Determinants of migration – a case study of Ca Mau and Hue Provinces, Vietnam

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Abstract

This paper uses data from the household-level social economic survey (Fishing Transition Survey) implemented in Ca Mau and Hue in 2012, to specify the determinants of the migration decision based upon three variables; namely, the respondent's demographic, household and commune characteristics. The difference between the current studies and this paper is that this paper uses a Logit model to conclude that a positive relationship exists between a fishing family and the migration decision. Moreover, the impact of household income on migration depends greatly on the household's migration strategy. The richest families are more likely to send migrants because they want to learn the modern technologies to increase the productivity of household industries. Moreover, the paper also finds that the migration process tends to increase the income inequality in rural areas.

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Introduction

In the past decades, Vietnam has been remarkably successful in economic growth and poverty reduction. It's outstanding economic development is fuelling large amounts of migration flows from rural to advanced areas. These migrants are most likely the surplus labor in the households, and are trying to find a better employment opportunity in order to improve personal and family income.

Since labor migration is intrinsically linked with the economic development and transition process of countries like China, Thailand, and Vietnam, lots of surveys have been carried out to analyze the migration patterns along with other aspects of socio-economic development in Vietnam. For example the positive contributions of the migrants to the urban economy, as well as the adverse impact they bring about. Other studies have examined the determinants of migration, its consequences and other related issues, such as the lack of labor for the agricultural sector and the inequality between the rural and urban areas. However, most of the studies are based on a large-scale survey, the Vietnam Living Standard Survey (Nguyen Thu Phuong et al. [2008]), and less attention paid to the migration for a specific area. This paper uses data from the survey conducted in 12 communes randomly selected from the Ca Mau and Hue provinces, and almost all of the households of this survey are working on fishing and/or aquaculture. As result, this paper is able to identify what kind of households will choose migration, and what is the impact of migration on income distribution. In other words, this paper is trying to solve the following two

questions:

(1) What are the determinants of migration for fishing families?

(2) How does migration impact the income inequality in rural areas?

The paper is structured as follows. Section 2 describes the general pattern of migration in Vietnam. After this paper discusses the various theoretical and empirical studies, which explain migration flows in the literature. The results of former empirical studies also provide some reference for the selection of the variables for inclusion in the Logit model, and their impacts.

Section 3 gives a description of the data set used, such as the geographical and socio-economic characteristics of the selected areas. The data set used in this study is compared with the data set from Vietnam Living Standard 2012 (VLSS) in order to show the reliability of the sample.

In section 4, the determinants of migration in these fishing families are determined. Using the Logit model to analyze which households are more likely to migrate, and the relationship between these factors and the probability of migration.

In section 5, the impact of the household members' migration decision on their households in terms of the resulting income distribution in the area of origin is analyzed. A number of studies have looked at the impact of migration on income inequality between rural and urban area. Very few studies have looked at whether migration could reduce the income inequality in the sending areas.

Literature Review

Definition

It is important to note that there is no agreement among researchers on the definition of migration. As discussed by Bilsborrow (1996), migration involves both a time and spatial dimension. In other words, it is viewed as a physical movement from one area to another during a certain period of time. However, both the space of movement and the period of time are not clear enough.

Apparently, we can divide the migration into international migration and internal migration by whether the migrant has crossed the national border. This paper only focuses on internal migration. Although it is hard to specify the distance and exact period of time of migration in detail, we can use the main reason of migration decision to give the definition. Therefore, the definition of migrants can be given as all the people who leave the countryside for the purpose of gaining better social-economic opportunities in the cities, including towns at the country level (Wenbao [1996]).

Vietnam Migration Pattern

Although the definition of migration is not exactly the same in different surveys and studies, they all conclude that there is a tendency of an increasing rate of internal migration. The most persuasive one is the Population and Housing Census conducted by General Statistics of Vietnam (GSO) in 1999 and 2009. Table 1 clearly shows the population of migrants almost doubled for each type of migration, and 8.35% of people who aged 5 or older moved with in the past 5

years. Specially, the rural-urban migration always has a relatively large proportion of population. Moreover, the population of this type of migration has increased from 0.86 million to 2.02 million, which is almost three times higher than 10 years ago.

Table 1 Population and structure of migrant population aged 5 or older at the place of destination by type of migration flow, 1999-2009

	1999		2009		Annual growth
	Population	%	Population	%	rate (%)
Urban destination					
Urban-Urban migrant	971,486	8.2	1,719,056	7.4	5.9
Rural-Urban migrant	855,943	7.2	2,062,171	8.9	9.2
Urban non-migrant	10,089,625	84.7	19,413,699	83.7	6.8
Total	11,917,055	100	23,194,927	100	6.9
Rural destination					
Urban-Rural migrant	219,718	0.6	547,626	1.0	9.6
Rural-Rural migrant	760,939	2.2	2,204,430	4.0	11.2
Rural non-migrant	33,778,197	97.2	52,273,214	95.0	4.5
Total	34,758,854	100	55,025,270	100	4.7

Note: 1. The definition of migrants in this survey is people whose residence place 5 years before the time of the survey is different from their current residence place.
2. The annual growth rate above is the average of annual growth rate from 1999 to 2009.

Source: GSO, Population and Housing Census 2009

In addition, the survey also found that the most frequent migration direction is inter-provincial migration, as Table 2 reports. The most interesting thing is that the Population and Housing Census (2009) found clear evidence of the "feminization of migration". Table 2 illustrates the population of female migrants accounted for more than half of the migrant population in all three types of migration. However, it is important to note that the females prefer to move within a lower level of administrative boundary, namely, the migration type of

female is more focused on commune-to-commune migration.

Table 2 also gives evidence that migration increased the living standard of migrants (in all three migration types, the living standard levels of more than half of the migrants are high or very high.), especially for males. Since for the "High" and "Very High" categories, the portions of male migrants is higher than the female migrants no matter what kind of migration these people chose. Thus, for the long term, working in the urban areas will increase migrants expected lifetime income.

Table 2 The household living standard of migrants by type of migration and gender

Type of migration / Living standard level		Intra-district	Inter-district	Inter-provincial
Very low	Male	11.5	6.1	4.5
	Female	12.7	6.8	4.7
Low	Male	11.8	8.1	7.0
	Female	15.1	9.2	7.0
Average	Male	13.2	10.3	12.9
	Female	17.3	12.3	13.5
High	Male	22.0	24.3	32.7
	Female	21.7	23.4	31.9
Very high	Male	41.6	51.2	42.9
	Female	33.2	48.3	42.8
N	Male	434,600	553,363	1,152,835
	Female	795,424	728,098	1,323,178

Note: the household living standard level posted above is measured by their assets and housing characteristics.

Source: GSO, Population and Housing Census 2009

Although Tables 1 and 2 give a pattern of Vietnam migration, they show only long-term migration. It is important to note that migrations in developing countries such as Vietnam are seasonal. These people only go to the more advanced areas when the farm work of that season doesn't need lots of labor.

(Ha Thi Kim Anh [1998]) The Population and Housing Census (2009) cannot reflect the migration situation of these people. Furthermore, the survey only pays attention to the characteristics of migrants, but not the conditions of the migrants' original households. In the following sections of this paper, the dataset from the Fishing Transition Survey will enable us to figure out these aspects.

Previous Theoretical Approach to Migration Studies

Generally, migration can be considered as a process of labor movement from less-developed areas to more advanced areas, Lewies (1954) assumed that the economy consists of two sectors – the agriculture sector (rural area) and the industrial sector (urban area). The theory shows that rural-urban migration would solve the dilemma of the labor market for both sending and receiving areas, and therefore bring an equalization of income and productivity in these two areas.

Sjaastad (1962) placed human migration in an investment context, and classified the cost and benefit of the migration. His theory gave a sketchy framework for further empirical study of migration. Lee (1966) gave four factors which impact the decision of migration, which are the characteristics of the original area, the characteristics of the destination area, Intervening obstacles, and the characteristics of migrants. Lee's hypotheses has been used extensively in modeling the determinants of the migration decision. Todaro (1976) is the one who used and extended Lee's theory. Moreover, he pointed out that the expected gain of migration should be measured by the difference of expected real income

in urban areas and expected opportunity income in rural areas. He also considered the uncertainty of getting a job in an urban area as a factor which tended to decrease the expected income in advanced areas. Todaro used his model to prove the coexistence of unemployment and the increasing migration flow as long as the expected wage rate in the cities is higher than the wage rate in the rural areas.

Todaro's model can be considered as a fundamental theory to understand the migration decision, and numerous researchers have used extended Todaro's model to estimate the probability of migration. For example, Stark and Taylor (1991) argued that some non-economic costs and benefits should also be included in the migration decision model, such as household background, cultural difference and family ties. Lakshmansamy (1990) pointed to the possible impact of individual preference. For example, a risk-averse person may choose to stay in the household rather than to migrate even if the expected income differential is positive.

Previous Empirical Approach to Migration Studies

In order to verify the reliability of former theoretical studies, lots of survey and empirical researches have been done on the topic of human migration in developing countries, especially in Vietnam.

Some studies confirmed that single male whose age is between 15 and 25 is most likely to migrate in Asia and Africa. (Connell et. al., 1976) However, in Latin America, largest parts of migrants are married men accompanied with the family

and single women. (Brigg, 1973; Herrick, 1971;Nelson, 1974)

Chi Loi (2005) used VLSS(2004) data to analyze the rural-urban migration situation of Ho Chi Minh City, Long An and Binh Duong provinces. He found that, although a large share of migrants to urban areas are the people who are jobless because of lack of arable land, just becoming part of the labor force, or recently demobilized from the army, a great part of migrants already had a job in the villages or countryside. These people move to a modern environment to pursue a better life and modern life style. Moreover, no matter whether they are employed or unemployed in the rural area, the majority of migrants to advanced cities are unskilled. So most of them can only do some simple jobs either in factories or in the informal sector.

Mendola (2005) explored the interrelationship between the determinants of migration and household characteristics of a migrant's household. He found the asset-poor farm households are more likely to enter into short-term migration with low entry costs, because these households are unable to overcome the entry costs of long-term migration. However, the richer families tend to choose long-term migration in order to gain the high return to migration and employ advanced technologies, thereby achieving higher productivity.

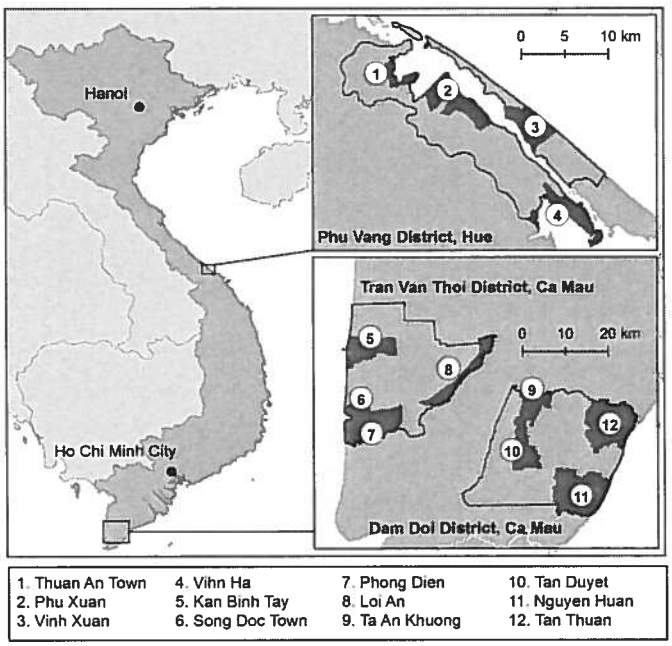
Huynh Truong Huy (2009) examined the determinants and benefits of migration, in the case of Khmer Families in Tra Vinh Province of Vietnam. He found that household size, the size of family farming or aquaculture lands and poverty status of the family has a significant effect on the migration decision. He also

pointed out that the status of other household members will affect the migration decision negatively. For instance, the existence of very young children and the elderly will decrease the probability of migration. Some other studies think the education status of the family, gender and martial status of the household head, and the communes' geographic and poverty characteristics also can be considered as significant variables in the migration decision model. (Nguyen Thu Phuong et.al. [2008]) Nguyem Thu Phiong also discussed the impact of migration on origin areas. He thought that the remittances migrants send to their family are both pro-poor and pro-rich, and it will increase the income inequality in the rural areas. Lan Anh Hoang (2009) disaggregated the migration decision-making by gender and martial status, which revealed that among males, it is generally easier to assert their interests and personal preference in migration decision than among females. Lan Anh Hoang thought the reason is the respective social identity shape of women and men, as well as their role in the household. Montira (2010) used a multilogit model to identify the determinants of the decision among non-migration, rural-urban migration and rural-rural migration. The way he defined the dependent variable enables him to figure out how the demographic and household characteristics of migrants impact the destination of migration.

Data

This empirical analysis is based upon the social survey, called the Fishing Transition Survey, implemented in the selected three districts from the two provinces in Ca Mau (Mekong River Delta region) and Hue (Northern Central Coast region) between December 2012 and January 2013. The main purpose of the survey is to understand the fisheries transitions (i.e., if and how people move from farming or fishing into fish farming, and vice versa). The survey enables us to make sense of fisheries transitions over the past decade, asking households about current (2012) livelihood practices compared to what they did a decade earlier (2002). The survey questionnaire included nine modules: household information; employment and earnings; other sources of income; fishing; aquaculture; assets and housing; loans; risks and coping; and perceptions.

Figure 1 Map of Vietnam, showing the selected provinces, districts and communes



From Figure 1, it is clear that both provinces are surrounded by the sea, and therefore fishing and fish products are the most important industries in these two provinces. The main rationale for the choice

of these provinces was to make sure of a variation in terms of fisheries and fishing farming activities. Table 1 indicates the characteristics of districts in the Fishing Transition Survey, which are high production rates for wild and farmed fish and varying poverty rates among districts.

Table 3 Socio-economic characteristic of selected districts

Characteristic	Ca Mau province			Hue province	
	Ca Mau	Dam Doi	Tran Van Thoi	Hue	Phu Vang
# of hhs.	1,212,089	182,332	187,132	1,090,879	171,363
Pop. density (/km^2)	229	222	266	215	612
Total land area (km^2)	5,295	823	703	5,062	280
Aqua. prod. (tons)	250,389	70,360	24,119	9,892	2,299
Fishing prod. (tons)	403,450	82,260	94,580	40,642	19,540
Poverty ratio (%)	10	15	6	11	13

Source: Provincial statistics, 2011; GSO, 2011

The data from GSO (Table 4) indicates that the two regions are the two most important origin areas. Among the percentages of households having migrated, the households having former migrated members are 39.6% for North Central Coast and 36% for Mekong River Delta. In our sample, 37.56% of all households have at least one family member who has migrated, which doesn't show a great difference from the percentage of overall rural areas provided by the Household Living Standard Survey 2012 (VLSS 2012). It also should be mentioned that about 28.32% of households in Mekong River Delta and 56% of households in Northern Central Coast reports the former migrated family members in the Fishing Transition Survey, and these data are both similar with the data from VLSS 2012.

The Fishing Transition Survey is a household-level survey, and the data was

collected from 599 households who live in Dam Doi district (220 households), Tran Van Thoi (179 households) and Phu Vang (200 households). These households are randomly selected from the 12 communes in the three districts and four communes per district (Figure 1). The statistical features of the database also indicate that considerable variation exists among the three districts and twelve communes (and one to eight villages per commune) that have been included in the survey. (See Appendix 1)

Table 4 Proportion of households having migrated former members by regions

Regions	% of households having migrated former members
Red River Delta	34.6
North East	32.5
North West	16.3
Northern Central Coast	39.6
Central Cost	36.7
Central Highlands	22.0
South East	17.9
Mekong River Delta	36.0
Rural Area	34.9

Source: GSO, Poverty and Migration Profile 2012

Our survey allows us to define a temporary-term migrant in 2012 as the household member who has been absent for a maximum of 6 months in the past year, thus this paper will only focus on temporary migration. However, the above definition of migration doesn't specify an explicit geographic boundary, which implies that this survey is unable to distinguish among intra-district, inter-district and inter-provincial movements. Since this paper defined migration as human physical movements to seek better social economic opportunities in an advanced areas, it doesn't matter whether the migration is within

districts/provinces or not, or even international migration. The survey also specifies the reason why the household member is absent for the last six months, whether they are away at school, working elsewhere, travelling, for family reasons (taking care of relatives/visits), married, in the army and in the pagoda. According to the definition of migration of this paper, only people who left households for the reason of working elsewhere are identified as migrants. In summation, the temporary migrant in this paper is the household member who leaves home for the reason of working elsewhere for a period of less than six months[1].

Table 5 Share of temporary migrants in household, by gender

	Male	Female	Total
Average No. of migrants	1.11	0.74	1.84
Percentage of the household size	22.95%	14.63%	37.58%
Percentage of male household member	41.52%	-	-
Percentage of female household member	-	30.76%	-

Note: 1. Percentage of male/female household member means the share of male/female migrants among all males/females in sample.
2. The temporary migrants here are only the people who migrate for working.

It is interesting to see what kind of people tend to migrate in our sample, as Table 5 reports. First, the average number of migrants in household for our sample is similar with the GSO data, which is 2.1. Moreover, from the above table, we can conclude that male household members are more likely to choose migration. Table 5 shows over forty percent of the male household members move to some advanced areas to pursue a better life or earn the higher salary to

[1] The household member who left family for more than six months is recognized as permanent migrant, and cannot be considered as a permanent resident of household.

support the poor family. However, approximately two thirds of the female household members choose to stay with other family members.

Table 6 clearly shows more than half of the households whose occupations include fishing and/or wage employment have at least one migrated family member. This fact enables us to say the household occupations should be considered as an important variable in the migration decision model.

Table 6 Number and percentage of households with migrants by household activities

	No migrants in family		Have migrants in family	
	#	%	#	%
Fishing	109	44%	141	56%
Aquaculture	304	68%	146	32%
Farm	138	77%	41	23%
Wage and Salary	92	43%	120	57%
Self-employment	77	70%	33	30%

Note: the household activities here are a set of the dummy variable which indicates whether household participate. This means it is possible one household has several family activities.

Determinants of migration

Theoretical Framework

The migration decision can be analyzed from the cost/benefit perspective. If the potential benefit is higher than the cost, then migration will occur, otherwise the migration won't happen. The goal of migrants is to maximize their net lifetime incomes, which can be considered as the present value of income difference between urban and rural areas. It is important to note that the negative effect on wage income due to the uncertainty of finding a job in city (Todaro, 1969). Thus, the expected net benefit from migration can be written as,

$$NET - BENEFIT = \sum_{t=1}^{n} \frac{P * Y_{URBAN}(t) - Y_{RURAL}(t)}{(1+i)^t} - C \quad (1)$$

where, $P =$ *the uncertainty of finding a job in city;*

$Y_{URBAN}(t) =$ *the expected urban income in period* t*;*

$Y_{RURAL}(t) =$ *the expected rural income in period* t*;*

$i =$ *the interest rate.*

$C =$ *the cost of migration*

The most important variable can be considered to be education level of the household. It is expected to have a positive relationship with the decision to migrate. First, better-educated individuals are more likely to get a job in the urban areas than people who are lower educated or have no schooling. The reason is that most urban employers require at least an upper secondary degree and tend to use the education level as a standard to select their workers. In addition, these higher educated persons usually have better access to

employment information, which also expands their chance to get a job. (Schwartz, 1973) Second, from the income point of view, one can expect that higher educated individuals tend to earn more money than lower educated persons.

As show in Table 6, persons whose household activities include either wage and salary earner or fishing earner have a greater propensity to migrate. This could be due to the relatively low expected opportunity income from the fishing and/or aquaculture industries, which implies the relatively high net expected income of urban wage work. (i.e. $P * Y_{URBAN}(t) - Y_{RURAL}(t)$ is higher for fishing family)

Whether the household participated in wage and salary work tends to increase the possibility of getting a wage job in the urban areas. The reason is that lots of employers will consider the experience of related job as an important factor in deciding whether to hire this worker or not.

The poverty status of communes is considered to be positively related to the migration decision. The poorer the commune is, the bigger the gap between expected urban and rural incomes, since a very poor commune is usually thought to have very low wage rate.

The income of the household perhaps has a negative relationship with the benefit of migration. For these relatively rich households, family members have less incentive to send migrants, because there is no need for them to earn money in the cities to support their families. Some studies suggested that the

relationship between household wealth and the possibility of migration should look like an inverted U-shape. Because the poorest households are too poor to migrate while the richest families have no incentive. (Lucas [2005]) However, other scholars thought both poor and rich families tend to migrate. Low-wealth families are more likely to engage in short-term migration because of the lower entry costs. On the other hand, rich families tend to participate in costly high return migration, i.e. long-term migration (inter-provincial migration or even international migration), in order to gain the modern technologies, which can be used to increase the productivity of household activities. (Mendola [2005]) Thus the overall impact of household income on migration is uncertain.

$$BENEFIT = f(E_{house}, F, A, W, P, I) \quad (2)$$

$$\frac{\partial f}{\partial E_{house}} > 0; \frac{\partial f}{\partial F} > 0; \frac{\partial f}{\partial A} > 0; \frac{\partial f}{\partial W} > 0; \frac{\partial f}{\partial P} > 0; \frac{\partial f}{\partial I} > 0 \text{ or } < 0$$

where, E_{house} *– household education level;* F *– fishing family;* A *– aquaculture family;* W *– wage and salary work;* P *– commune poverty status;* I *– household income*

Household size is expected to be negatively related to the cost of migration. In most cases, a large rural family will have surplus labor, which implies the expected opportunity cost of losing working labor is relatively low. Therefore, the migrants from a big rural family tend to have a smaller C in equation (1), which implies that the net benefit of migration for this kind of family is high.

The status of the family members is expected to have a positive impact on migration costs. Households with a large number of students are considered to

have lower family labor supply. This implies that the cost of losing a working family member is relatively high, which would decrease the net benefit of migration. In addition, when there exists a relatively large share of either very young children or old people in the family, households are less likely to send migrants. It is reasonable to think that young children and old people need be taken care of by other family members. Thus, the family tie can be considered as a non-monetary cost of migration.

The demographic characteristics of the household head include the gender and the age of the household head. If the household head is female, the risk of losing working labor in this household is relatively high. Since in most cases, the household head of the family is male, this occurs when there doesn't exist a male candidate in the household. It implies the female household head need not only work on the household activities but also take care of young children or old people. Thus, in this kind of family, people will tend to stay at home and help the female household head. In other words, the male household head tends to decrease the opportunity cost of migrations. However, the relationship between the age of household head and the net benefit is considered to look like an inverted U-shape. The household with a male middle-aged household head is usually more likely to send migrants. This kind of household has less risk to their income as a result of losing labor when they decide to send migrants to increase the expected family income. However, the family with very old household head tends to be less likely to send migrants. The reason is that the elderly household

head may need more labor to help household with family activities, and sending migrants could result in a shortage of labor.

The education level of the household head is considered to be positively related to the cost of migration. The reason is that the better-educated household head is more likely to pay attention on how to improve the productivity of the household activities, which means they need human capital. They tend to use household members, because he/she believes the cost of hiring some workers outside the family is higher than the benefit of sending the household member to the cities, especially the high-educated members. (Montira [2010])

Whether there exists big cities nearby the communes has a negative affect on migration costs. Transportation represents the largest proportion of the total cost of migration. If there are modern cities just nearby the commune, even poor people can migrate.

$$COST = g(S, SC, T, M, Y, E_{head}, D) \quad (3)$$

$$\frac{\partial g}{\partial S} < 0; \frac{\partial g}{\partial SC} > 0; \frac{\partial g}{\partial T} > 0; \frac{\partial g}{\partial M} < 0; \frac{\partial g}{\partial Y} < 0 \; and \; \frac{\partial^2 g}{\partial Y^2} > 0; \frac{\partial g}{\partial E_{head}} > 0; \frac{\partial g}{\partial D} < 0$$

In equation (3), S is household size; SC is the number of household members who are now in school; T is the family tie; M is whether or not the household head is male; Y is household head's age; D is whether there are big cities nearby; E_{head} is education level of household.

Therefore, the net benefit of migration can be written as following,

$$NET - BENEFIT$$

$$= f(E_{house}, F, A, W, P, I) - g(S, SC, T, M, Y, D, E_{head})$$

$$= h(E_{house}, F, A, W, P, I, S, SC, T, M, Y, D, E_{head}) \quad (4)$$

$$\frac{\partial h}{\partial E_{house}} > 0; \frac{\partial h}{\partial F} > 0; \frac{\partial h}{\partial A} > 0; \frac{\partial h}{\partial W} > 0; \frac{\partial h}{\partial P} > 0; \frac{\partial h}{\partial I} > 0 \; or < 0; \frac{\partial h}{\partial S} > 0; \frac{\partial h}{\partial SC} < 0; \frac{\partial h}{\partial T} < 0; \frac{\partial g}{\partial M} > 0; \frac{\partial h}{\partial Y} > 0 \; and \; \frac{\partial^2 h}{\partial Y^2} < 0; \frac{\partial h}{\partial E_{head}} < 0; \frac{\partial h}{\partial D} > 0$$

The principle of migration is

$$If \; NET - BENEFIT > 0, then \; migrate$$

$$If \; NET - BENEFIT < 0, then \; stay \; in \; communes$$

Methodology

According to the above framework, the variables affecting the migration decision can be classified into three categories: namely the household characteristics (X_i), the household head's demographic characteristics (H_i) and the commune characteristics (C_j). Thus the Logit model can be illustrated as follows,

$$Y = Prob(\; household \; has \; migrants \; in \; 2012\;)$$

$$= f(household \; and \; household \; head's \; demographic \; and \; commune \; characteristics\;)$$

$$= \lambda(\beta_0 + \beta_1 X_i + \beta_2 H_i + \beta_3 C_j) \quad (5)$$

where i is the household and j is the commune

As defined before, the migration in this paper is the human movements to seek better socio-economic opportunities in the cities. Since this paper only focuses on temporary migration, the dependent variable Y=1 if household member has left the family for the purpose of working outside for a maximum of six months; otherwise, Y=0.

The definitions of the household characteristics are as follows. The household size is a discrete variable that is number of people who are residing in this household. School attendance is the number of people in the household who are currently enrolled in school. The logarithm of income is a continuous variable that is the household total income from fishing, aquaculture and farming. Household income distribution can be represented by a set of dummy variables indicating the percentile ($\leq 10^{th}$ percentile, $>10^{th}$ and $\leq 40^{th}$ percentile, $>40^{th}$ and $\leq 70^{th}$ percentile, $>70^{th}$ and $\leq 90^{th}$ percentile, and $>90^{th}$ percentile) that the whole selected households' income falls into. The age composition of the household is used to show the family ties. The variable Age of less than 11 is the share of people who are under 11 years old in the family; similarly, the variable Age of more than 64 is the share of people who are over 64 in the family. The variable highest education level is a categorical variable (1=primary, 2=lower secondary, 3=upper secondary or professional high school, 4=junior college and above), which is the highest level of education achieved by an individual in the household. This variable is used to explain the overall educational level of household. The education level of the household head is also a categorical variable, and has same categories as "Highest education level". The variable fishing family is a binary variable that is equal to one if the household participates in fishing industry. This also holds for aquaculture family that is also a dummy variable and equal to one if the household participates in aquaculture industry. Wage and salary work is a binary variable and equal to one when the

household receives employment income.

The survey only has interviewees' demographic characteristics rather than household heads'. So a dummy variable "Household head" has been included in the model, which is equal to one when the respondent is the household head. Male is a dummy variable that is equal to one when interviewee is male, and zero when female. Age is a continuous variable indicating the age of the interviewee, and Age^2 is the square of Age.

Two variables are considered as the characteristics of the commune, and the definitions are as follows. Cities in a radius of 100km is a binary variable that is one if there exists large cities around the commune. The definition of the large cities here refers to the top 10 cities in Vietnam according to the population of the cities. (See Appendix 2) Poverty status is a dummy variable for whether the commune is classified as poor in the district. If the poverty rate of commune is higher than the poverty rate of its district, then this commune is considered as poor, and vice versa. (See Appendix 3)

It is also important to note that some variables in the model may be potentially endogenous. For example, "Highest education level": it is possible that because the parents are migrants in urban areas, they may recognize the importance of education, and thus tend to require their children to receive more education. In addition, households reporting wage and salary work may include some who have migrants with salary jobs in urban areas. Although we think the income from migrants is mainly recorded as remittances, there may still exist some

migrants who bring money back to home by themselves. There is no way to make sure that the income from wage and salary is not the money migrants bring back to home.

The following table includes the main statistical characteristics of the model variables.

Table 7 Variable description and summary statistics

Variable	Mean	S.D.
Household Characteristics		
Household size	4.78	1.46
School attendance	1.26	1.15
Logarithm of income (million VND)	3.94	1.17
Household income ≤ 10th percentile	0.10	0.30
> 10th and ≤ 40th percentile	0.31	0.46
>70th and ≤ 90th percentile	0.19	0.39
Household income ≥ 90th percentile	0.10	0.30
Age of less than 11	0.14	0.17
Age of more than 64	0.03	0.11
Education level of household head	1.49	0.84
Highest education level	2.57	0.89
Fishing family	0.42	0.49
Aquaculture family	0.75	0.43
Wage and salary work	0.35	0.48
Respondent's Characteristics		
Household head	0.83	0.37
Male	0.84	0.37
Age	46.68	10.59
Age^2	2291.34	1022.71
Commune Characteristics		
Cities in a radius of 100km	0.33	0.47
Poverty status	0.57	0.50
Number of observations	599	

Analyze the Determinants

Table 8 reports the econometric results for those families who have migrants. In order to see how exactly household wealth affects the migration decision, the

model uses two different kinds of variables to describe the income data.

Moreover, Table 8 includes the marginal effects of each variable, which represents the marginal influence on the possibility of migration decision when the independent variable changes. The reason to display marginal effects here is that our model is a nonlinear regression model, which implies that the parameters of the model are not the marginal effects we are accustomed to analyzing. (Greene, 2012) The marginal effects of the continuous variables in this Logit model is evaluated by,

$$Marginal\ effects\ of\ x = \frac{df}{dx} = \lim_{n \to 0} \frac{f(x+n) - f(x)}{n} \qquad (6)$$

The marginal effects for a dummy variable, say k, can be calculated as,

$$Marginal\ effects = Prob\left[Y = 1 \middle| \overline{x_{(k)}}, k = 1\right] - Prob\left[Y = 1 \middle| \overline{x_{(k)}}, k = 0\right] \qquad (7)$$

where $\overline{x_{(k)}}$, denotes the means of all the other variables in the model.

Table 8 Logit model of determinants of migration

Variable	Using Continuous Income		Using Categorical Income	
	Coffe.	Marginal Effects	Coffe.	Marginal Effects
Household Characteristics				
Household size	0.4435 (4.61)***	0.0937 (4.59)***	0.4756 (4.93)***	0.1009 (4.91)***
School attendance	-0.4234 (-3.42)***	-0.0895 (-3.43)***	-0.4510 (-3.62)***	-0.0956 (-3.64)***
Logarithm of income	0.4851 (4.15)***	0.1025 (4.23)***		
Household income ≤ 10th percentile			0.1356 (0.30)	0.0293 (0.29)
> 10th and ≤ 40th percentile			-0.3722 (-1.27)	-0.0765 (-1.32)
>70th and ≤ 90th percentile			-0.1743 (-0.53)	-0.0362 (-0.54)
Household income ≥ 90th			1.4921	0.3528

percentile			(3.36)***	(3.45)***
Age of less than 11	-2.0562	-0.4345	-2.0093	-0.4261
	(-2.52)***	(-2.53)***	(-2.44)**	(-2.45)**
Age of more than 64	0.6264	0.1324	0.4847	0.1028
	(0.54)	(0.54)	(0.41)	(0.41)
Education level of household head	-0.5757	-0.1216	-0.5534	-0.1174
	(-3.40)***	(-3.44)***	(-3.62)***	(-3.29)***
Highest education level	0.4171	0.0881	0.4003	0.0849
	(2.68)***	(2.67)***	(2.55)***	(2.54)***
Fishing family	1.0207	0.2196	1.0372	0.2239
	(3.00)***	(2.98)***	(3.03)***	(3.02)***
Aquaculture family	-0.202	-0.043	-0.1241	-0.0266
	(-0.54)	(-0.53)	(-0.32)	(-0.31)
Wage and salary work	1.6264	0.3577	1.5408	0.3402
	(6.06)***	(6.30)***	(5.79)***	(5.98)***
Respondent's Characteristics				
Household head	0.7129	0.1353	0.5935	0.1154
	(1.85)*	(2.10)*	(1.54)*	(1.70)*
Male	-0.997	-0.2308	-0.8584	-0.1978
	(-2.76)***	(-2.67)***	(-2.41)**	(-2.31)**
Age	0.1326	0.0280	0.1250	0.0265
	(1.53)*	(1.53)*	(1.43)	(1.44)
Age^2	-0.0014	-0.0003	-0.0013	-0.0003
	(-1.55)*	(-1.56)*	(-1.44)	(-1.44)
Commune Characteristics				
Cities in a radius of 100km	0.6623	0.1450	0.7320	0.1611
	(2.27)**	(2.21)**	(2.43)**	(2.37)**
Poverty status	0.8267	0.1700	0.9836	0.2011
	(2.97)***	(3.12)***	(3.51)***	(3.73)***

Value of z statistics in brackets
*significant at 10%; ** significant at 5%; *** significant at 1 %

According to the first two columns of two above table, first it turns out that the larger households tends to have more migrants, and based on the marginal effects we can say that the probability of migration will increase by more than 9.37% while having one more person in the household. It is also important to note that the number of family members in school has a negative impact on the migration decision. The possibility of migration will decrease by 8.95% if there is

one more person enrolled in school.

The results of the model shows the impact of household income on migration decision is positive. According to the model using continuous income data, the possibility of migration will increase by 10.25% when the household income from fishing, aquaculture and farming increase by 1%. But when the household income distribution is represented by the categorical income data (the last two columns of Table 8), the result suggests the nonlinear relationship between household income and possibility of migration, which looks like a U-shape. In other words, only poorest and richest households tend to migrate. But only the dummy variable for whether the household income is upper 10 percentage is significant. The marginal effects show the possibility of migration for richest families is 35.28% higher than the other households.

The reason of this result is related to the migration strategy. First, as mentioned before, the poorest households are only able to afford the low-return migration (i.e. intra-district migration). But they still tend to earn some money from the urban work to solve the economic difficulty of the family. These people from the poorest families are more likely to choose seasonal migration, which are more flexible and less costly. They can go the advanced area to do some part-time job when they have free time from household activities or when it's the bad year. Second, as some studies suggested relatively rich households have no incentive to migrate. Because this kind of households are considered to be able to enjoy a comfortable life in the communes or villages, but in most cases they are not able

to enjoy a comfortable life in advanced areas because of the higher cost of modern life, such as higher rental fee, higher prices of commodities and so on. However, if the households are super rich so that they don't care about the high cost of migration, they will still tend to send migrants. But they are more likely to choose high-return migration (inter-provincial or international migration) for the purpose of gaining higher techniques or better management method in the urban areas, which they can use in their own family business to increase the productivity. (Mendola [2005]) In this case, migration can be considered as the human capital investments, and the rich households are expecting a non-monetary benefit brought from migrants rather than money, i.e. remittances.

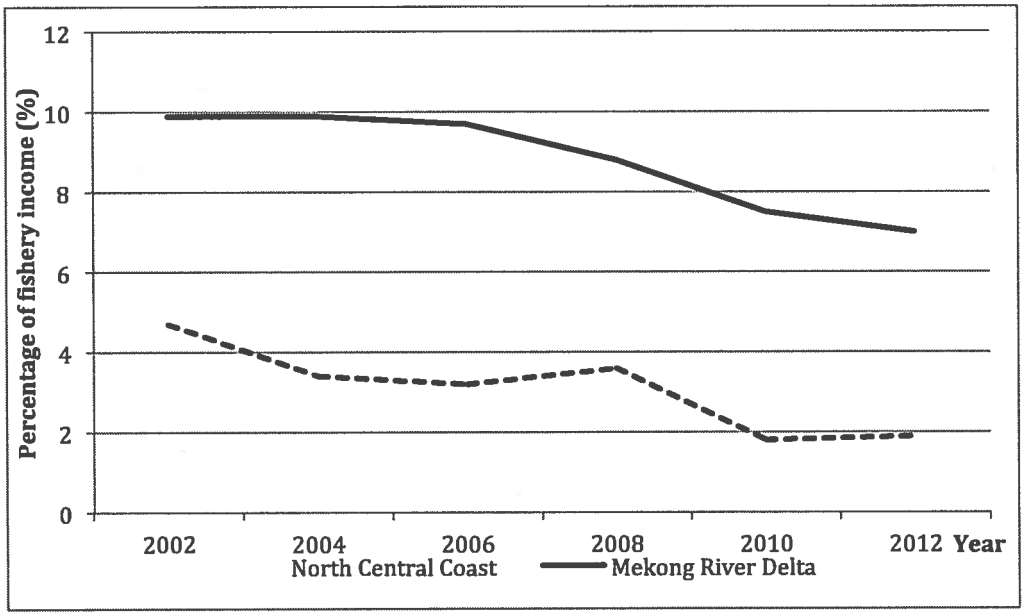
The proportion of the family represented by having children under 11 years old have a significant negative impact on the migration decision. Namely, an increase of 1% of young children in the household will reduce the possibility of migration by 43.45%. However, the share of old people doesn't have a significant effect on migration.

The education status of household head has a negative impact on migration as expected. If the household head's educational attainment increased by one level, the possibility of migration will decrease by 12.16% on average. This result shows that an educated household head prefers to possess the human capital in the household in order to develop the household activities, such as increasing productivity. Moreover, he/she may think it is the best way to save money from

the family activities when the cost of hiring an outside employee is considered. This result also proves although the decision to migrate is a household's joint decision, in most time it depends greatly on the household head's opinion.

However, the highest education level obtained in the household will raise the probability of migration by 8.81%. This variable is the proxy of household overall education status, which means the higher the top degree obtained by some household members, the higher average education level of the other households. As expected, the better-educated people are more likely to get a high wage rate job in urban areas, and thereby the benefit of migration is high. It increases the possibility of migration.

Figure 2 Percentage of fishing income in household income



Source: General Statistics Office, Household Livelihood Standard Survey 2012

Whether the household is a fishing family has a positive relationship with the

migration decision. It is 21.96% more likely to migrate than a non-fishing family. The reason why fishing families will choose migration is that the decreasing fish stock implies that the household's income from the fishing industry continuously decreases. This phenomenon is shown in the Vietnam Livelihood Standard Survey (2012), which is conducted by GSO every two years. This survey enabled us to track the structure of household income from 2002 to 2012. Figure 2 is the percentage of fishing income from total household income for families located in the Mekong River Delta and the North Central Coast[2]. It is clear that the portion of fishing income kept decreasing since 2008, which implies these fishing families are trying to earn money from other activities. One of the alternatives is that household members choose to work in the urban areas to support their family.

As expected before, if the household already participates in the wage employment, this household tends to migrate (35.77% higher than the households who don't have employment income). Besides the reason mentioned above that related to work experience would increase the possibility of having job in cities. It is thought that these households are more likely to have better access to the employment information, which also has a positive effect on the migration decision.

[2] Our samples are all from Ca Mau Province in Mekong River Delta region and Hue Province in North Central Coast region.

The impact of the household heads' demographic characteristics is not entirely consistent with the prediction. The reason may be that this model is using interviewees' demographic characteristics as a proxy of household heads'.

The impacts of the two characteristics of a commune on the migration decision are consistent with the prediction. If there exists a large city in circular of 100km, the households in this commune are 14.5% more likely to migrate than the households in the commune that don't have big cities nearby. Since this paper only focuses on temporary migration, the distance between advanced areas and urban areas is expected to have great effect on the cost of migration. The poverty status of commune also has positive relationship with the migration decision. The household from a poor commune is 17% more likely to migrate than a household from a better-off commune.

Migration and income inequality

Most studies of migration and income inequality examine the impact these migrants upon the destination areas. For example, whether the migration flow reduces the income gap between the rural areas and urban areas. Fewer studies did some tests about how the migration phenomenon affects the income distribution among the rural areas. Because of the resource difference[3] among agriculture is hard to make up within the short time, income inequality is more significant in rural areas than in urban areas. Table 8 is the data from the survey -- Poverty and Migration Profile 2012 of GSO, and it shows the GINI coefficient of the rural areas is higher than the urban areas.

Table 8 GINI coefficient by urban rural and region

Region		GINI Coefficient
Rural	Total	0.399
	North Central Coast	0.382
	Mekong River Delta	0.403
Urban		0.385

Source: GSO, Household Livelihood Standard Survey 2012

The way this paper used to evaluate the effect of migration on income distribution in origin is based on the estimation of the opportunity cost (or opportunity income). After comparing the actual income and costs of the migration, one can calculate the income difference caused by migration. The assumption here is that the migrants who choose to stay in villages they can only get the income that is not higher than the opportunity cost. Namely, the

[3] The resource difference in our sample is the difference of land size, fishing boats power, and residential areas size.

additional income from working for the industrial sector in cities should be equal to the difference between wage earned and the migration costs. The imbalance between the income and costs of the migrants is used to illustrate the impact of migration on income inequality.

First, this paper used OLS regression to estimate the income function for the families who have migrated household members family and who don't have migrated household members family respectively. From the equation below, we can obtain the marginal labor contribution rates of the household income for both families.

$$Log(Y_m) = \theta_0 + \theta_1 L_{out} + \theta_2 L_{in} + \theta_3 X_i + \epsilon \quad (6)$$

$$Log(Y_n) = \theta_0 + \theta_2 L_{in} + \theta_3 X_i + \epsilon \quad (7)$$

Y_m in the equation (6) is the net income per capita of a household that has at least one migrated family member, and Y_n in the equation (7) is the net income per capita of a household who doesn't have any migrants. θ_o in the above function is the intercept, which can be considered as the skill improvement rates for the migrants. And θ_1 is the marginal contribution rates of the number of migrants in household (L_{out}) for household marginal income. In other words, it represents how much will the individual income increase (decrease) when the number of migrants increases by one. Similarly, θ_2 represents the marginal contribution rates of the number of in-home members (L_{in}) for the household marginal income, which can be explained as the amount of income change if the

number of household members staying changes. It is also important to note that θ_2 in the second equations can also be considered as the marginal labor contribution rates of the migrants' opportunity income, which is just the impact of households size on family income. X_i in the function above is a set of explanatory variables reflecting the demographic characteristics of household head (interviewee's age and gender), education level (highest degree household head gained), the ownership of land (1=own land; 2=lease; 3=rent), and age composition of the household. Table 9 is the result of the OLS model.

For the household who has migrants, the impact of the number of migrants and the number of people staying with the family are both significant. Moreover, families with male household heads tend to have higher individual incomes. The education level is a significant variable, and the impact of this variable is that the higher degree a household head holds the higher individual income of this family.

The results also suggest households with their own land have higher annual income per capita. Although the family age composition is not significant in this model, the model still suggests that a household with larger share of people from 20 years old to 44 years old is more likely to have higher incomes. Although the model for household without migrants is not as significant as the model used to estimate the family income with migrants, some important variables are still significant, such as household size and the education level of the household head. Thus this model can be considered as acceptable to predict household income

per capita.

Table 9 OLS Regression Result of Income equality

Variables	Having migrants		No migrants	
	Coeff.	t	Coeff.	t
NO. of migrated household member	-0.193**	-2.15		
NO. of household member in home	-0.299***	-5.72	-0.151***	-3.67
Interviewee is household head	-0.690**	-2.41	-0.225*	-1.42
Interviewee's age	0.008	0.8	0.005	0.87
Interviewee is male	0.758***	2.99	0.334**	2.18
Education level of household head	0.405***	4.17	0.114*	1.89
The ownership of land	-0.316***	-3.32	0.054	0.67
Age of less than 11	1.839	1.82	0.355	0.65
Age of 12 to 19	0.324	0.38	-0.053	-0.1
Age of 20 to 44	1.370*	1.67	0.569	1.14
Age of 45 to 64	0.519	0.73	0.303	0.69
Constant	2.795	2.87	2.387	4.03
R-squared	0.387		0.146	

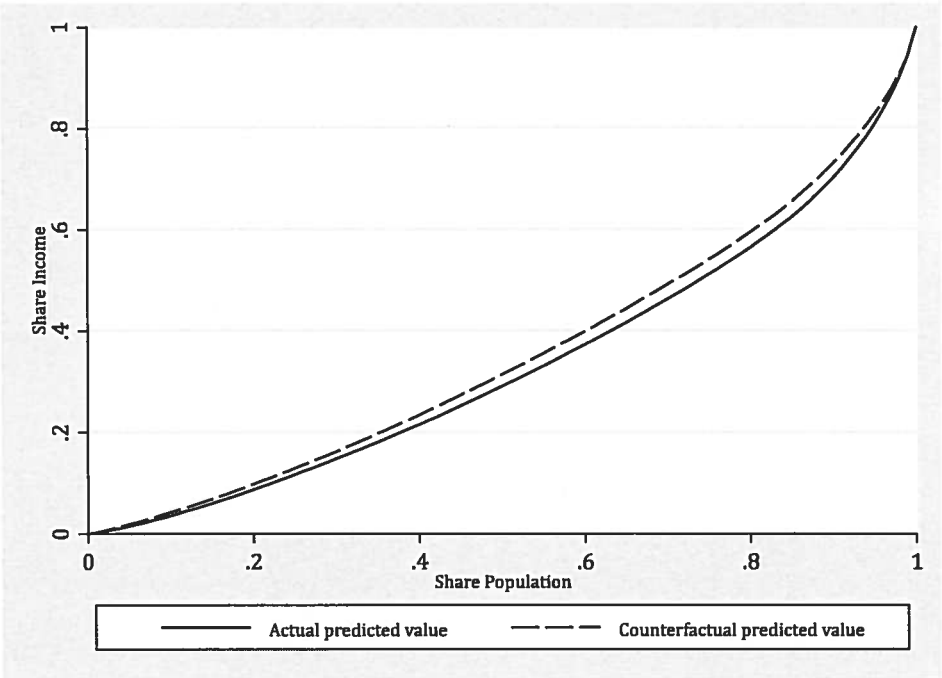
* significant at 10%; ** significant at 5%; *** significant at 1 %

The second step is to compare the distribution of income per capita with the distribution of counterfactual income if no migration had happened according to the estimation model above. In other words, first is to use equation (6) and (7) to predict the actual income per capita for all selected families in the sample, say Y_a. The next step is to simulate the counterfactual level of household income assuming the migrations from the households in equation (6) never happened. More specifically, L_{out} in equation (6) has been set as zero and the marginal effect of those migrants (θ_1) has been switched to the marginal effect of people who stay in the village (θ_2) for those who actually have migrated family members. For the households without migrants, we can still use equation (7) to predict income. After combining the prediction from equation (7) and the modified equation (6),

we can get the counterfactual distribution of income per capita (Y_c) for the whole sample.

The impact of migration on income inequality can be found by comparing the simulated distribution of Y_a and Y_c. The most straightforward way to show this impact is to calculate the GINI coefficient for both income distributions, which are 0.33 for actual predicted income and 0.29 for counterfactual predicted income. This result suggests that migration increases the inequality of household income, and this finding is similar with some other studies. (Rodriguez [1998], Nguyen Thu Phuong et.al. [2008]) Figure 1 is the Lorenz Curve based upon the GINI coefficients of the two distributions, which gives a clearer idea about how migration affects income inequality.

Figure 1 Lorenz Curve of actual and counterfactual per capita income



Conclusion

The results of the Logit model in this paper indicate that migration is a selective process based upon the demographic characteristics of the household head, the background of the household and commune attributes. The variables household size, income, percentage of students and young children in the family, the education level of family members and the household head, livelihood strategy, the geographic condition and poverty status of the communes can be considered as determinants of the migration decision in the selected areas. This result is consistent with a large number of former studies. However, the income of those richest families tends to have a positive relationship with the migration decision, which is not same with former studies. The reason is that the super rich families are more likely to participate in a costly high-return in the purpose of gaining modern technologies and employ them in their own business. The most interesting point here is that the migration selectivity differs significantly by the choice of livelihood methods. Firstly, the households involved in wage and salary work are much more likely to migrate than other households because of the related experience and better access to the labor market information. Secondly, as mentioned before these sample households in the survey are fishing and aquaculture families, which enable us to analyze the impact of the change in the fishing and aquaculture industries on the migration decision. The outcome suggests that households that participated in fishing have a very high tendency to migrate. This phenomenon can be explained by the over fishing in South Asia,

which accelerates the market competition and therefore decreases the benefits of working on fishing. In order to resolve the economic crisis of the household, many households consider either switching their living method from fishing and/or fishing farm to another activity, or have a second job. The most frequent alternative choice for households is to have salary work outside the household. No matter whether the households choose to be involved in wage employment during the village or not, this kind of transformation has direct and indirect impact on migration respectively. Since if the household decides to have salary work in the village for now, this household still has a very high possibility of migrating in the future, after taking into account the wage difference between rural and urban areas.

This paper also found the migration process will increase income inequality in sending areas. After using the OLS model to predict the actual distribution and counterfactual distribution of income per capita separately, the paper gives the GINI coefficient in order to compare the impact of migration on the income distribution problem. The GINI coefficients of the actual model is 0.04 higher than the GINI coefficient of the counterfactual model (this model assumes the migrants are staying in the household), which demonstrates that the migration decision expands the income inequality. The reason may be the migrants from poorest family cannot earn high wage rates in the urban areas because of lower education level, lack of relevant work experience and so on. Thus the money they earned cannot make up the income difference with rich families. However, the

richest families send migrants in order to get advanced technologies and skills, which result in much higher income. Therefore, migration actually increases the income inequality in rural areas.

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Appendix 1

Commune	N	Poverty rate 2012 (%)	Main livelihood activities	Average household income (million VND)	Average household assets
Dam Doi					
Tan Duyet	50	21.7	Aquaculture (intensive, extensive)	110.9	7.22
Ta An Khuong	60	14.02	Aquaculture (intensive, extensive), wage, self	84.08	6.33
Nguyen Huan	49	12.11	Aquaculture (extensive), farming	50.58	5.33
Tau Thuan	61	16.33	Fishing (inland), aquaculture (intensive; extensive)	108.57	5.10
Tran Van Tho					
Phong Dien	50	10.04	Aquaculture (intensive, improved extensive, extensive), wage	81.44	6.72
Khanh Binh Tay	40	11.19	Fishing (off-shore; near shore)	209.66	4.75
Song Doc Town	39	12.99	Fishing (off-shore; near shore)	1002.34	8.85
Loi An	50	9.04	Aquaculture (intensive; improved extensive), wage, self	97.68	5.98
Phu Vang					
Vinh Ha	50	17.29	Fishing	52.35	5.30
Thuan An	50	3.21	Fishing, aquaculture	70.21	5.66
Phu Xuan	50	16.65	Aquaculture	68.42	5.98
Vinh Xuan	50	15.01	Fishing, aquaculture	57.23	5.72

Note: 1. Poverty rates from GSO data

2. Livelihood activities – general breakdown by primary 2002 / 2012; specific breakdown by 2012 fishing and aquaculture top 3 species.

Appendix 2

Cities	Population	Tan Duyet	Ta An Khuong	Nguyen Huan	Tan Thuan	Phong Dien	Khan Binh Tay	Song Doc Town	Loi An	Vihn Ha	Thuan An Town	Phu Xuan	Vihn Xuan
Tp Hồ Chí Minh	8,190,775	324	324	308	317	363	332	331	338	942	952	947	933
Hà Nội	6,451,909	1,894	1,894	1,917	1,887	1,933	1,848	1,901	1,908	700	673	679	692
Hải Phòng	1,837,173	1,857	1,857	1,881	1,851	1,217	1,826	1,865	1,872	722	696	701	715
Cần Thơ	1,188,435	166	166	189	159	205	174	173	180	1,108	1,118	1,113	1,099
Đà Nẵng	887,435	1,176	1,177	1,199	1,170	1,215	1,184	1,177	1,191	96	106	101	87
Biên Hòa	701,194	351	360	383	353	395	359	367	365	936	945	940	921
Nha Trang	392,279	759	759	781	752	797	750	749	773	631	641	628	614
Huế	335,575	1,273	1,273	1,297	1,267	1,312	1,281	1,280	1,288	35	17	18	36
Buôn Ma Thuột	326,135	650	650	673	643	689	658	657	665	607	643	612	598
Vinh	303,714	1,544	1,544	1,613	1,583	1,629	1,513	1,544	1,553	401	374	380	393

Source: GSO, Vietnam Living Standard Survey 2012(VLSS); Google Map

Appendix 3

Commune/District	Commune Poverty Rate
Dam Doi District	**14.79**
Tan Duyet	21.70
Ta An Khuong	14.02
Nguyen Huan	12.11
Tau Thuan	16.33
Tran Van Tho	**10.75**
Phong Dien	10.04
Khanh Binh Tay	11.19
Song Doc Town	12.99
Loi An	9.04
Phu Vang	**11.76**
Vinh Ha	17.29
Thuan An	3.21
Phu Xuan	16.65
Vinh Xuan	15.01

Source: General Statistics Office of Vietnam