefficients are estimated using maximum likelihood estimation. It determines whether independent variables have a positive or negative effect on dependent variable, and one simply needs to know the sign of the parameter. Furthermore, the marginal effects are used to calculate how migration probability changes if there is marginal change in one of the explanatory variables. Hence, it is not constant because probit model use a transformation on the linear explanatory part of the model using a distribution function to guarantee value between 0 and 1. To determine the individual's choice, as is well known, the probit model is based on the underlying latent variable. In the case of rural urban migration, the latent variable may be thought of as the difference in expected utility from staying with the household and leaving the household to work in urban area (Li and Zahniser 2002). Therefore, to find out the magnitude of the effect, one calculates the 'average' probability of an event to be occurred minus the probability or event not occurred times its corresponding standard normal density function. Statistical tool STATA is used to calculate elasticities of independent variables both for dummy and continues variables.

As stated by the post estimation of binary outcome, the goodness of fit can be gauged by several measurements in order to test how well a model fits the data on that it was estimated. Moreover, three types of goodness of fit measurement will be present in this study: the likelihood ratio test, McFadden's R-Squared, and percent correctly predicted.

## Chapter 4: The Setting of Local Characteristics

### 4.1 Description of Deli Serdang

Deli Serdang is administratively located in Sumatera Utara province. As one of the 25 districts in Sumatera Utara, Deli Serdang has abundances of natural resources. Historically, Deli Serdang is separated into two kingdom of sultanates; Deli, which was located in Medan capital and Serdang at Perbaungan (It is now known as capital of Serdang Bedagai district) (BAPPEDA 2007). This district is surrounding Medan, the capital of Sumatera Utara province and some satellite cities such as Binjai, Lubuk Pakam and Tebing Tinggi, also encompassed administrative border with Serdang Bedagai, Langkat, karo and Simalungun districts. Geographically, these satellite cities as backwards linkage area for Medan and also known as the gate of Sumatera Utara. In 2003, based on national autonomy legislation law (Undang-Undang No.36 Tahun 2003), Serdang Bedagai district was established as a new district, which administratively separated from Deli Serdang district. As one of consequences of autonomy legislation law, the two districts total administrative are that changed regarding to historical territories. Thus, Deli Serdang total area is officially 2,497 square kilometres, which composed 22 sub-districts and 403 villages/counties, where laying on 3.34 per cent of total area of Sumatera Utara province (see *Appendix 2*).

Social relationship and network among cultures is shown that respectful and tolerant in Deli Serdang. Malay, Karo, Simalungun, Javanese, Bataknese, Minangkabau, Chinese and Acehese are few cultures who living and acculturating social life together. The religion harmoniousness among Moslem, Christian, Hindu and Buddha also keeps a concord social relation throughout approximately 1,634,115 inhabitants. Furthermore, BAPPEDA Deli Serdang (2007) is that noted developing and growing agenda implements some indicators for measuring their economics of development. There are three essential macroeconomic variables; regional gross domestic product, inflation and level of unemployment. These variables could be clearly revealing how its measurements stimulate on developments and growths after economic crisis in 1998.

The distribution of inhabitant in the study area depicts a balance ratio between male and female in sub-district of research areas. Kutalimbaru is the largest sub-district area, which is stretched for 174.92 square kilometres. Agriculture is the main activity of tenants, actually horticulture such as; vegetables and tropical fruits are mainly produced by Kutalimbaru. However, irrigated agro-ecological system, agro-climate also motivates farmers to cultivate their land for rice farming. Even tough rice farming is not shown as prime agriculture farming in this area, which dominantly domiciled Batak and Karo ethnics. Moreover, their living characteristics are resided away from their nuclear family that has counted for 35,338 inhabitants with population density around 202 headcounts per square kilometres. Thus, it can be clearly seen in Table 3 that the population density is quite rare as compared with other research areas. Meanwhile, Beringin, Tanjung Morawa and Sunggal sub-districts are the centres of rice production in Deli Serdang. National Agriculture Department and non-government organisations usually pointed these areas as their pilot project. Topographic, agro-climate and soil nutrient factors are suited for rice farming and poultry farming. Beringin is

one of the agriculture pilot project areas in particular of rice farming system. Rice intensification system and organic rice farming are two ongoing projects in Beringin and Sunggal. Moreover, these sub-districts have good transportation access and are closer to Medan and Lubuk Pakam.

Sunggal counted for 214,962 dwellers that its two-thirds inhabitant is absorbed working in industrial and trading sectors for around 10 years. Despite these prominent activities, rice farming is yet other interested activities for people in this sub-district. Rice farming agro-ecological is streamed by semi-technical irrigation covering whole areas from Deli river intake. Thus, rice farmers surely got water supply for two cropping patterns in a year. Then, the high population density resulted to a shortage of the number of arable lands and its effect obtains less of agriculture factor production.

*Table 2: Inhabitant distribution of Deli Serdang district based on gender*

Sub-districts	Total Area (km <sup>2</sup> )	Inhabitants		Total Inhabitants	Population Density (headcounts/km <sup>2</sup> )
		Male	Female		
Beringin	52.69	25,566	25,219	50,785	964
Tanjung Morawa	131.75	86,511	85,686	172,197	1,307
Sunggal	92.52	107,515	107,447	214,962	2,323
Kutalimbaru	174.92	17,763	17,575	35,338	202
Pancur Batu	122.53	39,861	39,879	122,53	651
<b>Total</b>	<b>574.41</b>	<b>277,216</b>	<b>250,587</b>	<b>473,282</b>	

*Source: Deli Serdang Regional Development Planning Agencies (2007)*

The proportion of agriculture sector on regional gross domestic product was generally decreasing in six years, from 2000 to 2006. Deli Serdang Regional Development Planning Agencies (2007) explained that the decline of agriculture sector is caused by high foreign exchange rate and transaction cost of agriculture production. In 2001, agriculture has contributed to around 17.01 per cent on regional gross domestic product. Thereafter, it slightly fell to 0.78 points in 2002 due to paddy diseases and viruses which spread over rice central productions. From the data, it can be seen that the percentage distribution of agriculture sector was diminishing from early 2002 to 2006. Unsurprisingly, the services sector was nearly reached as same as agriculture's level in 2006. Subsequently, food or staple crop sub-sector is the biggest distribution on agriculture sector. Plantation, livestock and cattle farming, forestry and fishery have also contributed consistently in favour of enhancing regional gross domestic product (see *appendix 3 and 4*).

Deli Serdang's regional gross domestic product consists of nine sectors. Every sector attracts people for its employment opportunities. From the table of distribution of employment status in research area, it is shown that agriculture mainly employs inhabitants by 35 per cent. Staple food farming, horticulture and livestock farming are clearly seen as representative on-farm activities. According

to local development agenda, district governments are currently motivating each sub-district to train their prominence sub-sectors for development of a long range program. For instance, industrial activities such as home industry-hand craft, small and medium enterprises are a definite local specific in Tanjung Morawa and Sunggal, whereas other sub-districts like Beringin and Kutalimbaru are more engaged in agriculture particularly on food cropping and horticulture. Therefore, some sectors are more affluence as effect of transition in agriculture. Few dwellers are interested to work in urban construction and services for utilising their seasonal on-farm activities.

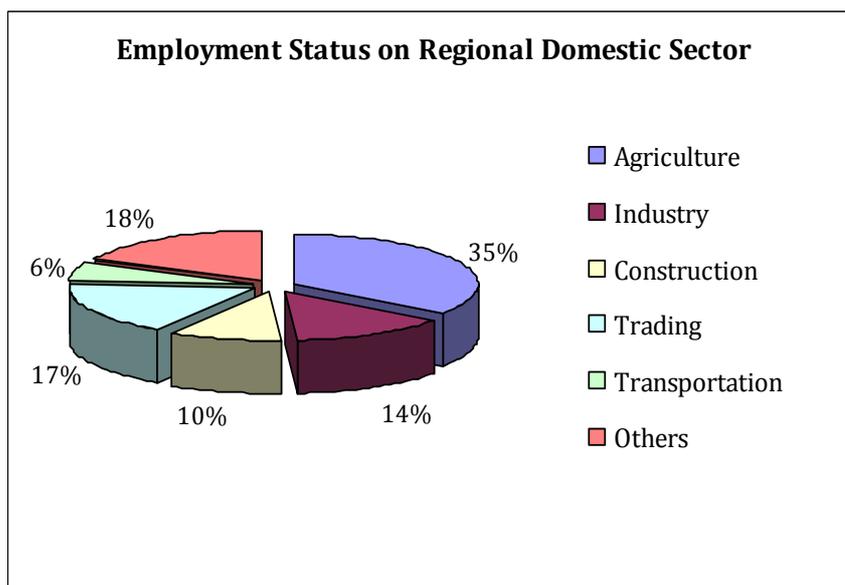


Figure 3: Distribution of employment status in research area

Generally, food cropping is the major contributory to agriculture sector in Deli Serdang. Nevertheless, there is a declining staple food harvest area that occurred in the research area. This condition is caused by large number of land conversions from cultivating land to residential estate or even industrial area. Basically, Agricultural land is one of the factors of production and also a farm household endowment. From table 3, Beringin and Tanjung Morawa have smaller number of harvest area than Sunggal. However, these two sub-districts have a higher yield rate of 54.04 and 50.49 quintal per hectare, respectively.

Beringin is one of the rice producers in Sumatera Utara. Initially, this sub-district is renowned for its tobacco plantations during Dutch colonialization. Large number of people transmigrated from Java Island as worker in many farm estates. Therefore, there are Javanese households who still remain to reside in this sub-district. Nowadays, being a rice farmer and brick maker are their main activities. These sub-districts also have various farmer associations; water user management and rice farmer cooperative society are working actively. Farm households usually rely on rural informal institutions to cope up with their risk on production side because it normally asks for minimum collateral requirement and has flexible procedures as well. The progressive farmer institutions would positively reach a higher amount of rice production when the harvest land is shortage. System of rice

intensification program is necessary in order to raise rate of production. The diminishing land size is deliberately seen in these areas.

*Table 3: Harvest area, production and yield rate*

Sub-district	Harvest Area		Production		Yield Rate (Kw/Ha)
	Ha	%	Ton	%	
Beringin	4719	5.81	24509	6.31	54.04
Tanjung Morawa	5700	7.01	27659	7.12	50.49
Sunggal	6093	7.50	28693	7.38	49
Kutalimbaru	2628	3.23	12399	3.19	49.09
Pancur Batu	1283	1.58	5919	1.52	48

*Source: Deli Serdang Regional Development Planning Agencies (2007) and Sumatera Utara in Figures (2004)*

## 4.2 Characteristics of respondents

This research collected 80 households that equally comprising migrant and non-migrant households. From 80 households collected, there are 453 household members as total of household member that is taken into account. The frequency of migrant member is 77 out of a total of 453 household members. Hence, around 83 per cent of the respondents where non-migrants while 17 per cent left for off-farm activity.

*Table 4: Rural urban migration work participation of the farmer*

Participation in migration	Frequency	Percentage	Cumulative percentage
No- not a migrant member	376	83	83
Yes- a migrant member	77	17	100
Total	453	100	

### 4.2.1 Individual characteristics

Several factors of individual characteristics can be explained by their education, age, gender, experience and ethnicity. In general, the work productivity and behaviour of farmer is more likely showed by age. Individual age also ascertains the farm experience.

The performance in running agriculture activity will be determined by the physical capabilities. Experience and assets or capital are other issues that embodied the natural conditions of individual. In this study, age distribution is obtained from individual level covering 80 randomly selected households. The percentage of respondents between or below 24 years old and 25-48 years old is a two-higher age distributions compared to other age categories. One may assume that the number of young farmers and family tends to correlate positively with higher productivity and health conditions. Moreover, the high demands of agricultural labour, in particular rice farming, required more young farmers to participate on-farm work. Figure 4 delineates the age distribution of farmers:

senior farmers (49-72 years old) accounted for only 13.7 per cent while only 0.4 per cent of farmers were above 73 years old. There are a quite larger number of senior farmers who had been interviewed during the survey. From the total distribution of farmers, it can be presumed that the elder farmers still have the motivation to cultivate their land and remain in stable performance in running the farm.

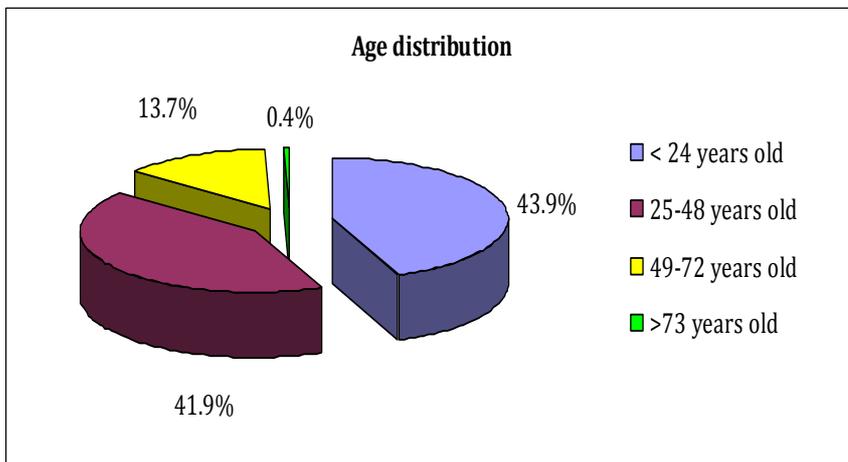


Figure 4: Distribution of age of the farm household member

The marriage status is one of the factors in determining the household decision on migration. From the survey in these five sub-districts there is an interesting finding that the percentage of married respondents are dominantly 58 per cent in migrant household, whilst the non-migrant household delineates 52 per cent for other marital status. As shown in table 5, the single marital status members in non-migrant household are presumed to choose staying in rural area, rather than following migrant members. Regardless of their divorce status, it is found that the higher number of married members who decide to out-migrate could happen because of having children or any other family dependents. Marital status may also consider a wide range of factors influencing individual migration.

Table 5: Marital status of respondents

	Participation in migration			
	Migrant household		Non-migrant household	
	Frequency	Percentage	Frequency	Percentage
Married	145	58	97	48
Single	105	42	106	52
Total	250	100	203	100

Like any other socio-economics phenomenon, the rural-urban migration characteristics in developing countries need to be analysed. Individual characteristic is one of its characteristics. Basically, individual characteristics are in fact a small unit of the socio-economic phenomena that can potentially explain migration behaviour.

#### 4.2.2 Farm household structure

The presence of household structure includes the size of household and number of children. These variables are distinguished between migrant and non-migrant household, which aims to reveal the difference of two household groups condition. The prevalence of family headcount is relatively 5-8 members between migrant and non-migrant household, which both household counted 83 and 60 per cent, respectively. Furthermore, the detailed percentage of household size distribution can be seen in table 6.

From the survey undergone, there are several families living in extended family, where married siblings live together with their parents. This structure assumes to present as an ideal of household formation. Even so, the young families are also clearly revealed their nuclear household size percentages among households. Another point, the farmer households consider to have more family members as an advantage due to the availability of family labour for working in farm household. However, the other family members tend to look for off-farm employment due to having more work in household and facing increasing living costs as well.

*Table 6: The presence of household size and number of children*

	Participation in migration			
	Migrant household		Non-migrant household	
	Frequency	Percentage	Frequency	Percentage
<b>Household size</b>				
< 4 headcounts	5	13	14	35
5-8 headcounts	33	83	24	60
> 9 headcounts	2	4	2	5
<b>Number of children</b>				
Children ≤ 14 years old	22	28	35	44
Children ≥ 15 - 20 years old	30	38	24	30
No children	28	34	21	26

This research study divides the number of children into three divisions: children below 14 and above 15 years old and null presence of children between migrant and non-migrant households. Empty children category is portrayed from new couple households, who just settled down as a farmer with a family, stable and orderly life.

On the other hand, the other two categories are defined quite differently from previous studies, while 15 years children can be classified as adult family member. The children aged 15 years old might not be decided as adult in Indonesia because of cultural reasons. Hence, the parents have to bear the cost of education and health of children of school age. At this age level, this term is therefore used by researcher in order to show the migrant burdens among farm households.

Generally, the percentage of children between 15-20 years old is moderately different in two types of household. There are 38 per cent of the members of the average migrant household and just beneath 30 per cent of the non-migrant household is made up of children above 15 year old. It may also indicate the higher number of 'adult' children postponing their marriage age due to poor family income or any socio-economics problems.

The term 'small Indonesia' is well-known for Sumatera Utara province. The development and growth of this province can not be separated from the patron-client relationship among ethnicities. In addition, multi-ethnic tolerance has already brought Sumatera Utara to become one of the illustrations of nationwide harmony. Javanese is one of the ethnicities who reside in many sub-districts. As the real farmer, Javanese ethnic shows a real inventive hard worker, toughness and optimistic, and has become a major requirement in establishing their success in farming. Recently, this study has taken place in five purposive sub-districts. Beringin and Tanjung Morawa sub-districts are two sub-districts that represent a majority of Javanese ethnic. Meanwhile, Kutalimbaru, Pancur Batu and Sunggal are inhabited by other ethnic groups such as Bataknese, Malay, Minangkabau, etcetera. The percentage of Javanese ethnic and other ethnic groups are relatively similar. Javanese ethnic just slightly diverged by 60 per cent for non-migrant participation and 55 per cent for migratory households.

*Table 7: Ethnicity group of rural urban migration respondents*

	Participation in migration			
	Migrant household		Non-migrant household	
	Frequency	Percentage	Frequency	Percentage
Javanese	22	55	24	60
Other ethnicity	18	45	16	40
Total	40	100	40	100

The high price of land and inadequate land access for household members are more likely influence the probability of migration. As shown in table 8, the smaller the sizes of current owned land, the higher the rate of migration. About 60 per cent of farm household came from the migrant household that currently owned less than 0.5 hectare of land. This figure indicated that the migrant member mostly come from the farm household with shortage land ownership. Similarly, non-migrant household are made up of about 83 per cent of respondents who have arable land below 0.5 hectare. It is assumed that there are several new households that have just been established. Basically, the young farmer started cultivating small land as a transfer of farm asset from their nuclear family.

In this study, the non-migrant household mostly worked as non-agriculture labour. As can be seen from table 8, about 59 per cent of them worked in migration such as rural small enterprises, brick maker and fish farmer. In migrant household, the percentage of agriculture and non-agriculture labour are 42 and 58 per cent, respectively. As can be observed from table 8, the distribution of job occupation (agricultural/ non-agricultural) is nearly equivalent across migrant and non-migrant households.

Table 8: The current land size and Agriculture labour status of respondents

	Participation in migration			
	Migrant household		Non-migrant household	
	Frequency	Percentage	Frequency	Percentage
<b>Current Land size</b>				
< 0.5 Ha	24	60	33	83
0.6-0.8 Ha	7	18	5	13
> 1 Ha	9	22	2	5
<b>Occupation of household member</b>				
Agriculture labour	105	42	83	41
Non-agriculture labour	145	58	120	59

From the independent samples test, household size, ethnicity and land size are estimated to compare the condition of the household characteristics between migrant and non-migrant household. Moreover, the output from the Levene's test is non-significantly different at  $p > 0.05$  then I can conclude that the different between the variances on each of three variables is zero or roughly equal. It indicates household size and ethnicity are homogenous between migrant and non-migrant household in this study. Given outcome of the independent samples test is clearly shown in *Appendix 6*.

Table 9: Household size, Ethnicity and Land size Statistics

	Participation in migration		t	Sig	Mean diff
	Migrant household	Non-migrant household			
	Mean	Mean			
Household size	6.25 (1.5)	5.15 (1.5)	3.288	0.425	1.1
Ethnicity	0.52 (0.5)	0.55 (0.5)	-0.221	0.675	-0.02

Numbers in parenthesis are standard deviation

As can be seen in table 6, the presence of household size is dominantly 5-8 headcounts between migrant and non-migrant household, while above outcome explains both households follow the assumption of homogeneity of variance. Moreover the ethnicity of migrant and non-migrant household also reveals equalled variances in terms of Javanese and other ethnicity.

Table 10 shows the average of owned land size, previous and current land size between migrant and non-migrant household. From the Levene's test of independent sample, the variances are significantly different- therefore, the assumption of homogeneity of variance has been violated. In the migrant household, the mean of current land size (0.72 ha) is larger than previous land size (0.48 ha). However, non-migrant household has a larger owned land size (0.58 ha) before 2005 than in 2009 (0.25 ha). It can be inferred that migrant households

apparently bought a lot of land in the last five years, whereas non-migrant households have sold their lands at a striking rate between 2005 and 2009. The latter may partly be due to the global economic downturn of the last years. In table 7 (in *appendix 7*), each variance of owned land size and the independent sample test is presented in detail.

*Table 10: Owned land size statistics*

	Participation in migration		t	Sig	Mean diff
	Migrant household	Non-migrant household			
	Mean	Mean			
Previous land size (Ha)	0.48 (0.6)	0.58(0.5)	-1.67	0.018	-0.98
Current land size (Ha)	0.72 (0.6)	0.25 (0.3)	9.89	0.00	0.46

*Numbers in parenthesis are standard deviation*

### 4.3 Migrant pattern and mobility

Socio economical condition is an ordinary factor that are seen and happened during field work in the research area. Paternal system is mostly exists in all Indonesian culture. Male is normally as leader in the family or household's decision maker. In this study area, the mobility of male migrant or husband tends to be migrated after land preparation and crop establishment. Presumably, they out-migrate to urban area for earning additional income.

In general, the proportion of male and female non-migrant member is higher than migrant member. Table 11 clearly shown the percentage of male and female migrants is counted 36 and 17 per cent, respectively. As usual, male migrant (husband or male other than husband) percentage distribution is higher than compared to female proportion during November 2008 - January 2009 planting season.

*Table 11: Proportion of male and female migrants*

	Migrant household			
	Male migrants		Female migrants	
	Frequency	Percentage	Frequency	Percentage
<b>Migrant distribution</b>				
Migrant member	58	36	19	17
Non-migrant member	104	64	92	83
<b>Number of migrant member per household</b>				
A headcount	13	42	15	88
Two headcounts	10	32	2	12
Three headcounts	7	23	0	0
Four headcounts	1	3	0	0

The migrant household are mostly represented by a headcount and two headcounts that percentage of household has a headcount of female migrant is 88 per cent. However, there are about 32 per cent household that displays for two male headcounts. Even now, three headcounts migrant is obtained by 23 per cent household. Hence, I presume that male migration pattern is seasonal, while female migrants usually come back to their village during Islamic Ramadhan or Aidl Fithr celebration (*suikerfeest*) due to female migration pattern is a bit longer –term or at least for more than 5 months.

From figure 7, of reason for migration in research area, it is known that some reasons indicate to determine the push factors, which driving farm household’s members to seek migration job in urban area. Land constraints, vulnerable risks in farm production and imperfections of rural market, missing of credit and insurance markets are assumed to be several push factors that affect household decision. Furthermore, the poor of farming income, children education attainment, achieved better income and poor living standard are several reasons that have exhibited dominantly in running the farm and settling household. Thus, the small percentage of other reasons should also be taken into account because it may display few accumulation of relationship among reasons, for instance social contacts could have influenced by joining in the family or vice versa. In addition, migrant respondents presume to get better offer for another job in the city (figure 7). So, every migrant member has their particular reason to determine whether or not to migrate towards urban area.

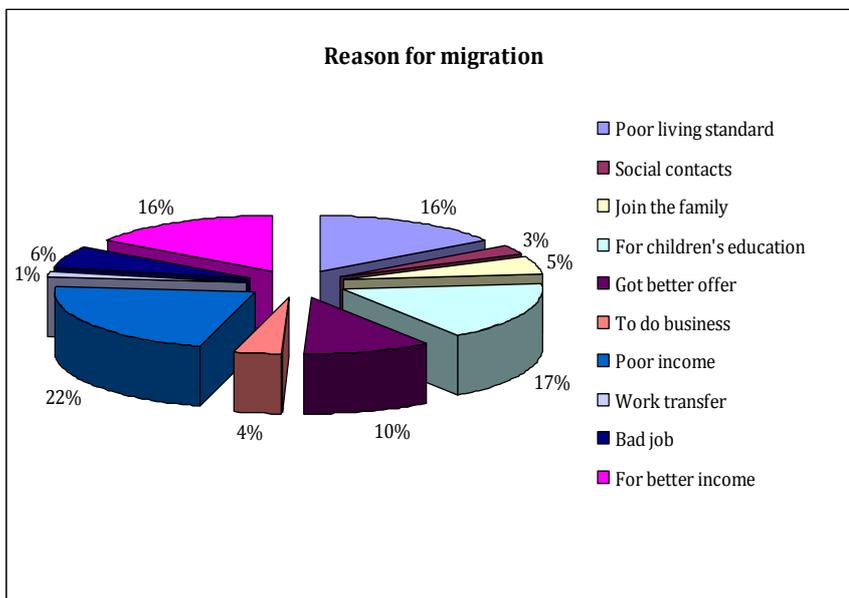


Figure 5: The reason of migrant member left rural to urban area

In general, most of migrant member’s preoccupation was rice farmer. Then, their main occupation changed into other activities out of farming and non-farming such as public transport driver, Pedit cab worker, dress tailor, waitress in restaurant, seasonal nanny, house maid or houseboy, etcetera. These activities actually represent for other occupation legend in figure 6. Given the highest percentage of other primary occupation in this rice farming area, its legends

illustrate associations among any other first occupations of migrant respondents. Correspondingly, some migrants were graduated from vocational school such as technician and business enterprises school. Therefore, the automotive technician (18%) and self-employed trading and business (13%) jobs are shown to have a quite higher percentage upon both occupations. About 18 per cent of male migrant worked as building worker. It engages male labour to work seasonally in urban area: Lubuk Pakam town and Medan capital.

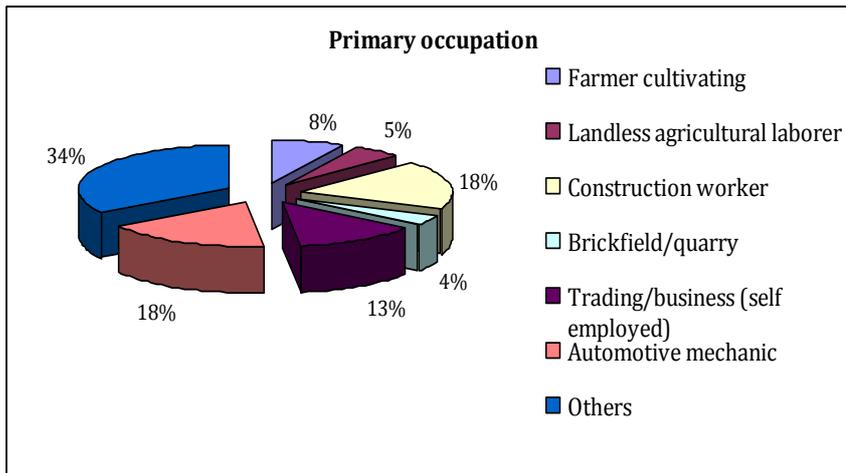


Figure 6: Primary occupation of migrant member

Migration pattern generally obtained long-term and short-term migration. However, short-term migrant usually works in Deli Serdang district town, Binjai and Tebing Tinggi towns. The metropolitan cities are also chosen by spell migrants as the best destinations for both male and female member from five sub-district research areas. The interesting fact illustrated that the percentage of destination to Medan capital and Deli Serdang town are relatively similar pointed at 31 and 27 per cent. Medan city is still to be the first priority for migratory destination. However, other province destinations like Pekanbaru, Tanjung Pinang and Batam is indeed being taken into account because these neighbour provinces' capital showed around 15 per cent proportion of being interesting destination.

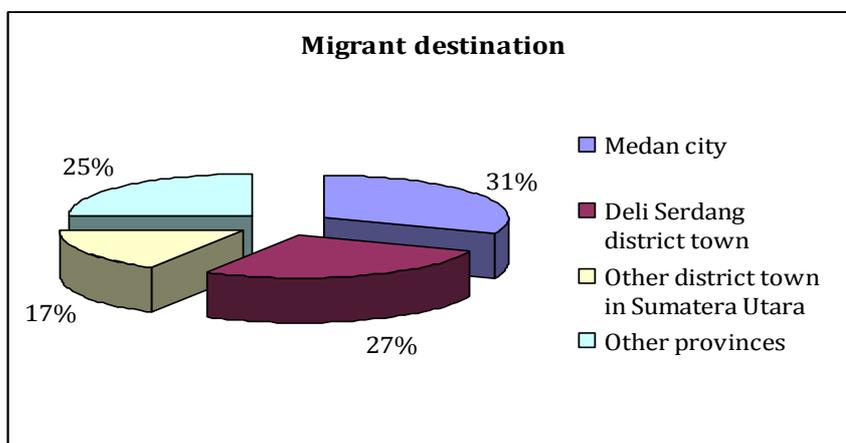


Figure 7: The preference of migrants' destination

## Chapter 5: Data Analysis

### 5.1 Statistical probit regression

The objective of this study is to determine lead factors to outmigration of labour from rice farming villages. A probit model was therefore used and the results are presented in table 12. The parameter that is used as explanatory variables are arranged into three categories: individual characteristics, time endowment and exogenous preference and farm characteristics. Each category contains few parameters to explain the determinants of migration. Furthermore, table 12 presented the estimation coefficient of each variable and their marginal effect after regression.

*Table 12: Regression coefficients representing the determinants of migration*

Parameter	Coefficient	Marginal Effect
Intercept	-1.63 (0.41)	
Age	0.01* (0.00)	0.00* (0.00)
Gender	0.20 (0.13)	0.07 (0.05)
Marriage status	-0.36 (0.22)	-0.14 (0.08)
Education	-0.11 (0.13)	-0.04 (0.05)
Household size	0.56** (0.11)	0.21** (0.04)
The children attendance ≤14 years old	-0.57** (0.11)	-0.22** (0.04)
The children attendance ≥15- 20 years old	-0.31** (0.11)	-0.12** (0.04)
Ethnic group	-0.32** (0.14)	-0.12** (0.05)
Owned land size	-0.26** (0.10)	-0.10** (0.04)

*Dependent variable : migration (1-with migrant, 0- without migrant)*

*\*\* significant at 1% level, \* significant at 5% level*

*Numbers in parentheses are standard deviations*

Number of observations = 453

Log likelihood = - 248.33279

LR chi<sup>2</sup> (9) = 126.44

Prob > chi<sup>2</sup> = 0.0000

Pseudo R<sup>2</sup> = 0.2029

The migration decision behaviour of rice farmer in research area is presented by the result of probit regression in table 12. Marginal effects of the explanatory variables are also revealed as on the third column in the table.

From the table of probit regression model, the goodness of fit of post estimation probit model is sufficient, likewise McFadden's pseudo R square (0.2029). The overall percent correctly predicted for this model classified 69 per cent of observations. Using the model it is predicted that 216 household members would not migrate (*MigPart=0*) and that 237 would migrate (*MigPart=1*) to urban area. Likewise, in reality 203 family labours did not migrate and 250 did. The table is clearly seen the predictions it is found that 140 of these 203 predictions not migrate are correct and 76 not. In similar, there are 250 predictions to migrate, which 174 are correct and 63 incorrect. Furthermore, the current model correctly predicts 69.60 per cent of family labours who migrate to urban area, meanwhile for members who do not participate in outmigration; the model correctly classified 68.97 per cent. For a clearer picture of the model prediction, appendix 5 describes the goodness of fit results.

The regression results show that individual gender, marital status, education have negative effect on the probability of migration. This seems to be logical since household has marriage and inexperience member, and society holds for male can not scrutinise with socio-economical conditions. By contrast, people with better education and mobile male member, therefore exhibit more intention to migrate. Meanwhile, male and female make much difference with respect to family migration, married member will probably result in increased ties to the residential community, which in turn discourage people from migrating.

Moreover, individual age, household size have a positive and significant effect on migration (table 12). However, the presences of children below 14 and above 15 years old, ethnicity group and previous land size have a negative and significant effect on the chance of migration.

According to available result of empirical studies, the migration decision is positively affected by the individual age of household members. The positive relation suggests that the intention to migrate of younger member in family, the higher probability to participate in migration. The marginal effect for this variable is reported 0.005, which means this variable has neglect able effect on probability of migration. It is also suggested that if the very young and the very old are less suited for the physical and physiological rigours associated with travelling and urban secondary job, then household members should have a smaller likelihood of becoming migrants. This finding tie in with Li and Zahniser (2002). In addition, the probability of household members to participate in migration work is increasing by reaching aged optimum point when they are younger, but after reach a certain point ('peak age'), the probability is decreasing when they are getting older. The average age of the migrant in the sample is 30 years. Moreover, the age squared variable is also used in order to explain life-cycle effect for migration participation. However, due to multicollinearity problem, age squared variable is dropped from the regression analysis.

The household size of migrant and non migrant is mostly less than 7 members. There is clear evidence that bigger size of family tended to have more members to migrate. It seems that working age group influenced the tendency to

migrate. Therefore, the household size variable turned out to be a significant factor encouraging the decision to migrate. The finding implies that higher number of household size positively associated 0.21 probabilities of participation in migration work. The largest probability of household size contributes to migration and the poor households are more prone to migration. In a similar vein, Rijanta (2008) views on his Indonesian's study that some households are categorised as household have a heavy demographic burden and uncertainty in obtaining income, which many of them are the target of the government's social security programs. Concisely, household size variable is a push factor that will increase probability of household members to participate in migration. Then, this outcome is quite similar with various studies in Africa and Asia that provided quantitative evidence of this phenomenon such as in Tanzania, The Philippines, Thailand and India.

Among the household characteristics, the presence of children below fourteen years old in household affects migration decision in this study. Previously, the hypothesis of this explanatory variable is not a clear assumption whether positive or negative expectation towards participation in urban working. The regression result shows the presence of children below the age of fourteen to have a significant effect on the migration decision. However, the value of marginal effect holding other explanatory variables fixed is  $-0.22$ , which means that if the household is having any one child in this level of age, the probability of migration decision is reduced about 22 per cent or has a less intense participation in migration. It determines that the migration probability of any household, which has this children age category, will be smaller than household has none of it. So, the simple explanation for this outcome is because the children presence below fourteen years old requires child care, nurture education and any parental inputs to children, and hence the family member more likely endures to have secondary job.

Another interesting result for the presence of the children variable in this study is that the presence of children between fifteen and twenty years old turned out to be a significant factor in describing the decision to migrate. Yet, the sign of this independent variable involves negatively ( $-0.12$ ) in this study, which means the 'old children' presence deter the negative decision to migrate, which has a less intense participation in migration. Presumably, this variable supposed to have positive relation with migration decision, because the higher expenditure for education cost and health of children, the higher the probability to migrate to urban area. However, this remark has a possible reason that children in this age group can work in rice farming, to help their parents or older siblings for responsible for daily farming. Henceforth, the probability of having any secondary jobs is getting lower for the parents and household members, because the household have already more family labours to work on farm.

A significant negative relationship between ethnicity and participation in migration work is also shown in regression. This finding implies that Javanese farmers' participation in urban secondary job is 0.12 smaller than other ethnicity, holding other variables at their means. Javanese farmers dominantly work in on-farm in these study areas. The rice farming activity can not be separated from the acknowledgement of the Javanese ethnic and their patron-client relationship. As the real farmer, Javanese shows the spirit and hard worker. Considering that rice

farmers with other ethnicities such as Malay, Minang and Bataknese are well known as having a higher level of entrepreneurship, the higher probability of their participation in migration work is plausible.

The land ownership variable is measured by previous own land size. By regressing current owned land size the result of which is presented in *appendix 5.b*, endogeneity problem occurs. Reverse causality is expected between current owned land size and the migration dummy. The positive sign of the current owned land size can be explained by the fact that migrants earn more money than non-migrants, and can therefore buy more land. Since an active land market exists, there is hardly a barrier to purchasing land. Therefore, instead of the current land size, previous land size is used as regressor. This previous land size refers to the cultivated land areas owned by farm household in hectares before 2005. In the discussion on table 10, I mentioned that it appears that the causality indeed runs from migration to land ownership, as migrants buy more land and non-migrants sell their land off.

Contrary to the result of naive regression, previous owned land size has a significant negative effect on the likelihood of migration. From table 12, this finding implies that one per cent extra land endowment will decrease the probability of migration participation by 10 per cent, while keep other variables constant. As I expected, land ownership tends to be negatively associated with participation in migration. This situation might be explained by the fact that rich owner operators are less likely to migrate because they have more capital than poor owner operators. Lack of land appears to be a push factor for rural-urban migration. Hence, poor households who have a smaller size of land tended to have more members to migrate. Land ownership can be interpreted as a proxy for wealth: it is the major income determinant in the rural areas of Deli Serdang district. Poverty thus induces rural dwellers to migrate seasonally to the urban areas.

## **Chapter 6: Conclusion and recommendation**

### **6.1 Conclusion**

Rural-to-urban migration is an ordinary occurrence in current Indonesia. This research aimed to obtain the lead factors influencing agriculture labour to participate in outmigration. The advantages of studying migration intensions perceive the migration decision making process. Based on previous studies, the rural-urban migration study is theoretically influenced by individual and farm characteristics, time endowment and exogenous preference. In this study, the determinant factor of migration decision has been estimated using probit model analysis and the ordinary least squares method, which corrected for sample selection bias.

These findings suggest that three research questions need to be answered. The first research question addresses the member of household's decision towards migration work. Age, gender, marriage and education status are four explanatory variables in this category. Then, the result clearly illustrates that age is only a significant variable in explaining the participation of family labours in migration work. The probability of younger members to participate in urban work is higher than senior members. The analysis also supports the hypothesis that the higher probability to participate in urban work, if household members reaching aged optimum point, but after attain a peak age, the probability is decreasing through. The analysis also supports the second research question regarding time endowment and exogenous preference variables, which all explanatory variables influence the migration decision. Household size, ethnicity, and the presence of children below fourteen and above fifteen years old statistically affects the decision of household members to seek secondary occupation in urban area. Meanwhile, household size has the largest probability contributed to migration and poor households are expectedly more prone as push factor toward migration. In family structure, the presences of children below fourteen and above fifteen years old have a less intense participation in migration. Notwithstanding, the family structure findings are quite different to other previous studies.

Among the findings of time endowment and exogenous variables, ethnicity variable is negatively significant in explaining the migration propensity. This trend is likely to be connected by the fact that socio-economic performance of present day's farmer is explained by parental skills and the average skills of the ethnic group in the parents' generation. Borjas (1995) uncovered a similar outcome that ethnicity has an external effect, even among persons who grow up in the same farm neighbourhood.

The farm characteristic finding in this study highlight the important role that intra-household heterogeneity plays in the decision of household members to participate in urban work. This study found that the previous owned land size variable is explaining a negative significant on the probability of migration decision. This result reveals that rich owner operators are less likely to migrate because they have more capital than poor owner operators. Lack of land appears to be a push factor for rural-urban migration. Hare (1999) coined that the productive asset like land has a higher level of capital accumulation. Landownership size may also be an indicator of household wealth. The households

whose have small size of land are sending their family member to supplement their farm incomes. In addition, this implies that farm work does not necessarily compete with migration in terms of family labour allocation. Because during a busy cultivating time or after harvesting time, farm labour can freely adjust their time to participate in urban secondary work. This finding is in line with Li and Zahniser (2002) Chinese study of migration.

Migration work embraces all the urban job opportunities, household member can have a secondary job outside his on-farm activity. This study only includes the possibility of working in urban area for earning another income. Nevertheless, there are possibilities of working in another farm for a wage. In order to gain diversity and stabilise their income, rural households might supplement their on-farm activities with secondary urban job employment. Hence, the tendency of the urban income earned is more likely to play for household's supplement rather than off-farm wage from working in another farm.

Moreover, the observation of this seasonal migration study, migrant members out-migrate to urban area for earning additional income while women and other family members were responsible to cultivate and undertake daily farming activities, for instance hand weeding, hauling and transplanting, and pasturing or animal care activities. During harvesting time, migrant members would return to their countryside for harvesting and threshing rice crop. In the meantime, most of them also worked as a group of harvesters at the neighbouring villages since income from those activities are similarly comparable to the job in the urban area. Subsequently, they looked for another work in urban area after harvesting time until the second rice or secondary crop planting season started. They therefore went to urban area to get better income opportunities. These findings tie in with Wardana et al (2008) who finds for rural in Central Java that prevailing household member activities are mainly linked to primary occupations and opportunity of looking for another job in urban area.

All variables in this study have some propensities of push and pull factors in terms of migration. The poor households, who are generally those with low asset endowments, they participate more because of pushed out of agriculture. On the other hand, the rich who participate more because they have socio-economic means to do in urban area such as education, health access or other public accommodations, then it indicates that rich households are more likely to step forwards long-term migration rather than short-term or seasonal migration once.

## **6.2 Recommendation**

Empirically estimating the overall rice household income and farm productivity are challenging and fascinating tasks, as these effects can take place through direct and indirect channels. Investigation into how migration affects rice farming activities need to be based on information of changes in income and any productive investment induced by migration, which include physical and human capital accumulation. Such findings are in accordance with explanations derived from the 'new economics of migration'. Yet, there are some interesting question left unanswered , whether to learn that migration-related decisions should not be assessed and scrutinised only on the basis of utility maximisation of individual

migrants, but also on the source of risk reducing by households. The next necessary step should be to analyse the key variable that impinge on the seasonal migration decision, by drawing in line with the theoretical argument, the cost of living differential and cost of separation from the rural family towards individual and family migration decision. At the same time, the analysis of two factors (push and pull) is relied on which factor is more important- the labour (productivity) surplus or the liquidity (capital) constraint- either the poor or the rich households engage more in migration work.

Data limitations often form the biggest obstacle of in-depth in some research area. Currently, government, some international academic institutions and development organisations are gathering data through five years longitudinal surveys throughout Indonesia. Forth, these data would be used to answer some queries regarding rural- urban migration's studies and the related further studies on economic development such as income mobility, poverty alleviation, health and nutrition of children of migrant workers, education and so on. Therefore, the corresponding authority should facilitate and encourage the non-governmental organisations and academic institutions to do more research in rural-to-urban migration areas.

Onwards, the outcome of research studies would enable to support government for preparing programs to rural areas in order to diminish the rate of outmigration. The appropriate programs such as resources management in irrigated lowland, integrated rice crop and micro-finance credit scheme for small farmers to solve cash scarcity for farming and small scale industry need to be further developed and scaled up.

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## Appendix

In Indonesian-the original data

### 1. Harvest Area, Production and Average Production of Lowland Rice per District or city in Sumatera Utara 2006

Kabupaten/Kota <i>District/ city</i>	Luas Panen (Ha) <i>Harvest land</i>	Produksi (Ton) <i>Production</i>	Rata-rata Produksi (Kw/Ha) <i>Average Production</i>
(1)	(2)	(3)	(4)
Kabupaten/			
1. Nias	20 424	73 627	36,05
2. Mandailing Natal	31 497	135 523	43,03
3. Tapanuli Selatan	71 838	316 387	44,04
4. Tapanuli Tengah	30 157	122 889	40,75
5. Tapanuli Utara	22 653	88 478	39,06
6. Toba Samosir	21 621	91 928	42,52
7. Labuhan Batu	67 109	282 503	42,10
8. Asahan	42 619	183 921	43,15
9. Simalungun	84 696	367 793	43,43
10. Dairi	23 258	82 277	35,38
11. Karo	18 783	65 704	34,98
<b>12. Deli Serdang</b>	<b>137,596</b>	<b>625,982</b>	<b>45,49</b>
13. Langkat	73 336	318 965	43,49
14. Nias Selatan	8 295	30 538	36,81
15. Humbang Hasundutan	14 993	61 731	41,17
16. Pakpak Bharat	4 296	14 091	32,80
17. Samosir	6 323	27 152	42,94
18. Serdang Bedagai	72 828	335 233	46,03
19. Batu Bara	x	x	x
Kota/City			
71. Sibolga	0	0	0,00
72. Tanjung Balai	65	272	41,81
73. Pematang Siantar	3 231	14 353	44,42
74. Tebing Tinggi	1 484	6 422	43,27
75. Medan	4 164	18 003	43,23
76. Binjai	3 935	16 889	42,92
77. Padangsidempuan	4 954	21 729	43,86
<b>Jumlah/Total</b>	<b>705 023</b>	<b>3 007 636</b>	<b>42,66</b>
<b>Sumber/Source :</b>	BPS Provinsi Sumatera Utara/ <i>BPS-Statistics of Sumatera Utara Province</i>		
<b>Keterangan/Note :</b>	x) Masih bergabung dengan Kabupaten Induk (Asahan ) <i>Included in Main District (Asahan)</i>		

## 2. Number of Villages Area and Population Density 2006

No	Sub-districts	Sum of Villages	Area (km <sup>2</sup> )	Number of Households	Adult Inhabitants		Children Inhabitants		Population	Population Density (headcounts /km <sup>2</sup> )	Percentage (%)
					Male	Female	Male	Female			
1	Gunung Meriah	12	76.65	735	821	838	448	414	2,521	33	0.15
2	STM Hulu	20	223.38	2,870	3,972	3,921	2,168	1,937	11,998	54	0.73
3	Sibolangit	30	179.96	5,055	6,541	6,867	3,568	3,395	20,371	113	1.25
<b>4</b>	<b>Kutalimbaru</b>	<b>14</b>	<b>174.92</b>	<b>8,086</b>	<b>11,490</b>	<b>11,762</b>	<b>6,273</b>	<b>5,813</b>	<b>35,338</b>	<b>202</b>	<b>2.16</b>
<b>5</b>	<b>Pancur Batu</b>	<b>25</b>	<b>122.53</b>	<b>18,373</b>	<b>25,718</b>	<b>26,686</b>	<b>14,143</b>	<b>13,193</b>	<b>79,740</b>	<b>651</b>	<b>4.88</b>
6	Namo Rambe	36	62.3	6,350	8,387	9,089	4,575	4,493	26,544	426	1.62
7	Biru-Biru	17	89.69	7,300	10,612	10,813	5,790	5,345	32,560	363	1.99
8	STM Hilir	15	190.5	6,977	9,419	9,775	5,139	4,832	29,165	153	1.78
9	Bangun Purba	33	129.95	8,331	11,650	12,021	6,497	5,904	36,072	278	2.21
10	Galang	29	150.29	14,991	22,089	22,598	12,054	11,168	67,909	452	4.16
<b>11</b>	<b>Tjg. Morawa</b>	<b>26</b>	<b>131.75</b>	<b>38,266</b>	<b>55,970</b>	<b>57,342</b>	<b>30,541</b>	<b>28,344</b>	<b>172,197</b>	<b>1,307</b>	<b>10.54</b>
12	Patumbak	8	46.79	14,874	23,226	23,355	12,676	11,544	70,801	1,513	4.33
13	Deli Tua	6	9.36	11,386	18,056	18,735	9,850	9,262	55,903	5,973	3.42
<b>14</b>	<b>Sunggal</b>	<b>17</b>	<b>92.52</b>	<b>47,141</b>	<b>69,559</b>	<b>71,905</b>	<b>37,956</b>	<b>35,542</b>	<b>214,962</b>	<b>2,323</b>	<b>13.15</b>
15	Hamparan Perak	20	230.15	32,028	45,066	45,566	24,567	22,523	137,722	598	8.43
16	Labuhan Deli	5	127.23	11,239	17,485	17,640	9,542	8,720	53,387	420	3.27
17	Percut Sei Tuan	20	190.79	67,836	104,596	106,080	57,073	52,437	320,186	1,678	19.59
18	Batang Kuis	11	40.34	10,453	15,845	15,930	8,643	7,875	48,293	1,197	2.96

19	Pantai Labu	19	81.85	8,680	14,073	13,963	7,679	6,903	42,618	521	2.61
<b>20</b>	<b>Beringin</b>	<b>11</b>	<b>52.69</b>	<b>11,595</b>	<b>16,540</b>	<b>16,877</b>	<b>9,026</b>	<b>8,342</b>	<b>50,785</b>	<b>964</b>	<b>3.11</b>
21	Lubuk Pakam	13	31.19	17,067	29,249	31,079	15,960	15,361	91,649	2,938	5.61
22	Pagar Merbau	16	62.89	7,504	12,035	11,092	4,785	5,482	33,394	531	2.04
	Total	403.00	2497.72	357,137	532,399	543,934	288,953	268,829	1,634,115	654	100.00

Source: *Deli Serdang Regional Development Planning Agencies (2007) and Sumatera Utara in Figures (2004)*

### 3. Distribution of Percentage of Regional Gross Domestic Product 2000-2006

Sector	Year						
	2000	2001	2002	2003	2004	2005	2006
Agriculture	15.96	17.01	16.23	15.52	15.28	13.34	13.54
Mining and Natural Resources	0.73	0.76	0.65	0.69	0.83	0.91	0.93
Industry and Processing	45.02	43.46	47.85	45.7	45.08	46.22	48.6
Electricity, Gas and Safe Drinking Water	0.19	0.22	0.24	0.28	0.3	0.26	0.26
Construction and Growth	1.27	1.68	1.7	2.11	2.14	2.34	2.29
Trade and Tourism	23.01	22.19	19.74	20.95	20.97	21.51	18.95
Transportation and Communication	2.46	2.72	2.43	2.42	2.2	1.97	1.84
Finance, Rent Payment and Property Leasing	2.2	2.29	2.09	2.03	2.26	2.21	2.2
Services	9.15	9.67	9.06	10.3	10.94	11.22	11.39
<b>RGDP</b>	100	100	100	100	100	100	100

Source: *Deli Serdang Regional Development Planning Agencies (2007)*



Probit regression, reporting marginal effects

Number of obs = 453  
 LR chi2(9) = 126.44  
 Prob > chi2 = 0.0000  
 Pseudo R2 = 0.2029

Log likelihood = -248.33279

MigPart	dF/dx	Std. Err.	z	P> z	x-bar	[	95% C.I.	]
IndivAge	.0050664	.0028265	1.79	0.073	28.7395	-.000473	.010606	
IndivGen*	.0771602	.0517752	1.49	0.137	.525386	-.024317	.178638	
IndivM~t*	-.1410156	.0870321	-1.60	0.110	.534216	-.311595	.029564	
IndivE~t*	-.0429612	.0533878	-0.80	0.423	.589404	-.147599	.061677	
HHSIZE	.2177082	.0430238	5.00	0.000	6.09051	.133383	.302033	
NumbCh~1	-.2227418	.0438093	-5.02	0.000	1.26711	-.308607	-.136877	
NumbCh~2	-.1212876	.0437092	-2.76	0.006	2.34216	-.206956	-.035619	
Ethnic*	-.125708	.0544031	-2.27	0.023	.560706	-.232336	-.01908	
Prv_La~z	-.1028395	.0417262	-2.46	0.014	.526667	-.184621	-.021058	
obs. P	.5518764							
pred. P	.5825426	(at x-bar)						

(\*) dF/dx is for discrete change of dummy variable from 0 to 1  
 z and P>|z| correspond to the test of the underlying coefficient being 0

. estat classification

Probit model for MigPart

Classified	True		Total
	D	~D	
+	174	63	237
-	76	140	216
Total	250	203	453

Classified + if predicted Pr(D) >= .5  
 True D defined as MigPart != 0

Sensitivity	Pr( +   D)	69.60%
Specificity	Pr( -   ~D)	68.97%
Positive predictive value	Pr( D   +)	73.42%
Negative predictive value	Pr( ~D   -)	64.81%
False + rate for true ~D	Pr( +   ~D)	31.03%
False - rate for true D	Pr( -   D)	30.40%
False + rate for classified +	Pr( ~D   +)	26.58%
False - rate for classified -	Pr( D   -)	35.19%
Correctly classified		69.32%

**b. Current owned land size**

Probit regression Number of obs = 453  
LR chi2(9) = 212.22  
Prob > chi2 = 0.0000  
Log likelihood = -205.44336 Pseudo R2 = 0.3406

MigPart	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
IndivAge	-.0006194	.0079249	-0.08	0.938	-.0161519	.0149132
IndivGen	.2709458	.1451612	1.87	0.062	-.0135648	.5554564
IndivMarrSt	.0626192	.2485047	0.25	0.801	-.424441	.5496794
IndivEduSt	-.2184324	.1479615	-1.48	0.140	-.5084316	.0715668
HHSsize	.4255161	.1167075	3.65	0.000	.1967735	.6542587
NumbChild_1	-.7125956	.12479	-5.71	0.000	-.9571796	-.4680116
NumbChild_2	-.2785895	.1174698	-2.37	0.018	-.508826	-.048353
Ethnic	.0945424	.1564894	0.60	0.546	-.2121713	.401256
Curr_landSz	1.587358	.1923914	8.25	0.000	1.210278	1.964438
_cons	-1.650717	.4361866	-3.78	0.000	-2.505627	-.7958068

Probit regression, reporting marginal effects Number of obs = 453  
LR chi2(9) = 212.22  
Prob > chi2 = 0.0000  
Log likelihood = -205.44336 Pseudo R2 = 0.3406

MigPart	dF/dx	Std. Err.	z	P> z	x-bar	[ 95% C.I. ]	
IndivAge	-.0002379	.0030434	-0.08	0.938	28.7395	-.006203	.005727
IndivGen*	.103953	.0554634	1.87	0.062	.525386	-.004753	.212659
IndivM~t*	.0240585	.0954954	0.25	0.801	.534216	-.163109	.211226
IndivE~t*	-.0832679	.0558404	-1.48	0.140	.589404	-.192713	.026177
HHSsize	.1634132	.0443739	3.65	0.000	6.09051	.076442	.250384
NumbCh~1	-.2736619	.0472754	-5.71	0.000	1.26711	-.36632	-.181004
NumbCh~2	-.1069882	.0448238	-2.37	0.018	2.34216	-.194841	-.019135
Ethnic*	.036352	.0602857	0.60	0.546	.560706	-.081806	.15451
Curr_l~z	.6096015	.0720227	8.25	0.000	.509183	.46844	.750763
obs. P	.5518764						
pred. P	.6087179 (at x-bar)						

(\*) dF/dx is for discrete change of dummy variable from 0 to 1  
z and P>|z| correspond to the test of the underlying coefficient being 0

. estat classification

Probit model for MigPart

Classified	----- True -----		Total
	D	~D	
+	201	45	246
-	49	158	207
Total	250	203	453

Classified + if predicted Pr(D) >= .5

True D defined as MigPart != 0

Sensitivity	Pr( +   D)	80.40%
Specificity	Pr( -   ~D)	77.83%
Positive predictive value	Pr( D   +)	81.71%
Negative predictive value	Pr( ~D   -)	76.33%
False + rate for true ~D	Pr( +   ~D)	22.17%
False - rate for true D	Pr( -   D)	19.60%
False + rate for classified +	Pr( ~D   +)	18.29%
False - rate for classified -	Pr( D   -)	23.67%
Correctly classified		79.25%

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**6. Independent Sample Test Household Size and Ethnicity**

**Group Statistics**

MigratPart		N	Mean	Std. Deviation	Std. Error Mean
ethnicsHH	Migrant HH	40	,5250	,50574	,07996
	Non-Migrant HH	40	,5500	,50383	,07966
HHoldSizeHH	Migrant HH	40	6,2500	1,49786	,23683
	Non-Migrant HH	40	5,1500	1,49443	,23629

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
ethnicsHH	Equal variances assumed	,177	,675	-,221	78	,825	-,02500	,11287	-,24971	,19971
	Equal variances not assumed			-,221	77,999	,825	-,02500	,11287	-,24971	,19971
HHoldSizeHH	Equal variances assumed	,642	,425	3,288	78	,002	1,10000	,33455	,43396	1,76604
	Equal variances not assumed			3,288	78,000	,002	1,10000	,33455	,43396	1,76604

## 7. Independent Sample Test Owned Land Size

Group Statistics

Y	N	Mean	Std. Deviation	Std. Error Mean
LandSz_Old	Migrant HH	250	,48	,652
	Non-Migrant HH	203	,58	,571
LandSz_New	Migrant HH	250	,72	,590
	Non-Migrant HH	203	,25	,350

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
LandSz_Old	Equal variances assumed	5,669	,018	-1,677	451	,094	-,098	,058	-,212	,017
	Equal variances not assumed			-1,700	448,337	,090	-,098	,057	-,211	,015
LandSz_New	Equal variances assumed	45,880	,000	9,894	451	,000	,464	,047	,372	,557
	Equal variances not assumed			10,400	415,453	,000	,464	,045	,377	,552