

# **Migration and Rural Development in Vietnam**

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## Zusammenfassung

Der Zusammenhang zwischen Migration und Entwicklung wurde in der Vergangenheit erst als positiv und später als negativ angesehen; die Theorie der Neuen Ökonomie der Arbeitsmigration (NELM) wiederum geht von einem positiven Zusammenhang aus (de Haas, 2012). Unter welchen Verhältnissen spielt Migration eine positive oder negative Rolle für Entwicklung und wie kann die positive Auswirkung gestärkt und die negative reduziert werden? Dies ist zu einem wichtigen Thema für die Analyse in Entwicklungsländern wie Vietnam geworden, wo sich zunehmend Wissenschaftler und politische Entscheidungsträger diesen Fragen annehmen.

Das übergeordnete Ziel dieser Arbeit ist es, den Zusammenhang zwischen Migration und Entwicklung in Vietnam zu analysieren. Die spezifischen Ziele sind: (1) die Motivation der Migrationsentscheidung zu untersuchen; (2) die Lebens- und Migrationsverhältnisse in den Städten zu erforschen; (3) die Auswirkung von Migration auf das Wohlbefinden und die Vulnerabilität ländlicher Haushalte zu beurteilen; (4) die Auswirkungen von Migration auf Konsummuster ländlicher Haushalte zu evaluieren; (5) die Wirkung von Migration auf die landwirtschaftliche Produktion in Verbindung mit einer Diversifizierungsstrategie ländlicher Haushalte zu analysieren; (6) und die Migrationsdauer und die Rückkehrabsichten von Migranten zu untersuchen.

Die Ergebnisse der Dissertation zeigen, dass Migration, vor allem Arbeitsmigration, eine Strategie zur Sicherung des Lebensunterhalts für Haushalte darstellt, die landwirtschaftlichen und wirtschaftlichen Schockereignissen wie Dürren, Überschwemmungen, Verlust des Arbeitsplatzes oder Finanzschulden ausgesetzt sind. Bildungsmigration ist eher bei Haushalten mit höherem Humankapital und finanziell bessergestellten Haushalten zu beobachten. Dennoch nimmt die Wahrscheinlichkeit der Migration mit Beschäftigungsmöglichkeiten im Dorf ab.

Migration hat positive Effekte auf das Einkommenswachstum, welche in Provinzen mit geringeren Beschäftigungsmöglichkeiten ausgeprägter sind. Diese Effekte helfen nicht nur Migrantenhaushalte der Armut zu entkommen, sie verbessern auch die Armutssituation im

ländlichen Raum. Allerdings führt Migration zu einer Verminderung der Arbeitsproduktivität und zu einer Nutzpflanzendiversifizierung ländlicher Haushalte.

Darüber hinaus konnte gezeigt werden, dass in Bezug auf Konsumausgaben, Migrantenhaushalte ohne Rücküberweisungen mehr Geld für Nahrungsmittel, Gesundheit und Nicht-Lebensmittel, aber weniger für Bildung ausgaben. Migrantenhaushalte mit Rücküberweisungen gaben hingegen mehr für Nicht-Lebensmittel und Wohnraum aus. Im Hinblick auf die Produktionsweise hat die Studie gezeigt, dass ländliche Haushalte, welche Geldüberweisungen von Migranten erhalten, den Anteil ihres Einkommens aus Reis reduzieren, ihre Landproduktivität erhöhen und sich mehr in der Arbeitsverteilung spezialisieren.

Im Allgemeinen sehen sich Migranten am Zielort bessergestellt. Explizite Ausbildung und Lohnstandards könnten nützliche Instrumente für die Verbesserung der Situation eines Migranten im städtischen Raum sein. Allerdings können Einkommensverluste durch Schocks ihrer ländlichen Haushalte ihre Arbeitsqualität reduzieren. Migranten aus ländlichen Haushalten, welche mit einer höheren Anzahl idiosynkratischer Schocks konfrontiert sind, verlängern ihren Aufenthalt in Städten, während Migranten aus (ursprünglichen) Haushalten, die vorübergehende Schocks erleben, ihren Aufenthalt verkürzen. Ein vermindertes Einkommensgefälle zwischen Ziel- und Ausgangsgebieten erhöht ebenfalls die Migrationsdauer. Schließlich wollen die meisten Migranten in der Zukunft nach Hause zurückzukehren, auch wenn sie die Chance haben, ihre Lebensbedingungen in den Städten zu verbessern. Die Rückkehrabsicht erhöht sich nicht nur für den Fall, dass sie mit Schocks in den Städten konfrontiert werden, sondern auch mit der Verbesserung der Lebensbedingungen an ihrem Heimatort.

**Stichworte:** Migration, Rücküberweisung, Wohlfahrt, Ausgabenstruktur, landwirtschaftliche Produktion, Diversifikation, Fixed-Effekt-Regression, Migrationsdauer, Migrationsintensität, Vietnam.

## **Abstract**

The nexus between migration and development turned from positive to negative in the past; the New Economic Theory of Labor Migration (NELM) again considered it as being positive (de Hass, 2012). Thus, under what condition does migration play a positive or negative role for development and how can the positive effect be advanced and the negative one be restricted? This has become an important issue for analysis in developing countries such as Vietnam, where scientists and policy-makers have been increasingly concerned with internal migration.

The overall objective of this thesis is to analyze the nexus between migration and development in Vietnam. The specific objectives are: (1) to determine the motivation of the migration decision, (2) to explore the migrants' living and working conditions in the cities, (3) to assess the effect of migration on rural household's welfare and vulnerability to poverty, (4) to evaluate the impact of migration on rural household's consumption patterns, (5) to analyze the effect of migration on agricultural production linked to the diversification strategy of rural households, and (6) to determine the duration of migration and intention of return plans of migrants.

The findings of the dissertation show that migration, especially migration for employment, is a livelihood support strategy for households exposed to agricultural and economic shocks such as droughts, floods or loss of job, or with financial debts. Migration for education is more likely observed among households with higher human capital and being financially better off. Nevertheless, the probability of migration decreases with the employment opportunity in the village. Migration has been found to have positive income growth effects, and these effects are more pronounced in provinces with fewer job opportunities. These effects help not only migrant households moving out of poverty, but they also improve the poverty situation in rural areas. However, migration decreases labor productivity and crop diversification of rural households.

In addition, in terms of consumption expenditure, migrant households without remittances spend more on food, health and non-food items, but less on education, while

migrant households with remittances spend more on non-food items and housing. In terms of production, rural households who receive remittances from their migrants reduce the share of their income from rice, increase their land productivity and become more specialized in labor allocation.

In general, migrants perceive themselves to be better off at the place of destination. Explicit training and wage standards might be useful instruments for improving a migrant's situation in the urban areas. However, income losses from shocks of their rural households may reduce their employment quality. Migrants coming from rural households that faced a higher number of idiosyncratic shocks increase their stays in the cities, while those from original households that experienced transient shocks shorten the length of stays. A decreased income gap between destination and original provinces also increases the duration of migration. Finally, although migrants have a chance to improve their living conditions in the cities, most of them want to return home in the future. The intention of return plans not only increase in case they face shocks in the cities, but also with the improvement of the living conditions at their original places.

**Keywords:** Migration, Remittances, Welfare, Expenditure Patterns, Agricultural Production, Diversification, Fixed-Effect Regression, Length of Migration, Migration Intensity, Vietnam.

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## List of Abbreviations

AEL	Ausschuss für Entwicklungsländer
ATT	Average Treatment Effect on the Treated
DFG	German Research Foundation
EQI	Employment Quality Index
Eqn	Equation
FGT	Foster-Greer-Thorbecke
GDP	Gross Domestic Product
GSO	General Statistics Office
IOM	International Organization for Migration
IPSARD	Institute of Policy and Strategy for Agriculture and Rural Development
ISSRM	International Symposium on Society and Resource Management
MARD	Ministry of Agriculture and Rural Development
NELM	New Theory of Labor Migration
OLS	Ordinary Least Squares
PEGNet	Poverty Reduction, Equity and Growth Network
PPF	Production Possibility Frontier
PPP	Purchasing Power Parity
PSM	Propensity Score Matching
SCAP	Southern Center of Agricultural Policy and Strategy
SID	Simpson Index of Diversification
UN	United Nations
UNFPA	United Nations Population Fund
VASS	Vietnam Academy of Social Sciences
VAST	Vietnam`s Agricultural Sector
VLSS/VHLSS	Vietnamese Living Standard Survey/Vietnamese Household Living Standard Survey
VTP	Vulnerability to Poverty

# **1. Introduction**

## **1.1 Problem Background**

Vietnam is a developing country making rapid progress in moving from a centrally-planned to a market-oriented economy and in getting integrated in the global market. Industrialization and modernization accelerated simultaneously, thus promoting population mobility. According to the 2009 Population Census data, about 6.6 million people migrated internally, rising from 4.5 million people in 1999. Rural-urban migration - as part of the domestic migration - has become the most rapid increasing trend indicated by the share of rural-urban migrants in the urban population which has been projected to reach 11 percent in 2019 departing from 8.9 percent in 2009 (GSO, 2011). Furthermore, the different development levels of the regions trigger inter-provincial migration. The inter-provincial migrant population, in 2009, increased to 3.4 million people from 2 million in 1999 and 1.3 million in 1989. The more developed regions with large industrial parks and better living standard conditions such as Ho Chi Minh City, Ha Noi as well as their surrounding provinces become the main destinations of internal migration. At the same time, less developed places, which are dominated by agricultural production, such as Central Coast and Mekong River Delta regions, are the main areas of departures.

So-called 'pull' factors, such as job opportunities and better living and education standards in urban areas, are the main attractions for rural outmigration. It has become a life aspiration of the majority of rural people, especially the young. They hope to earn much higher incomes and receive better living services in urban places than if they stay in the villages working on their own farms. However, 'push' factors including low productivity in agricultural sectors, income volatility as well as disasters and climatic events also play a role in migration in Vietnam. Evidently, it is not easy to differentiate between 'push factors' such as shocks and economic stresses, and 'pull factors' such as opportunities available in urban areas. Although migrants are more likely to cite economic reasons rather than disasters and climate change, migration could be a result of disasters or climate change often related to economic stresses, whereby people move because their livelihood is no longer sustainable (UN Vietnam, 2012).

## Chapter 1: Introduction

De Hass (2010) argued that the debate on the nexus between migration and development has swung back and forth from developmental optimism in the 1950s to pessimism over the 1970s and 1980s, and then again towards more optimistic views in the 1990s and 2000s with the New Economic Theory of Labor Migration (NELM). Similarly, Lucas (2007) and Mendola (2012) voiced that migration may, directly or indirectly, support or possibly worsen rural development depending on the context-specific factors.

Urban immigrants perceive themselves to be better off, however, they often face difficulties, such as the inability to enter social protection programs, find housing, use health services, or public education services. These difficulties result from administrative regulations, such as the household registration system. Even if this registration system has been relaxed from some restrictions, rural-urban migrants still face various risks and continue to be excluded and marginalized from the social security system (Le et al., 2011; Dang et al., 2003). In addition, due to the limited experience and knowledge with urban life, migrants also become vulnerable with fewer resources, lower income, less savings and more debts (UNFPA, 2010).

Looking back to rural areas, rural-urban migration by largely young adult household members leave behind mainly the elderly, women and children; this increases the challenges for social-economic development in rural areas. From the literature, migration can be considered as an adaptive strategy of households to manage risks. Decisions to migrate may not simply reflect the migrant's goals or needs, but the household decision to maximize household incomes or minimize risks (Dercon, 2002; Stark and Bloom, 1985). Rural households often allocate their human capital over dispersed locations to reduce risk. Through migration, household members pool and share their incomes together. The flow of remittances becomes an integral part of the household's survival strategy. Eventually, migration is not only a coping strategy in response to shocks, including income and environmental shocks but also a strategy for livelihood diversification.

The major impacts of migration and remittances on source rural areas occur directly through changes in the patterns of expenditure and investments of households having migrant members. In the context of missing or imperfect rural markets, such as labor, credit and insurance markets, migration becomes important in overcoming these

imperfections, thus affecting rural households' decisions on production and investments (Rozelle et al., 1999; Taylor et al., 2003). Furthermore, it is worth noting that remittances may have potential costs for migrant-sending households, largely believed as deriving from moral hazard problems (Azam and Gubert, 2004). It has been argued that if migrant work is lucrative enough household members remaining behind may entirely forgo productive activities and live primarily on remittances receipts (Gubert, 2000). The income effect of remittances receipts, therefore, will typically result in diminished labor efforts among remaining family members. However, people left behind may invest more so as to motivate the migrant to send more remittances. Eventually, these ambiguous arguments are an open debate and more research has to be conducted. Therefore it is asked under what conditions migration plays a positive or negative role for development, and how to advance the positive effects and restrict the negative ones. Looking into these questions have become important for developing countries such as Vietnam.

In the context of the global financial crisis in 2008, Vietnam faces several weaknesses in terms of structure and institutions of its economy. To ensure a sustainable economic development, the government promulgated to re-structure its economic policy in order to stimulate both industrialization, which mainly occurs in urban areas, and rural development. Since rural-urban migration is the main trend of human mobility in the process of industrialization and urbanization, comprehensive knowledge of the causality between migration and development is needed. Such knowledge becomes a key factor in supporting the success of this policy in the economic transition.

Studying migration in Vietnam, however, suffers some limitations due to the lack of efficient data sets and impact assessment studies. The lack of suitable data sets for migration studies is a concern for developing countries in general but also for Vietnam in particular (de Brauw and Carletto, 2012; IOM, 2005). Temporary (also called seasonal or circular) migration, which is a structural feature of agricultural economies, unfortunately, is not included or underestimated in the Population Census and VHLSS data sets, which are used mostly for migration studies in Vietnam (Nguyen et al., 2009, Nguyen, 2009; Nguyen et al., 2008; Nguyen and Mont, 2012; de Brauw and Harigaya, 2007 and de Brauw, 2010).

This problem makes the results of migration studies, which are mainly based on these data sets, become ambiguous (Pincus, 2008; Dang, 2003; GSO, 2011; UNFPA, 2010). Systematic analyses and empirical research are thus hampered by a lack of micro data sets containing information on the array of variables required to estimate migration impacts, within the neoclassical and NELM-focused theoretical frameworks. For example, findings from the studies of UN and Oxfam (2009) in Vietnam on the one hand, and those from the Population Census data on the other hand, do not match. While the study of UN and Oxfam (2009) suggests that temporary out-migration tends to be a strategy adopted by men, results from the Population Census finds that migration of women is dominant.

This thesis addresses an important issue in Vietnam's development and deploys new household data sets in combination with tracking migrant data set with more complete information on migration. The findings of this thesis provide a new perspective on the impact of migration on the lives of migrants and on sending households in Vietnam.

## **1.2 Research Objectives**

This thesis contributes to research on rural-urban migration and the nexus between migration and development of original rural households in Vietnam by pursuing the following specific objectives:

1. To determine the factors affecting the migration decision of rural households and identify to what extent several types of shocks influence this decision.
2. To explore the effects of migration on the living and working conditions of migrants in the destination places.
3. To assess the impact of migration on rural household's welfare and vulnerability to poverty.
4. To evaluate the impact of migration and remittances on rural household consumption patterns.
5. To analyze the effect of migration and remittances on agricultural production and diversification strategies of rural households.
6. To determine the duration of migration and the intention of return plans of migrants.

### **1.3 Data**

This thesis deploys unique data sets of 2,200 households from rural Vietnam which was collected in the years of 2007, 2008 and 2010, and of a tracking survey of 299 migrants in 2010. It was partly financed by the German Research Foundation (DFG) under the umbrella of the research project ‘Impact of shocks on vulnerability to poverty: Consequences for development of emerging Southeast Asian economies’ (DFG FOR 756). Although the questionnaire was designed to estimate and analyze vulnerability to poverty, it also captured more complete information on migration to address the lack of unreliable data sets with migration information in Vietnam.

Three provinces in the Central Coast and High Land regions, namely Ha Tinh, Thua Thien Hue and Dak Lak were selected for the survey based on information on the average per capita income, high dependence on agriculture, existence of special risk factors (remoteness and peripheral location along the country’s border, poor infrastructure and risky environment). The selection of the household data sample was based on a three-stage cluster sampling procedure (Hardeweg and Waibel, 2009).

The questionnaires for the household survey covered a broad set of questions regarding the socio-demographic and economic conditions of the sampled households. Among others, specific interest was with the migration experience of the household and the household members, with the composition of the income source portfolio, with borrowing and lending patterns, and the exposure to demographic, social, economic, and agricultural shocks. In addition, village heads were interviewed in 2007 and 2010 in order to collect general information about their villages such as village population, employment structure, infrastructure characteristics, and resource use patterns.

The information on migration also provides details about the duration and destination of migration, and the remittance transfers between migrants and their original households. Moreover, the migration survey is designed as a tracking survey in which the respondents are migrant household members of the surveyed rural households in Ho Chi Minh City and its two surrounding and highly industrialized provinces Dong Nai and Binh Duong which have the highest rates of net migration (UNFPA, 2010).

In addition, secondary data on GDP growth and income gaps between the main destination and original provinces, and share of agricultural production in total GDP, are used in the analysis. It has been taken from the Vietnam General Statistics Office (GSO) and the World Bank database.

#### **1.4 Methodology**

In this study, descriptive analysis and several empirical models were applied to address the objectives of the study.

The first objective is addressed by estimating the non-linear probability model that links the household migration status in 2008 and 2010 to household and village characteristics in 2007. The difference-in-difference method with Propensity Score Matching (PSM) procedure is used to achieve the third objective. This method is widely used to evaluate the impact of migration (Nguyen et al., 2009; Acosta et al., 2008; Jimenez-Soto and Brown, 2012). It first estimates the propensity score by estimating a binary probit regression. Based on this score, the outcomes that the migrant households would have in case none of their household members had migrated (counterfactual outcome) is estimated by Nearest-Neighborhood and Kernel matching methods under the assumption of conditional independence (Rosenbaum and Rubin, 1983). These outcomes include the growth of income per capita, vulnerability to poverty index and the Foster-Greer-Thorbecke (FGT) poverty indices. Additionally, an employment quality index was constructed and explored by Ordinary Least Squares (OLS) regression to capture the second objective.

To achieve the fourth objective, in order to reduce the bias of endogenous problems, a fixed-effect regression is used to evaluate the effect of migration with remittances and without remittances on household expenditure patterns, including food, education, health, housing, and other non-food items. Moreover, the marginal effect of migration remittances on the share of household expenditure patterns is estimated by applying the Engel demand function.

The fifth objective is also gained by a fixed-effect regression model. However, lagged migration status variables are used; thus, the migration status of rural households in 2007

is used to explain outcomes in 2008, and the migration status of rural households in 2008 explains outcomes in 2010. The outcomes are the share of rice income in total crop income, the growth of land productivity and labor productivity and Simpson's diversification indices of crop production and labor allocations.

Finally, to achieve the sixth objective, a random-effect Tobit regression model is used to determine the duration of migration. In addition, the migration intensity index is constructed by Principal Component Analysis (PCA) through several indicators such as the length of migration, remittances transfer behaviors, and localized physical and social investment; and it is determined by the OLS regression.

It should be noted that the methods of fixed-effect regression and difference-in-difference only eliminate the bias of endogeneity caused by unobserved variables that are time constant over the survey waves. Fixed-effect regression, however, fails to remove the endogeneity bias which occurs if the unobserved variables which affect outcome and migration are not time-invariant. In this study, therefore, the unobserved variables related to household-level characteristics such as production skills or the motivation for reaching higher income and expenditure consumption, or village characteristics (quality of land, education attributes, and geo-environmental attributes) are assumed to be time-invariant and relatively dominant to the bias of endogeneity. It is expected that the estimation bias resulting from the time-variant unobserved variables is small relative to the bias of time-invariant variables, which are eliminated by fixed-effect regression or difference-in-difference. While instrumental variables could improve the accuracy of impact assessment, it is too hard to find good instrumental variables, and using invalid instruments can lead to an even larger bias in the estimation. Actually, a large number of instrumental variables had been tried in this study, but the estimation results were not robust and reasonable.

### **1.5 Structure of the Dissertation and Results**

This dissertation is structured in five chapters. Chapter 1 represents the introduction of the whole thesis. Chapters 2 to 5 present the findings of specific objectives. Table 1 presents an overview of the included articles.

## Chapter 1: Introduction

Chapter 2 presents the determinants of the migration decision and the impact of migration on vulnerability to poverty and on the welfare of rural households in three provinces in Central Vietnam. It also assesses the working and living conditions of migrants in the cities. The empirical evidence from a probit model shows that migration, especially migration for employment, is a livelihood support strategy for households exposed to agricultural and economic shocks. Migration for education is more likely observed among households with higher human capital and being financially better off. Migrants perceive themselves to be better off at the place of destination, but income losses from shocks of their rural households may reduce their employment quality. Migration has positive income growth effects, and these effects are more pronounced in provinces with fewer job opportunities.

Chapter 3 evaluates the impact of migration and remittances on rural household consumption patterns by measuring the effect of two types of migration related to remittance behavior on the spending on food, education, health care, housing and non-food items. The results show that migrant households without remittances spend more on food, health and non-food items, but less on education, while migrant households with remittances spend more on non-food items and housing. Increasing remittances lead households to also increase their non-food expenditure.

Chapter 4 estimates the impacts of migration on agricultural production and diversification in order to test the hypothesis of NELM with a fixed-effect regression model. The findings suggest that rural households who receive remittances from their migrants reduce the share of their income from rice, increase their land productivity, and become more specialized in labor allocation. However, migration also decreases labor productivity and crop diversification of rural households. In addition, production conditions, such as irrigation system, as well as employment opportunities strongly affect households' strategies.

Chapter 5 determines the duration of migration and analyzes the intention of return plans of migrants. The findings shows that migrants coming from rural households that faced a higher number of idiosyncratic shocks increase their stays in the cities, while those from original households that experienced transient shocks shorten the length of their

stays in the cities. An increased length of migration is also observed among migrants and households with higher human capital. A decreased income gap between destination and original provinces due to the higher economic growth of original places also increases the duration of migration. The plans of migrants to return not only increase in case they face shocks in the cities, but also with the improvement of the living conditions at their original places.

**Table 1. List of papers included in the dissertation**

Paper title	Authors	Published in/Submitted to/Presented at
Rural-Urban Migration, Household Vulnerability and Welfare in Vietnam	Loc Duc Nguyen, Katharina Raabe, Ulrike Grote	<p>Published in <i>World Development</i>. URL: <a href="http://dx.doi.org/10.1016/j.worlddev.2013.11.002">http://dx.doi.org/10.1016/j.worlddev.2013.11.002</a></p> <p>Contributed paper to the Ausschuss für Entwicklungsländer (AEL) Conference 2013 “Development Economics and Policy”, Munich, June 21-22, 2013.</p> <p>Contributed paper to the DFG Workshop 2013 “<i>Impact of shocks on the vulnerability to poverty: consequences for development of emerging Southeast Asian Countries</i>”, Hannover, September 24-25, 2013.</p> <p>Contributed paper to the Poverty Reduction, Equity and Growth Network (PegNET) Conference 2013 “<i>How to Shape Environmentally and Socially Sustainable Economics in the Developing World-Global, Regional, and Local Solutions</i>”, Copenhagen, Denmark, October 17-18, 2013.</p> <p>An earlier version was contributed to the Tropentag 2012 “<i>Resilience of agriculture systems against crises</i>”, University of Göttingen, September 19-21 – Kassel/Witzenhausen. URL: <a href="http://www.tropentag.de/2012/abstracts/full/354.pdf">http://www.tropentag.de/2012/abstracts/full/354.pdf</a> (Title: Rural-Urban Migration in Vietnam: Do Households and Migrants Get Better Off?)</p>
Migration remittances and rural household expenditure: A case study in Vietnam	Loc Duc Nguyen, Ulrike Grote	<p>Submitted to <i>Journal of Development Studies</i>.</p> <p>Contributed paper to the DFG Workshop 2013 “<i>Impact of shocks on the vulnerability to poverty: consequences for development of emerging Southeast Asian Countries</i>”, Hannover, September 24-25, 2013.</p>

## Chapter 1: Introduction

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Migration, Agriculture Production and Diversification in Vietnam	Loc Duc Nguyen, Ulrike Grote	Submitted to <i>Journal of Rural Studies</i> . Contributed paper to the International Symposium on Society and Resource Management (ISSRM) 2014 titled “Challenges of Urban and Rural Transformation” Hannover, June 8-13, 2014.
Rural-Urban Migrants in Vietnam: Should We Stay in the Cities or Return Home?	Loc Duc Nguyen	Working Paper, Institute for Environmental Economics and World Trade .

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The contribution of the authors to the submitted articles is as follows: Literature review, all calculations and drafting the text had been done by Nguyen. The contribution of Grote includes providing suggestions and guidance on methodology, results and general contents, especially editing. Regarding chapter 2, the contribution of Raabe is related to guidance on methodology and editing.

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## **2. Rural–Urban Migration, Household Vulnerability, and Welfare in Vietnam**

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### **3. Migration Remittances and Rural Household Expenditure: A Case Study from Vietnam**

This paper has been submitted to the *Journal of Development Studies*.

#### **Abstract**

This paper investigates the relationship between migration and consumption expenditure patterns of rural households of Vietnam. Analysis of household survey shows that rural migrant households increase their overall expenditure. Migrant households without remittances spend more on food, health and non-food items, but less on education, while migrant households with remittances spend more on non-food items and housing. Increasing remittances lead households to also increase their non-food expenditure. These results indicate that remittances do not promote rural development in the longer run, since rural households spend more on non-productive items rather than on improving human capital.

**Keywords:** Migration, Expenditure Patterns, Fixed-Effects Regression, Average Treatment Effect on the Treated, Vietnam

### **3.1 Introduction**

In the past two decades, rural development in Vietnam has improved significantly. By ensuring food security and reducing poverty, the rural sector has formed a stable base for economic development (MARD, 2007). These achievements resulted from the robust development of the agricultural sector. Food security, poverty alleviation and rural development are still main elements of the strategy for sustainable development of the Vietnamese government.

Recently, however, the growth in agricultural production has slowed down. Agricultural land is increasingly allocated to industrial development, and rising labor and other input prices lead to an increase in agricultural production cost (MARD, 2007; Dang, 2009). These challenges reduce the contribution of agricultural production to rural development. At the same time, non-farm activities, which are dominated by the private sector, play an increasingly important role in sustaining the progress of rural development.

One of these non-farm activities is migration which has become one of the main strategies to cope with shocks and uncertain livelihoods in rural areas. Accordingly, migration remittances is considered as an important source for rural development. Many studies confirm that migration has positive impacts on welfare of rural households at places of origin. But in some cases, the impact becomes negative since migrating household members no longer participate in the rural labor work force (Azam and Gubert, 2006). Nguyen et al. (2013) found that migration in Vietnam can improve household welfare through income growth, and that it helps to reduce poverty of rural households. Obviously, the benefit of migration depends on the way rural households utilise their new income source, meaning how they spend their remittances. It is also important whether they manage to increase labor productivity despite the reduced labor surplus in rural areas. Therefore, crucial questions are how migration affects the spending behavior of rural households and whether migration remittances could become a potential resource for rural development. This paper analyses these two questions based on household panel data from 2007-2010 in Vietnam.

The paper has been structured as follows: The next section reviews the related literature, followed by the description of the data and the methodology. The results are presented and discussed thereafter. The paper ends with a summary and a conclusion.

### **3.2 Literature Review**

Links between migration and development have been widely discussed in the literature. Until the early 1970s, an optimistic view on the development impacts of migration prevailed but was replaced by a more pessimistic one until the 1990s. In recent years, the New Economic Theory of Labor Migration (NELM) stressed the optimistic view again (de Hass, 2010).

The neoclassical optimistic view considered migration as a form of optimal allocation of production factors, bringing benefits to both, sending and receiving regions. The development of the places of origin was strongly linked to the return of migrants. The capital and knowledge transfer through return-migrants was expected to help rural households in the places of origin to become better-off (Lewis, 1954; de Hass, 2010).

The more pessimistic view is related to the concern of “brain drain”. Migrants were considered being talented young men who were the most significant agricultural innovators. Their outmigration was assumed to cause a shortage of agricultural labor and decrease agricultural productivity (Lipton, 1980). Moreover, the pessimistic view questioned whether migrants and their families do invest their remittances efficiently. It was rather assumed that they spend them on non-productive items related to housing or luxury furniture. It was, therefore, believed that migration increases inequality instead of supporting the sustainable development in sending communities.

The pessimistic view was also based on the fact that remittance transfer happens under asymmetric information and economic uncertainty, and that it can cause behavioral change at the household level. These created a moral hazard problem between remitters and recipients (Chami et al., 2003). The recipients used remittances as substitute for other income sources. The lower the income from other sources, the more the household depended on remittance transfer in the future, which may have a negative effect on economic growth. Lipton (1980) and Connell and Brown (2005) concluded that the priority of remittance use was to pay for household’s debts, but a large portion of remittances was

spent on daily consumption. The most important consumption behavior change in migrant households related to increased spending on weddings, feasts, funerals or even luxurious goods (Lipton, 1980). Investments only ranked last regarding the remittance use (Van Dalen et al., 2005). Another study conducted by De Brauw and Rozelle (2008) in China classified investments into the two categories of productive and consumptive investments; it also found that migrant households, particularly in poorer areas, preferred spending on consumptive than on productive goods.

The NELM considers migration as a risk-sharing behavior of households. Through migration, households diversify their resources, such as labor, in order to minimise income risk (Stark and Bloom, 1985). Moreover, migration is also considered as a strategy to overcome various market constraints, including imperfect credit (capital) and risk (insurance) markets that prevail in developing countries (Taylor, 1986). Consequently, households are enabled to invest in productive activities and to improve their welfare (Stark, 1980).

The optimistic view is supported by Adams and Cuechuecha (2010) who conducted a study on migration in Guatemala. They found that households receiving international remittances spend less at the margin on food consumption compared to what they would have spent in case of having no remittances. Households receiving either internal or international remittances spend more at the margin on education and housing. By using data from El Salvador, Edwards and Ureta (2003) found that households receiving remittances spend these remittances, rather than their income from other sources, more likely on education. Yang (2005) also noted that migration remittances increased original households' spending on education in the Philippines. Some studies found that remittances would be spent more on housing or asset accumulation. Osili (2005) found that migrants' income increases the probability of investing in housing in Nigeria. He also examined the extent to which remittances are influenced by altruism versus insurance motives in Nigeria. He found that remittances are motivated by altruism because remittances increase the family's asset holdings (Osili, 2007). The same results were found for Pakistan by Adams (1998), who investigated the effect of remittances on the accumulation of physical assets in rural areas. Migration remittances, especially international ones, had a more important effect on the accumulation of rural assets.

Recently, these findings have been challenged by Adams et al. (2008). Focusing on spending behavior of households in Ghana, they found that households having received remittances do not spend more at the margin on food and consumer goods than those who received no remittances. However, in Indonesia, they found that households with remittances spend more on basic goods such as food than on investment goods such as education and housing (Adams and Cuechuecha, 2010). They concluded that migrant households treated remittances just like income from any other sources.

In Vietnam, several studies confirmed that migration is considered as one of the main strategies to alleviate poverty and improve household welfare in rural areas (De Brauw and Harigaya, 2007, Nguyen et al., 2009, Nguyen et al., 2013). However, there are only a few studies having investigated how rural households used remittances. Nguyen (2009) used data from the Vietnam Household Living Standard Surveys (VHLSS) 2002 and 2004 to empirically measure the impact of international and internal remittances on household welfare in Vietnam. He concluded that the impact of remittances on non-food expenditure tends to be higher than the impact on food expenditures. Specifically, a large proportion of the international remittances is used for savings and investments, while most of the internal ones are spent on consumption. Binci and Giannelli (2012) applied an ordinary least squares regression to two cross-sectional data sets and a fixed effects linear regression model to the panel data sets of the 1992/93 and 1997/98 Vietnam Living Standards Surveys (VLSS) to measure the effect of internal and international remittances on school attendance rates and child labor in Vietnam. Their results indicated that children belonging to a remittance recipient household have lower probabilities to work and greater probabilities to go to school.

Le and Nguyen (2011) compared the expenditure patterns between remittance recipient and non-remittance recipient households as well as between migrant and non-migrant households in Thai Binh and Tien Giang provinces in Vietnam. The results revealed that remittances are primarily spent on daily and immediate needs, human capital (i.e. education and healthcare), and production activities. They also found that in terms of absolute value, the migrant households tend to have higher expenditures than non-migrant households. Among the migrant households, those who received remittances tend to spend more than those who did not receive any remittances. Paris et al. (2010) found a difference

in expenditure patterns between migrant and non-migrant households in the North and the South of Vietnam. In the South, migrant households spend more on food and farm inputs, while those in the North keep much of the remittance amount as savings for future investment, and spend less on food. However, they confirmed that, in general, once the basic needs have been met, construction or decoration of a house is generally a common investment of migrant households with remittances.

Most empirical studies from Vietnam are based on VLSS or VHLSS data sets which only included officially registered migrants being for at least six months in the survey location in the sample (Nguyen et al., 2013). Migrants without a permanent residence status, including temporary migrants, are ignored in the sample. Moreover, these studies estimated the impact of remittances rather than migration in general. They did not pay attention to migration where no remittances had been sent. Pincus and Sender (2008) therefore voiced concern about studying migration based on the data sets of the VLSS and VHLSS.

This paper is motivated by the ambiguous empirical results which are additionally based, as in the case of Vietnam, on unreliable data sets. By using an own unique panel data set from Vietnam, this paper seeks to provide new evidence on the impact of migration on the spending behavior of rural households. The results will help to understand whether remittances can contribute to rural development in Vietnam.

### **3.3 Data and Methodology**

#### **3.3.1 Data**

The study uses a panel data set that contains information on a random sample of 2,200 households from the three provinces Dak Lak, Thua Thien Hue, and Ha Tinh in Vietnam in 2007, 2008 and 2010. These data sets have been collected under the project 'Impact of shocks on vulnerability to poverty: Consequences for development of emerging Southeast Asian economies', funded by the German Research Foundation (DFG FOR 756) (Hardeweg and Waibel, 2009).

The questionnaire contains a broad set of questions on the socio-demographic and economic conditions of the rural households. Of special importance are questions related to the migration experience of household members, the composition of the income source

portfolio, production activities, borrowing, lending and expenditure patterns, as well as the exposure to shocks and risks. We investigate consumption expenditure patterns including expenditure on food, non-food, education, health and housing. Detailed descriptions of these categories are presented in Table 1. We also control for the impact of several types of shocks on the household expenditure behavior and for some socio-demographic household characteristics when investigating the impact of migration remittances.

**Table 1. Description of the expenditure categories**

<b>Category</b>	<b>Category Description</b>
Per capita expenditure	Total household expenditure divided by total nucleus household members <sup>1</sup>
food	Per capita expenditure on purchased and non-purchased food products including food eaten outside home
education <sup>2</sup>	Per capita expenditure on education, like school fees, books, and so forth.
health	Per capita expenditure on health care, like medicine, doctor fee, and so forth.
housing	Estimated as rent equivalent per capita
non-food items	Per capita expenditure on other types of non-food items, such as fuel, electricity, transportation, clothing, alcohol, tobacco, donation, and so forth.

Note:

1 Nucleus household members are household members who stayed in the household for at least 180 days per year.

2 Expenditure for education only covers the household spending for education at the village level; it does not include money transfers to household members studying outside the village.

Source: Povel, F. (2008). Consumption aggregate handbook DFG Project 756.

Similar to Nguyen et al. (2013), a migrant is defined in our paper as a household member, who moved to urban areas outside of the original province for at least one month. We separate the migrant households into two types: migrant households with remittances

from their household members working in the cities, and migrant households without any remittances from their members who might be also students. It is assumed that households show different spending behaviors depending on their remittance status.

### 3.3.2 Methodology

There are two approaches dominating empirical research on migration and expenditure (Taylor and Mora, 2006). The first approach is based on remittance use surveys, which involve directly asking migrant households how they spend their remittances. However, these studies are at fault by assuming that household income is not fungible. When migrants send their remittances, these become part of household budgets and thus may simultaneously change the complete set of household expenditures. The second approach, mainly applied in recent studies, is an econometric one. Remittances are considered as an explanatory variable in the econometric model. The advantage of this approach is that it is consistent with widely used demand models, which assume that income from diverse sources is pooled in a common household budget constraint. Moreover, the constraint includes not only remittance income but also information, uncertainty, and preference (Taylor and Mora, 2006).

In this paper, the second econometric approach is applied. The estimation model can be defined as:

$$C_{ijt} = f(D_{it}, X_{it}, S_{it}, R_{it}, G_t) + e_{ijt} \quad (1)$$

where  $C_{ijt}$  denotes consumption expenditure of household  $i$  for good  $j$  at time  $t$ . Consumption expenditure is divided into five categories, including total per capita expenditure, per capita expenditure on foods, education, health, housing and other non-food items.

The independent variables include  $D_{it}$  as a dummy variable for the migration status of the household, consisting of a migrant household with remittances ( $D_{1it}=1, D_{2it}=0$ ) or a migrant household without remittances ( $D_{1it}=0, D_{2it}=1$ ), in comparison with a non-migrant household ( $D_{1it}=0$  and  $D_{2it}=0$ ).  $X_{jt}$  describes the characteristics of household  $i$  at time  $t$ .  $S_{it}$ ,  $R_{it}$  are the total number of shocks and risks, respectively, that household  $i$  faced and is expected to face in the next five years at time  $t$ . Finally,  $G_t$  is the time dummy variable at

time  $t$ , and  $e_{ijt}$  is the error term. The descriptive statistics of these variables is presented in the Appendix 1.

One of the challenges when examining the effect of migration on household expenditure outcomes is the inherent selection problem (Heckman and Smith, 1999; Damon, 2010). Since we have panel data, we are able to control for household level unobserved characteristics by using fixed-effects models.

Another challenge in migration research is endogeneity, which means that unobservable factors that influence the migration status ( $D_{it}$ ) may also influence household outcome ( $C_{ijt}$ ). Instrumental variable regressions are the standard method to deal with the endogeneity problem. However, it is very difficult to find valid instrumental variables. Using invalid instruments can result in an even larger bias in impact estimates (Nguyen and Mont, 2012; Vartanian and Buck, 2005). In this study, we use fixed-effects regressions to reduce the endogeneity bias. A main assumption of the method is that unobserved variables are correlated with both expenditure and migration status, and that these variables remained unchanged in the period 2007–2010. It can be explained that the relevant unobservable variables, such as migration conditions or motivation for higher income, are expected to be time-invariant during such a short period of time. By taking the difference in household variables over time, fixed-effects regressions can remove the unobserved time-invariant variables to obtain unbiased estimates of coefficients (Duncan et al., 2004).

Moreover, next to fixed-effects models, we also estimated random-effects regressions. However, the Hausman test statistics strongly reject the null hypothesis that the difference in coefficients between two regressions is not systematic (the P-values of the tests are smaller than 0.01). Therefore, we are inclined to use the fixed-effects regressions also for estimating the Average Treatment Effect on the Treated (ATT).

The ATT is defined as the impact of migration on the household outcome, i.e. expenditure patterns (Heckman et al., 1999) as follows:

$$ATT = E(\Delta|D_i = 1) = E(C_{i1}|D_i = 1) - E(C_{i0}|D_i = 1) \quad (2)$$

where  $E(C_{i1}|D_i = 1)$  denotes the expected household outcome in the state of migration, which is observed from the data set.  $E(C_{i0}|D_i = 1)$  is called a counterfactual outcome,

which is the outcome of the households if they had not been migration households. It is not observed and has to be estimated.

In this study, the unobserved counterfactual outcome of a household is estimated following equation (3). According to Glewwe (1991) and Deaton (1992), expenditures often follow log-normal distribution. We modify therefore equation (3) to the semi-log functional form as:

$$\ln(C_{ijt}) = \beta_0 + \beta_1 D_{it} + \beta_2 X_{it} + \beta_3 G_t + u_i + \varepsilon_{it}, t = 1, 2, 3 \quad (3)$$

where  $C_{ijt}$  denotes per capita expenditure of household  $i$  for good  $j$  at time  $t$ . Expenditure is divided again into six categories, as described above. Once coefficients in equation (3) are estimated in the fixed-effects regression model, we can estimate the counterfactual  $E(C_{i0}|D_i = 1)$  for a migrant household  $i$  at time  $t$  as follows (Nguyen, 2009):

$$\begin{aligned} \hat{C}_{it0} &= e^{1\hat{\eta}(Y_{it0})} \\ &= e^{1\hat{\eta}(\hat{\beta}_0 + \hat{\beta}_2 X_{it} + \hat{\beta}_3 G_t + \hat{u}_i + \hat{\varepsilon}_{it})} \\ &= e^{[\ln(Y_{it}) - \hat{\beta}_1]} \\ &= Y_{it} e^{(-\hat{\beta}_1)} \end{aligned} \quad (4)$$

Finally,  $ATT$  at time  $t$  can be estimated as follows:

$$\begin{aligned} \overline{ATT}_t &= \hat{E}(C_{i1}|D_i = 1) - \hat{E}(C_{i0}|D_i = 1) \\ &= \frac{1}{n_t} \sum_{i=1}^{n_t} C_{it} - \frac{1}{n_t} \sum_{i=1}^{n_t} C_{it} e^{(-\hat{\beta}_1)} \\ &= \frac{1}{n_t} [1 - e^{(-\hat{\beta}_1)}] \sum_{i=1}^{n_t} C_{it} \end{aligned} \quad (5)$$

where  $n_t$  is the number of migrant households at time  $t$ .  $ATT$  depends on outcomes at time  $t$ . We estimate  $ATT$  for all time periods: 2007, 2008 and 2010. The standard error of the estimates would be calculated using bootstrap techniques.

In order to measure the marginal effect of migration remittances on household expenditure patterns, an Engel demand function is applied (Leser, 1963).

$$C_{ij} = \alpha_j + \delta_j EXP_i + \beta_i (EXP_i) \log(EXP_i) \quad (6)$$

where  $C_{ij}$  is the per capita expenditure on item  $j$  of household  $i$ .  $EXP_i$  is the total per capita expenditure, and  $EXP_i = \sum C_{ij}$ . Then the share of expenditure on item  $j$  in the total expenditure is expressed as follows:

$$\frac{C_{ij}}{EXP_i} = \frac{\alpha_j}{EXP_i} + \delta_j + \beta_i \log(EXP_i) \quad (7)$$

Finally, to measure the impact of migration remittances on the expenditure share, we add the remittances and control variables to equation (7):

$$\frac{C_{ij}}{EXP_i} = \frac{\alpha_j}{EXP_i} + \delta_j + \beta_i \log(EXP_i) + \gamma_j \log(Remittances_{it}) + \beta_j X_{it} + \varepsilon_{ij} \quad (8)$$

This equation (8) is also estimated with a fixed-effects regression model. The marginal effect of remittances on the share of expenditure on item  $j$  is measured by the parameter  $\gamma_j$ .

### 3.4 Results and Discussion

The following section presents the descriptive findings on migration, remittances and consumption expenditure of rural households, followed by the econometric results of the impact of migration on household consumption expenditure patterns.

#### a) Descriptive analysis

**Table 2. Descriptive statistics on migration and remittances**

	2007	2008	2010
Migrant households	690	862	954
Migrant households who received remittances	201	203	311
Remittance income per year (US\$-PPP, 2005)	202	182	301
Annual per capita consumption (US\$-PPP, 2005)	1,258	1,241	1,182
Percentage of poor households (<US\$ 2-PPP, 2005)	0.21	0.20	0.21
Total observations	2,064	2,100	2,041

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

The descriptives on migration and household consumption expenditure from our data set are presented in Table 2. The number of migrant households increased from 690 households in 2007 to 862 in 2008 and 954 households in 2010. This is equivalent to about 33 per cent in 2007, 41 per cent in 2008 and 47 per cent in 2010 of the total households in the sample. The migrant households who received remittances accounted for about 29 per

cent, 24 per cent and 33 per cent of total migrant households in 2007, 2008 and 2010, respectively. Similarly, also the value of remittances increased from about US\$ 202 to US\$ 182 and US\$ 301 in 2007, 2008 and 2010. Table 2 also provides information about yearly per capita consumption expenditure amounting to US\$ 1,260 in 2007, which was slightly higher than in 2008 and 2010. The share of households with consumption expenditure below the poverty line (US\$ 2 PPP per day) was around 20 per cent over the three years.

**Table 3. Migrant households by poverty status and province**

	2007	2008	2010
Migrant households as a share of			
total households	33.4	41.0	47.0
all in the non-poor group	37.2	44.3	51.2
all in the poor group	19.0	28.0	30.4
<i>At provincial level</i>			
Ha Tinh	38.5	52.9	56.0
Thua Thien Hue	33.0	38.6	46.6
DakLak	29.1	31.7	37.9
Percentage of migrant households who received remittances			
All	29.1	23.5	32.6
Non-Poor	30.6	23.1	33.0
Poor	17.7	26.5	30.3
<i>At provincial level</i>			
Ha Tinh	38.5	30.5	43.2
Thua Thien Hue	33.2	24.2	37.5
DakLak	12.4	11.5	11.4
Total observations	2,064	2,100	2,041

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

The descriptives of migration and consumption expenditure are disaggregated into poor and non-poor household groups and into provinces in Table 3. The non-poor

households have a higher rate of migration than the poor households. Comparing between the three provinces, Ha Tinh province, the poorest province, has the highest rate of outmigration, which increased from 38 per cent in 2007 to 56 per cent in 2010. The rate of outmigration in Dak Lak province is the lowest amounting to 29 per cent in 2007 but also increased to 38 per cent in 2010. Migrant households who received remittances used to be more pronounced in the non-poor group in 2007 but in 2010, their share amounted to around 30 per cent in the poor and non-poor group. Around 43 per cent of the migrant households in Ha Tinh province received remittances in 2010. While the overall level of remittances slightly increased over the time period of three years, the number of non-poor households with remittances decreased in 2008. This can be explained by the food crisis in that year where less migrants in cities were able to send any remittances. In case of the poor households, the share of migrant households with remittances increased in 2008 indicating that migration was used as a coping strategy. Although the percentage of migrant households who received remittances is lower in the poor group than in the non-poor one, it further increased over time. Based on this observation and the fact that also the number of migrant households increased over time, it can be hypothesized that migration has become an important income generation strategy of rural households in Vietnam.

Table 4 shows the ratio of remittances to the total household consumption expenditure. Overall the level of this ratio is highest in 2010 and in Ha Tinh and Thua Thien Hue provinces. Remittances amounted to only about 2.3 per cent in 2007, decreased to 1.8 per cent in 2008 and increased again to 4.2 per cent of total household consumption expenditure in 2010. Although this ratio is higher in the non-poor household group than in the poor group, it has increased steadily in the poor group from 2007 to 2010 (while it is flexible in the non-poor group). In sum, this indicates that migration remittances have become an important strategy for the poor, especially in the poorer provinces.

**Table 4. Rate of remittances to total household expenditure for different groups**

	2007	2008	2010
Average	2.3	1.8	4.2
Non-Poor	2.7	1.9	4.7
Poor	0.9	1.8	2.5
<i>At provincial level</i>			
Ha Tinh	4.0	2.6	7.3
Thua Thien Hue	2.3	2.2	4.7
DakLak	0.7	0.7	0.7
Total observations	2,064	2,100	2,041

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

**Table 5. Comparison of consumption expenditure among the three types of households by migration status**

Outcomes	Non-migrant HH		Migrant HH		T-test		
	(1)	(2)	(3)	(1-2)	(1-3)	(2-3)	
Per capita expenditure	1,106.7	1,417.2	1,374.8	***	***	ns	
Food	715.2	851.6	815.0	***	***	*	
Education	42.3	97.5	75.1	***	***	**	
Health	42.3	59.3	68.0	***	***	ns	
Housing	41.3	52.2	52.8	***	***	ns	
Non-food	265.4	356.6	363.8	***	***	ns	
Number of observations	3,699	1,791	715				

Note: These numbers are calculated for the pooled data set of 6,134 observations in 2007, 2008, and 2010. All values are changed to US\$ PPP 2005.

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

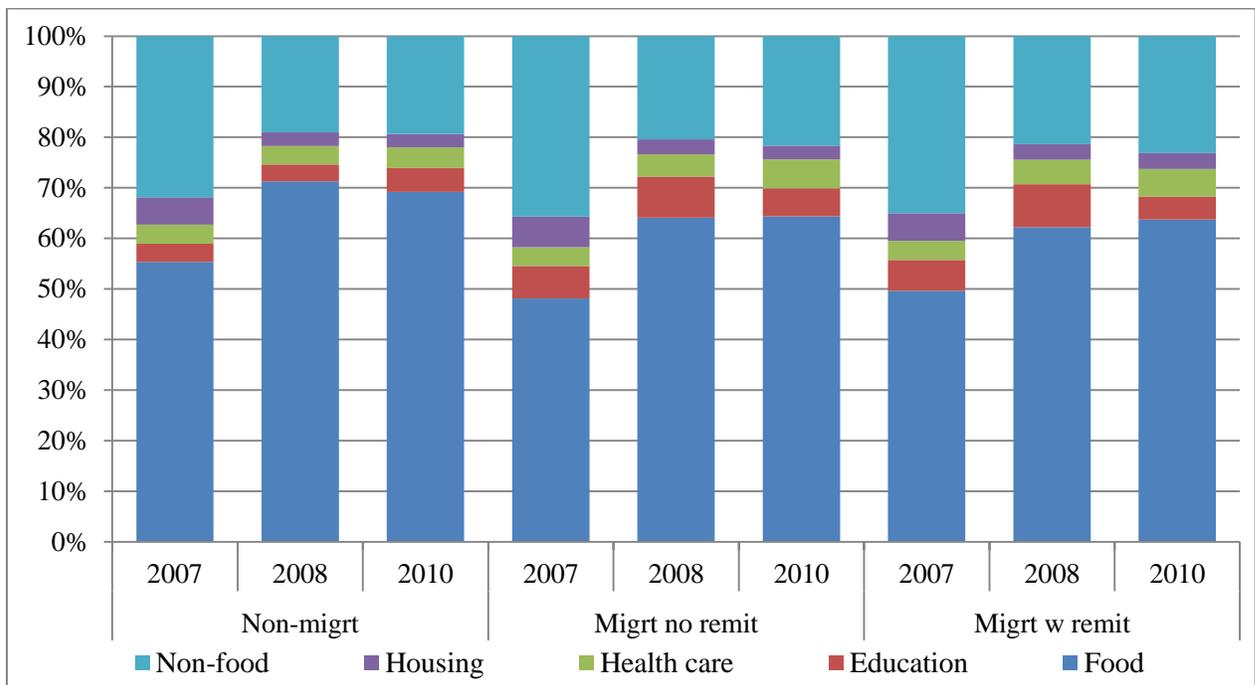
ns indicate a non-significance

\* Denote statistical significance at 10%

\*\* Denote statistical significance at 5%

\*\*\* Denote statistical significance at 1%

Table 5 presents the descriptives about the differences in expenditure consumption patterns among three types of households. The results show that expenditures in all categories are higher for migrant households than for non-migrant households. Comparing the consumption expenditure between migrant households with remittances and migrant households without remittances, we find that there is no significant difference in total consumption expenditures. We also could not find any difference in their spendings on health, housing and non-food patterns. However, the spendings of migrant households without remittances on food and education is higher than those of migrant households with remittances.



Source: Based on the DFG Rural Household Surveys 2007, 2008 and 2010.

**Figure 1. Change in consumption patterns by year and migration**

Figure 1 shows that rural households in Vietnam spend about 50 per cent - 70 per cent of their total consumption expenditures on food. The share of this consumption category slightly increased for migrant households and it is highest for non-migrant households. The share of non-food consumption items decreased for all households over time and was in 2010 only slightly higher in migrant households compared to non-migrant households. The share of education expenditure is higher for migrant households than for non-migrant ones

in 2007 and 2008, but this difference disappears in 2010. The share of health expenditures increased for migrant households over the years, but almost remained the same for non-migrant households. The share of spendings on housing decreased for all households.

Finally, it can be observed from the descriptive data that migration and remittances are more pronounced in Ha Tinh province, which is the less developed place with scarce job opportunities. Migration occurred more often in the non-poor households, but it is also an important livelihood strategy for the poor ones. Although, the level of expenditure of the migrant households is higher than those of non-migrant households, the shares of spendings on specific categories do not vary a lot between the household groups within one year.

*b) Econometric results*

The fixed-effects regression model results are presented in Table 6. In the first regression on the total per capita expenditure, migrant households (either with or without remittances) are more likely to increase their per capita expenditure. Additionally, households with higher numbers of risks are also more likely to have higher total expenditures. Households with a large ratio of household members who are below or achieved secondary schools show positive effects on expenditures due to higher spendings on education. The time dummy variables are negative and statistically significant. It means that given the control variables, per capita expenditures decreased over time. This can be explained by the impact of the financial crisis.

The estimation results also indicate that on the one hand, migration with remittances has a positive and statistically significant effect on household spending related to non-food items and housing. On the other hand, migration without remittances has a positive and statistically significant effect on household spending on food, health and non-food items, but it is negative and statistically significant for spending on education. The negative sign of migration (either with or without remittances) on per capita education expenditure can be explained by a co-insurance mechanism by rural households of having migrants. Some of these rural household members have to stop studying and join the labor force in the place of origin.

The variable of total number of risks that household expect in the next five years has a positive and statistically significant effect on per capita food expenditure, per capita health expenditure and non-food expenditure. It indicates that the more concerned households are about the future, the more they spend on food, health and non-food items. The variable of total number of shocks has a positive and statistically significant on per capita health expenditure but a negative and significant one on the spending of non-food items. This can be explained by the fact that most rural households facing health shocks, spend more on health treatment (Appendix 3).

Estimates of the ATT parameter for migration with remittances are presented in Table 7. Migration with remittances increased households' per capita expenditures by USD 56, USD 50 and USD 51 (PPP \$ 2005) in 2007, 2008 and 2010, respectively. These estimates were also positive and statistically significant for per capita expenditure on housing and non-food items. However, the effect estimates of migration with remittances on per capita expenditure on food, education and health were not statistically significant.

Estimates of the impact of migration without remittances on the household expenditure patterns are presented in Table 8. Migration without remittances made households increasing their per capita expenditures by 55 USD, 49 USD and 50 USD (\$PPP 2005) in 2007, 2008 and 2010, respectively. In the case of migration without remittances, per capita expenditure on food, health and non-food items also increased, but the per capita expenditure on education decreased.

Therefore, migration (either with or without remittances) pushed the per capita expenditure by about 4 per cent. Per capita expenditure on non-food items increased, but not the expenditure on education. Additionally, remittances helped migrant households to increase their spending on housing, while without remittances, they spend more on food and health.

The regressions of expenditure shares of different categories are presented in Table 9. The estimates of remittances are too small. Additionally, remittances are only statistically significant in the regressions on per capita expenditure on non-food items. The higher the income from migration remittance transfer, the higher the spending of recipient households on non-food items.

### **3.5 Conclusions**

The paper investigates the impact of migration on rural household expenditure in Vietnam. It looks for evidence whether migration contributes to the development of original rural places of migrant households. The study is based on three waves of a panel data set from three provinces in Vietnam (Ha Tinh, Thua Thien Hue and Dak Lak). To reduce the endogenous bias, a fixed-effects model was used to estimate the Average Treatment Effect on the Treated (ATT) of migration and remittances on rural household expenditure. In addition, the effect of remittances on household consumption behavior was estimated by an Engel demand model.

The descriptives revealed that migration has become an important rural household livelihood strategy. It has become more and more important to the poor in rural areas. Migrant households' expenditures are higher than the total expenditures of non-migrant households. The share of total expenditures for education, health, housing and non-food categories of migrant households are also higher than those of non-migrant households, while the share of spendings on food of non-migrant households is higher.

The econometric results show that migration (either with or without remittances) can increase per capita expenditures of rural households by about 4 per cent. Specifically migration with remittances helped rural households to spend more on housing and non-food items, while migration without remittances increased per capita expenditures on food, health and non-food items. These results imply that migrant households are generally more likely to spend money on non-food items and that remittance transfers if they took place, increase the propensity of households to spend on housing. However, migrant households spend less on education, and the higher spendings on health can be explained by their own health problems rather than by investments into improving the human physical situation of their members. The result also confirmed that the higher the remittances the migrant household received, the more they spend on non-food items, such as alcohol and tobacco but also transportation and donations.

The results suggest that in terms of consumption expenditure, migration and remittances do not sustain rural development. They make rural households spend more on non-productive items and housing rather than on improving human capital.

In the next step, the relationship between migration and production expenditure of rural households need to be investigated. This will provide additional evidences of the effect of migration on rural development.

**Table 6. Fixed-effects regressions of household expenditure categories**

Variables	Log of per capita expenditure		Log of per capita food expenditure		Log of per capita education expenditure		Log of per capita health expenditure		Log of per capita housing expenditure		Log of per capita non-food expenditure	
	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
	Migrant household with remittances (1-Yes; 0-No)	0.05**	0.02	0.03	0.02	-0.03	0.06	0.12	0.08	0.07*	0.04	0.10***
Migrant household without remittance (1-Yes; 0-No)	0.04***	0.02	0.05***	0.02	-0.08*	0.05	0.15**	0.06	0.01	0.03	0.05*	0.02
Total number of shocks that HH faced	0.01	0.00	0.01	0.01	-0.01	0.01	0.04*	0.02	-0.02	0.01	-0.02*	0.01
Total number of risks that HH expected in next 5 years	0.00**	0.00	0.01***	0.00	-0.00	0.01	0.02**	0.01	-0.00	0.00	0.01**	0.00
Ratio of HH members below secondary school	0.18***	0.04	0.13***	0.05	0.62***	0.14	-0.01	0.20	-0.12	0.09	0.14*	0.08
Ratio of HH members finished secondary school	0.16***	0.05	0.01	0.05	0.68***	0.16	0.15	0.20	0.21*	0.12	0.19**	0.08
Household size	-0.25***	0.02	-0.29***	0.02	-0.27***	0.08	-0.27***	0.08	-0.48***	0.04	-0.25***	0.03
Square of household size	0.01***	0.00	0.02***	0.00	0.01*	0.01	0.01*	0.01	0.03***	0.00	0.01***	0.00
Dependency ratio	-0.02	0.05	-0.08	0.06	0.15	0.19	0.14	0.22	0.06	0.11	0.20**	0.10

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Land per capita (Hectare)	0.05*	0.03	0.03	0.03	0.03	0.05	-0.15	0.12	0.15***	0.06	0.06**	0.03
Time dummy 2008 (1- Yes; 0 No)	-0.05***	0.01	0.20***	0.01	-0.11***	0.04	-0.28***	0.05	-0.41***	0.03	-0.54***	0.02
Time dummy 2010 (1- Yes; 0 No)	-0.07***	0.01	0.20***	0.01	0.16***	0.04	-0.06	0.05	-0.50***	0.03	-0.52***	0.02
Constant	7.75***	0.06	6.97***	0.07	4.61***	0.24	3.80***	0.24	5.07***	0.12	6.41***	0.09
Number of observations	6,105		6,105		4,126		5,496		6,103		6,105	
Number of i	2099		2099		1641		2080		2099		2099	
R-square	0.1243		0.1537		0.0410		0.0609		0.2137		0.1347	

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

\* Denote statistical significance at 10%

\*\* Denote statistical significance at 5%

\*\*\* Denote statistical significance at 1%

**Table 7. Estimates of impact of migration with remittances**

Indicators	2007			2008			2010		
	Y1	Y0	Impact	Y1	Y0	Impact	Y1	Y0	Impact
	(Y1 - Y0)			(Y1 - Y0)			(Y1 - Y0)		
Per capita expenditure	1,397.2	1,342.0	56.2**	1,250.0	1,200.4	49.6**	1,296.6	1,245.2	51.4**
	[41.8]	[46.0]	[24.8]	[45.8]	[47.0]	[21.3]	[22.1]	[38.6]	[22.0]
Per capita expenditure for food	523.7	510.3	13.4	619.2	605.1	14.1	651.9	637.1	14.8
	[13.9]	[16.5]	[11.3]	[29.2]	[29.7]	[12.4]	[17.1]	[20.8]	[13.1]
Per capita expenditure for education	88.2	94.6	-6.5	70.4	75.1	-4.7	52.2	55.7	-3.5
	[11.1]	[9.1]	[5.9]	[8.6]	[10.3]	[4.5]	[7.3]	[5.6]	[3.4]
Per capita expenditure for health care	46.0	42.3	3.7	57.4	52.8	4.6	71.3	65.6	5.7
	[5.3]	[4.2]	[3.5]	[9.6]	[10.3]	[4.4]	[11.1]	[10.8]	[5.3]
Per capita expenditure for housing	76.3	70.9	5.4**	36.6	34.2	2.4**	41.0	38.3	2.7**
	[6.5]	[6.4]	[2.7]	[2.4]	[2.2]	[1.2]	[2.3]	[2.5]	[1.3]
Per capita expenditure for non-food	487.5	440.2	47.3***	261.2	235.8	25.4***	291.9	263.6	28.3***
	[21.2]	[22.2]	[11.3]	[15.5]	[14.6]	[6.9]	[13.3]	[14.2]	[7.3]

Note: All numbers are changed to PPP \$ 2005. Standard errors in brackets. Standard errors are corrected for sampling weights and estimated using bootstrap with 200 replications.

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

\* Denote statistical significance at 10%

\*\* Denote statistical significance at 5%

\*\*\* Denote statistical significance at 1%

**Table 8. Estimates of impact of migration without remittances**

Indicators	2007			2008			2010		
	Y1	Y0	Impact (Y1 - Y0)	Y1	Y0	Impact (Y1 - Y0)	Y1	Y0	Impact (Y1 - Y0)
Per capita expenditure	1,410.7 [46.1]	1,355.4 [47.4]	55.4*** [20.2]	1,297.8 [26.9]	1,238.8 [31.9]	49.1** [19.4]	1,307.8 [32.1]	1,258.0 [37.8]	49.8** [19.6]
Per capita expenditure for food	531.8 [17.2]	509.4 [17.8]	22.5*** [8.5]	649.4 [15.0]	623.1 [18.2]	26.3** [10.4]	672.9 [16.2]	645.6 [19.5]	27.2** [10.7]
Per capita expenditure for education	74.8 [6.7]	81.9 [8.5]	- 7.1* [4.0]	85.5 [6.8]	93.4 [8.6]	- 7.9* [4.6]	63.6 [4.8]	69.5 [6.2]	-5.8 [3.4]
Per capita expenditure for health care	55.9 [3.9]	44.6 [4.4]	7.3** [2.9]	51.4 [4.9]	44.2 [5.1]	7.2*** [2.8]	55.8 [6.9]	47.9 [6.1]	7.9** [3.2]
Per capita expenditure for housing	78.3 [6.7]	79.3 [7.2]	- 1.1 [2.2]	37.4 [1.8]	37.8 [2.1]	- 0.5 [1.0]	37.4 [1.8]	37.8 [2.1]	- 0.5 [1.0]
Per capita expenditure for non-food	500.8 [23.1]	478.5 [24.6]	22.3** [10.7]	262.2 [9.6]	250.9 [10.9]	11.3* [6.4]	287.8 [13.8]	275.4 [14.7]	12.4* [7.0]

Note: All numbers are changed to PPP \$ 2005. Standard errors in brackets. Standard errors are corrected for sampling weights and estimated using bootstrap with 200 replications.

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

\* Denote statistical significance at 10%

\*\* Denote statistical significance at 5%

\*\*\* Denote statistical significance at 1%

**Table 9. Fixed-effects regressions of share of expenditure patterns**

Variables	Food		Education		Health		Housing		Non-food	
	coef	se	coef	se	coef	se	coef	se	coef	se
Inverse of per capita expenditure	-70.67***	13.38	36.93***	8.16	11.612	7.58	8.01	5.26	25.07*	13.95
Log of per capita expenditure	-0.09***	0.02	0.06***	0.01	0.048***	0.01	-0.00	0.01	0.05***	0.02
Remittances	0.00	0.00	-0.00	0.00	-0.000	0.00	-0.00	0.00	0.00**	0.00
Total number of shocks that HH faced	0.00	0.00	-0.00	0.00	0.002**	0.00	0.00	0.00	-0.00**	0.00
Total number of risks that HH expected in next 5 years	0.00	0.00	-0.00	0.00	0.000	0.00	-0.00	0.00	0.00	0.00
Ratio of HH members is below secondary school	-0.01	0.01	0.02***	0.01	-0.008	0.01	-0.01	0.01	-0.01	0.01
Ratio of HH members finished secondary school	-0.05***	0.01	0.03***	0.01	-0.004	0.01	0.01**	0.01	0.02	0.01
Household size	-0.02***	0.01	0.02***	0.00	0.009**	0.00	-0.01***	0.00	0.01**	0.01
Squared of household size	0.00***	0.00	-0.00***	0.00	-0.000	0.00	0.00***	0.00	-0.00	0.00
Dependency ratio	-0.01	0.02	-0.01	0.01	0.008	0.01	-0.00	0.01	0.05***	0.02
Land per capita (Hectare)	-0.01	0.01	0.00	0.00	-0.005	0.00	0.00	0.00	0.00	0.01
Time dummy 2008 (1-Yes; 0-No)	0.11***	0.00	0.01***	0.00	0.002	0.00	-0.02***	0.00	-0.12***	0.00

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Time dummy 2010 (1-Yes; 0-No)	0.11***	0.00	0.01***	0.00	0.005**	0.00	-0.02***	0.00	-0.11***	0.00
Constant	1.18***	0.12	-0.47***	0.08	-0.35***	0.08	0.10**	0.05	-0.09	0.13
Number of observations	6,105		6,105		6,105		6,105		6,105	
Number of i	2,099		2,099		2,099		2,099		2,099	
Squared R	0.245		0.1226		0.0161		0.0997		0.2658	

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

- \* Denote statistical significance at 10%
- \*\* Denote statistical significance at 5%
- \*\*\* Denote statistical significance at 1%

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## Appendices

### Appendix 1. Summary statistics of explanatory variables

Variables		Mean	Std. Dev.	Min	Max	Observations
Migrant household (1-Yes; 0-No)	overall	0.36	0.48	0.00	1.00	N = 6105
	between		0.40	0.00	1.00	n = 2099
	within		0.27	-0.31	1.03	T-bar = 2.91
Migrant household with remittances (1-Yes; 0-No)	overall	0.12	0.33	0.00	1.00	N = 6105
	between		0.22	0.00	1.00	n = 2099
	within		0.24	-0.55	0.79	T-bar = 2.91
Migrant household without remittances (1-Yes; 0-No)	overall	0.24	0.43	0.00	1.00	N = 6105
	between		0.31	0.00	1.00	n = 2099
	within		0.30	-0.43	0.91	T-bar = 2.91
Total number of shocks that HH faced	overall	1.12	1.40	0.00	10.00	N = 6105
	between		0.86	0.00	5.67	n = 2099
	within		1.12	-2.55	7.45	T-bar = 2.91
Total number of risks that HH expected in next 5 years	overall	5.23	3.07	0.00	21.00	N = 6105
	between		2.09	0.00	12.67	n = 2099
	within		2.27	-3.77	15.56	T-bar = 2.91
Ratio of HH member below secondary school	overall	0.32	0.26	0.00	1.00	N = 6105
	between		0.24	0.00	1.00	n = 2099
	within		0.11	-0.20	0.99	T-bar = 2.91
Ratio of HH member finished secondary school	overall	0.20	0.22	0.00	1.00	N = 6105
	between		0.20	0.00	1.00	n = 2099
	within		0.09	-0.46	0.87	T-bar = 2.91
Ratio of HH member finished high school and above	overall	0.47	0.28	0.00	1.00	N = 6105
	between		0.26	0.00	1.00	n = 2099
	within		0.10	-0.20	1.14	T-bar = 2.91
Household size	overall	4.34	1.73	1.00	14.00	N = 6105
	between		1.64	1.00	12.33	n = 2099
	within		0.62	0.34	8.34	T-bar = 2.91
Squared of household size	overall	21.9	17.22	1.00	196.00	N = 6105
	between		16.18	1.00	152.33	n = 2099
	within		6.28	-34.79	98.55	T-bar = 2.91
Dependency ratio	overall	0.28	0.26	0.00	1.00	N = 6105
	between		0.25	0.00	1.00	n = 2099
	within		0.07	-0.35	98	T-bar = 2.91

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Per capita land own (Hectare)	overall	0.19	0.49	0.00	17.68	N = 6105
	between		0.41	0.00	10.45	n = 2099
	within		0.26	-5.46	10.35	T-bar = 2.91
Ha Tinh province (1-Yes; 0-No)	overall	0.34	0.47	0.00	1.00	N = 6105
	between		0.47	0.00	1.00	n = 2099
	within		0.00	0.34	0.34	T-bar = 2.91
Thua Thien Hue province (1-Yes; 0-No)	overall	0.32	0.47	0.00	1.00	N = 6105
	between		0.47	0.00	1.00	n = 2099
	within		0.00	0.32	0.32	T-bar = 2.91
Dak Lak province (1-Yes; 0-No)	overall	0.34	0.47	0.00	1.00	N = 1907
	between		0.47	0.00	1.00	N = 5913
	within		0.00	0.34	0.34	T-bar = 2.91
Year 2007 (1-Yes; 0-No)	overall	0.34	0.47	0.00	1.00	N = 6105
	between		0.09	0.00	1.00	n = 2099
	within		0.47	-0.16	1.00	T-bar = 2.91
Year 2008 (1-Yes; 0-No)	overall	0.33	0.47	0.00	1.00	N = 6105
	between		0.08	0.00	1.00	n = 2099
	within		0.47	-0.17	1.00	T-bar = 2.91
Year 2010 (1-Yes; 0-No)	overall	0.33	0.47	0.00	1.00	N = 6105
	between		0.08	0.00	1.00	n = 2099
	within		0.47	-0.17	1.00	T-bar = 2.91

Source: Own calculations based on the DFG Rural Household Survey in 2007, 2008 and 2010.

**Appendix 2. Random-effects regression of household expenditure patterns**

Variables	Log of per capita expenditure		Log of per capita food expenditure		Log of per capita education expenditure		Log of per capita health expenditure		Log of per capita housing expenditure		Log of per capita non-food expenditure	
	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Migrant household with remittances (1-Yes; 0-No)	0.09***	0.02	0.07***	0.02	0.06	0.05	0.19***	0.06	0.17***	0.03	0.17***	0.03
Migrant household without remittances (1-Yes; 0-No)	0.08***	0.01	0.07***	0.01	0.04	0.04	0.18***	0.05	0.10***	0.03	0.11***	0.02
Total number of shocks that HH faced	-0.01	0.00	-0.01***	0.00	-0.03***	0.01	0.08***	0.02	-0.04***	0.01	-0.03***	0.01
Total number of risks that HH expected in next 5 years	0.00	0.002	0.00	0.00	-0.01	0.01	0.01**	0.01	-0.01***	0.003	-0.00	0.00
Ratio of HH members below secondary school	-0.08***	0.03	-0.07**	0.03	-0.02	0.08	-0.36***	0.09	-0.33***	0.06	-0.19***	0.05
Ratio of HH members finished secondary school	0.11***	0.03	0.04	0.04	0.43***	0.10	-0.00	0.11	0.16**	0.07	0.17***	0.05
Household size	-0.17***	0.01	-0.19***	0.01	-0.19***	0.05	-0.35***	0.04	-0.39***	0.03	-0.15***	0.02
Squared of household size	0.01***	0.00	0.01***	0.00	0.01	0.00	0.01***	0.00	0.02***	0.00	0.00	0.00
Dependency ratio	-0.36***	0.03	-0.30***	0.03	-1.09***	0.10	-0.07	0.09	-0.22***	0.06	-0.51***	0.05
Land per capita (Hectare)	0.03***	0.01	0.03***	0.01	-0.04	0.03	-0.05	0.04	0.07***	0.02	0.05***	0.02
Time dummy 2008 (1-Yes; 0-No)	-0.05***	0.01	0.19***	0.01	-0.14***	0.03	-0.27***	0.04	-0.40***	0.02	-0.51***	0.02

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Time dummy 2010 (1- Yes; 0-No)	-0.07***	0.01	0.20***	0.01	0.06*	0.03	-0.21***	0.04	-0.47***	0.02	-0.51***	0.02
Ha Tinh province (1-Yes, 0-No)	-0.23***	0.02	-0.26***	0.02	0.34***	0.06	-0.48***	0.05	0.03	0.04	-0.24***	0.03
Thua Thien Hue province (1-Yes, 0-No)	-0.16***	0.02	-0.13***	0.02	-0.35***	0.05	-0.62***	0.05	0.22***	0.04	-0.17***	0.03
Constant	7.83***	0.04	6.95***	0.04	4.94***	0.15	4.52***	0.12	4.94***	0.08	6.58***	0.06
Number of observations		6,105		6,105		4,126		5,496		6,103		6,105

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

\* Denote statistical significance at 10%

\*\* Denote statistical significance at 5%

\*\*\* Denote statistical significance at 1%

**Appendix 3. Types of shocks that household experienced**

	2007	2008	2010
Demographic	0.45	0.18	0.65
Social	0.04	0.01	0.12
Agriculture	0.25	0.24	1.23
Economic	0.08	0.02	0.10

Source: Own calculations based on the DFG Rural Household Survey in 2007, 2008 and 2010.

**Appendix 4. Hausman tests of fixed-effects and random-effects regressions of log of per capita expenditure**

Variables	Fixed-effects regression	Random-effects regression	Difference	Standard errors of difference
Migrant household with remittances (1-Yes; 0-No)	0.041889	0.089822	-0.04793	0.009743
Migrant household without remittances (1-Yes; 0-No)	0.040723	0.076761	-0.03604	0.007816
Total number of shocks that HH faced	0.002557	-0.00554	0.008101	0.001827
Total number of risks that HH expected in next 5 years	0.003606	0.000176	0.00343	0.000684
Ratio of HH members below secondary school	0.146752	-0.07522	0.221973	0.030877
Ratio of HH members finished secondary school	0.147707	0.109652	0.038056	0.03295
Household size	-0.26163	-0.17339	-0.08824	0.012896
Squared of household size	0.012595	0.006884	0.005711	0.001251
Dependency ratio	-0.04832	-0.35999	0.311676	0.044789
Land per capita (Hectare)	0.012606	0.03373	-0.02112	0.008666
Time dummy 2008 (1-Yes; 0-No)	-0.04228	-0.05002	0.007743	0.001533
Time dummy 2010 (1-Yes; 0-No)	-0.06634	-0.06736	0.001024	0.003018

**Test: Ho: difference in coefficients not systematic**

$$\text{chi2}(12) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 215.29$$

$$\text{Prob}>\text{chi2} = 0.0000$$

Source: Own calculations based on the DFG Rural Household Survey in 2007, 2008 and 2010.

## **4. Migration, Agricultural Production and Diversification: A case study from Vietnam**

This chapter has been submitted to the *Journal of Rural Studies*.

### Abstract

The New Economics of Labor Migration (NELM) hypothesizes that migration is a strategy to reduce risks and financial liquidity constraints of rural households. This paper tests this hypothesis for the case of Vietnam. The impacts of migration on agricultural production and diversification are estimated in fixed effects regression models based on a panel data set of about 2,000 households in Vietnam. The findings suggest that rural households who receive remittances from their migrants reduce the share of their income from rice, increase their land productivity and become more specialized in labor allocation. However, migration also decreases labor productivity and crop diversification of rural households. Overall, the NELM hypothesis is only supported in cases migrant households receive remittances.

Keywords: Migration, Remittances, Agricultural Productivity, Diversification, Vietnam

## **4.1 Introduction**

As a consequence of the economic development process, rural to urban migration tends to commonly occur in developing countries. The effect of this trend on rural development is quite complex (de Brauw, 2007). On the one hand, migration is considered as a coping strategy to risks (Stark and Bloom, 1985). It supports income and expenditure of origin households, and alleviates poverty in rural areas (Nguyen et al., 2013; Amare, 2012, Taylor et al., 2003). On the other hand, migration may also have effects on agricultural production patterns of households depending on the broader agro-ecological, economic, and institutional context in rural regions (Lipton, 1980; Lucas, 2007). Although rural outmigration tends to reduce the pressure on agricultural labor, this could not reduce agricultural incomes because the loss of household labor may be, and often is, compensated by improvements in other factors, such as an increased access to capital due to remittances. However, in the context of missing or imperfect rural markets, such as labor, credit and insurance markets, migration becomes an important factor to overcome these imperfections affecting rural households' decisions on agricultural production, investment and labor allocation (Rozelle et al., 1999; Taylor et al., 2003). Moreover, migrants mainly come from relatively poor rural areas with fewer job opportunities although they may not be the poorest people in those places (Nguyen et al., 2013). Instead, migrants often are the more educated ones. Their outmigration results in brain drain in general but also in falling agricultural production (Connell, 1987).

Vietnam is an interesting place to study the relationship between migration and agricultural production. Although Vietnam's economy has grown rapidly since the late 1980s, agriculture is still an important part in its economic structure. It creates the largest number of jobs, and is a main income source for about 70 percent of its population (GSO, 2011a). However, agricultural production is challenged by several pressures, such as climate change, price volatility, and the outmigration of agricultural labor. The motivation of people moving to urban regions derives from the labor surplus and low productivity in the rural sector. About 50 percent of Vietnam's total labor force (population in working age) work in the agricultural sector, but produce only 20 percent of its Gross Domestic Product (GSO, 2011a). Moreover, the widening gap of living conditions between rural and

urban areas “pull” rural residents to urban areas which are expected to provide better jobs and better education and public services. As a result, the rural to urban migration trend has strongly increased in the last decades. In contrast, rural market institutions are still underdeveloped in Vietnam. Farm households primarily depend on their own labor, and the land market is still controlled by the government. Also the credit and insurance markets are still lacking behind (van de Walle and Cratty, 2004; Deininger and Jin, 2008). Migration, therefore, has become a livelihood strategy to solve these problems. These in turn affect household decisions on their labor force allocation and production portfolio.

The objective of this paper is to assess the effects of migration on agricultural production and labor allocation of rural households in Vietnam. It tests the hypothesis of the New Economics of Labor Migration (NELM) stating that migration is a strategy to cope with risks. Specifically, the paper explores the potential impact of rural-urban migration on land and labor productivity, agricultural diversification and labor diversification based on a panel data set from 2007-2010. The results of this paper are expected to provide evidence on how to improve the efficiency of agricultural production and contribute to rural development against the background of increasing rural outmigration.

The remainder of this paper is structured as follows: Section 2 summarizes the literature on migration, agricultural production and diversification. Section 3 introduces the data and research methodology. The results and their discussions are presented in Section 4, followed by Section 5, the conclusion.

## **4.2 Literature Review**

Damon (2010), Rozelle et al. (1999) and Taylor et al. (2003) found that migration can be motivated by three reasons: (1) remittances are sent to enable households to invest; (2) remittances help to overcome credit constraints; and (3) they substitute for missing insurance markets.

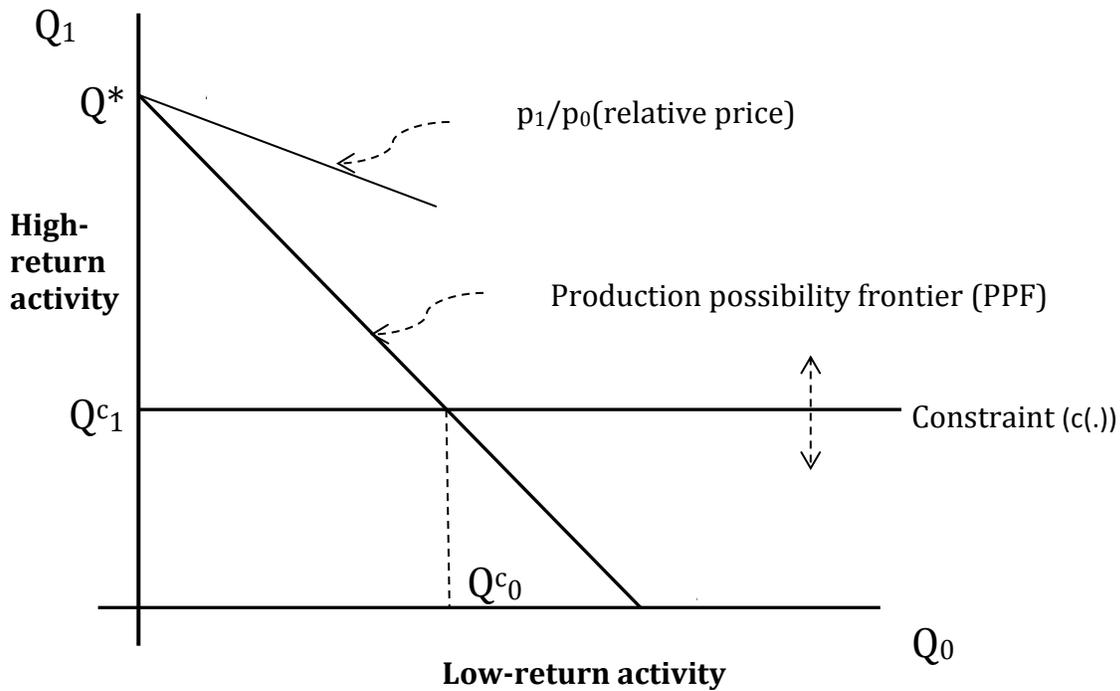
The first motivation considers migration as an investment activity of rural households. The family expects to receive remittances in the future as a return on their initial investment cost. This cost includes both, the household’s financial contribution to

migration and the loss of household labor. Are remittances being transferred after migration, the households are enabled to invest into different farm and non-farm activities.

The second and third motivations are based on the theory of the NELM (Stark and Bloom, 1985). It hypothesizes that remittances play a role as financial intermediaries, enabling rural households to overcome credit constraints and risks to achieve the transition from small-scale to commercial production. It is assumed that a household face a binding credit constraint in cases of missing or incomplete credit markets. Migration can help a household relieve these constraints through remittances. Consequently, it is expected that there is an increasing investment in agricultural assets, agricultural technology, and agricultural commercialization activities. Migration and remittances are also considered as informal insurance mechanisms between the migrants and their rural households (Gubert, 2000 and Damon, 2010). Therefore, it provides a safety net for farm households to cope with the volatility of agricultural prices and production, and induce a modification in the agricultural production patterns.

These arguments are illustrated in Figure 1. Assume a household with two possible production activities, namely a high-return and a low-return activity. A household may invest fixed resources  $T$  (i.e. land or family labor) in either these activities. Let  $Q_i$  for  $i=1,0$  denote output of the two production activities.  $AA$  represents the production possibility frontier (PPF). At the relative price  $(p_1/p_0)$ , the household specializes in the high-return activity  $Q_1$  and its output will be  $Q^* = f(T,Z)$  with  $Z$  being a vector of household characteristics that shape the returns from investing in each activity.

Assume now that the household faces constraints on investing in the high-return activity, such that  $c(.) \leq T_1$ , where  $c(.)$  denotes the barriers that limit the household to invest only  $T_1$  ( $T_1 < T$ ) of fixed resources in the high-return activity. In case of credit or liquidity constraints,  $c(.)$  represents the sunk cost of adopting the high-return activity, and  $T_1$  denotes household's available credit and liquidity for investing in this activity. In case of facing risks,  $c(.)$  would be a measure of these (e.g., output variance) and  $T_1$  would be the maximum level of risk that a household would be willing to take in the high-return activity.



Source: Rozelle et al. (1999).

**Figure 1. Potential Migration Effects on Rural Household's Production**

The NELM theory hypothesizes that  $c(.) = \theta(M, R)$ . The constrained resource allocation to the high-return activity is  $T_1c = \varphi c(.)$ , where  $\varphi c > 0$ . The constrained output under the high-return activity is  $Q_{c1} = f_1(T_{c1}, Z_y)$ , and under the low-return activity, it is  $Q_{c0} = f_0(T - T_{c1}, Z_y)$ . Constrained output,  $Q_c$ , is given by

$$Q^c = Q_0^c + Q_1^c$$

where  $Q_c < Q^*$ , the unconstrained output.

Migration (M) and remittances (R) could contribute to production by relaxing the credit constraint through remittances or the implicit commitment to remit in case the household suffers an income loss. The potential effect of migration on these constraints, however, is not always positive. If rural households face a missing or imperfect labor and credit market, migration may further tighten the constraints on investing in a high-return activity since it increases the competition of scarce resources such as labor. In case these markets work well, the lack of migrant labor can be substituted by hired labor, if needed, and households

can borrow money for buying production inputs. Then the effect of migration is minimal for production. It just helps rural households increase their total income. Therefore, the influences of migration on liquidity, risk and labor constraints are unknown, or  $\theta(M)$  and  $\theta(R)$  are ambiguous.

These motivations have been investigated in several empirical studies. Rozelle et al. (1999) and Taylor et al. (2003) explored the links between migration, remittances, and crop and self-employment incomes in rural China based on a three stage least squares model with cross-sectional data. The results supported the NELM hypothesis that remittances loosen constraints in production on imperfect markets which are prevalent in rural areas in developing countries. The authors found that migration has a negative impact on crop income but it does not affect crop yields, and remittances could partially compensate for the presumed lost labor effect. They also provided evidence that migration supports self-employment activities of rural households. The results are also confirmed by Li et al. (2013) who tested the relationship between migration, remittances and agricultural productivity in small farming systems in Northwest China. Also Taylor and Lopez-Feldman (2010) confirmed that rural households' access to U.S. migrant labor markets could increase income and raise land productivity in migrant-sending households in Mexico.

Wouterse (2010) distinguished between two types of migration in Burkina Faso: continental migration (migration in the continent) and intercontinental migration (migration to Europe). He found that only continental migration improved technical efficiency, due to shifted labor time of male adults away from cereal production. The intercontinental migration could not improve the efficiency because of the distortion of the gender balance in the household when the females become the prominent provider of labor in cereal production. In contrast, Mendola (2008) found that international migration resulted in increased investments in new agricultural technologies by rural migrant household, while internal migration did not. This has been explained by the fact that the migrant households involved in international migration are generally better off in comparison with those involved only in domestic migration.

Lucas (1987) examined the impact of temporary labor migration in Southern Africa to work in the mining sector. He found that temporary migration leads to diminished agricultural production in the short run, but it enhances both crop productivity and cattle accumulation through invested remittances in the long run.

Damon (2010) used panel data and a two stage least squares model with instrumental variables to measure the effect of migration and remittances on agricultural land use and asset accumulation in El Salvador. He found that migration and remittances cause a household to reallocate land away from commercial cash crops toward the production of subsistence food crops. These do not affect agricultural input use and may decrease the returns to land and labor.

McCarthy et al. (2009) explored the effect of migration on the re-allocation of resources in agriculture among migrant families in Albania. The authors argued that migration exerts a strong downward pressure on agricultural labor and crop diversification. However, the loss in household labor in agriculture is compensated by increased access to capital, leading to overall improvements in both agricultural and total incomes.

Literature on the effect of migration on agriculture production in Viet Nam is still scarce. A recent estimation was conducted by Brennan et al. (2012) who ran a dynamic macro model, namely Vietnam's agricultural sector (VAST) programming model, to estimate the impact of migration on agriculture production. The results showed that under assumption of full employment, migration slightly increases meat production and decreases feed output. Producers in rural areas may be better off because any decrease in production is offset to some extent by an increase in prices.

A unique econometric approach evaluating the impact of migration on agricultural production in Vietnam is conducted by de Brauw (2007, 2010). The author used data from the Vietnam Living Standard Survey (VLSS) from the periods 1992-93 and 1997-98 and a two stage least squares model with instrumental variables to measure the impact of migration on agricultural production. The results revealed that migration does not change agricultural productivity, but it does modify cropping patterns from labor-intensive to land-intensive crops. However, his studies only refer to migration for employment, but not

to migration for education or any other purposes such as marriage. Migration for employment often occurs together with remittance flows from these migrants to their original households. Consequently, the loss of labor due to migration could be compensated by remittances. Therefore its impact on labor allocation and production might be different to other types of migration, such as migration for education that often does not imply any remittances flows to rural households. Moreover, there is a concern that migration is not reflected accurately in the VLSS data set (Pincus and Sender, 2008). The temporary and unregistered migrants are excluded in this data set (GSO, 2011b, Dang et al., 2003).

This paper is motivated by these shortcomings of earlier research in this field. By using a different panel data set, we are able to separate migration into two types depending on the status of remittances transfer. In cases of migration with remittances transfers to rural households, it is assumed that the loss of household labor can be compensated by remittances. Households can also use remittances to overcome the constraints of risks on production. Therefore, agricultural production could be maintained or increased. On the other hand, in cases of migration without remittances transfers, rural households cannot reduce the constraints of credit and risks, so that decreased agricultural production is expected. However, both types of migration are expected to increase labor productivity.

### **4.3 Data and Methodology**

#### **4.3.1 Data**

This paper uses a panel data set under the project ‘Impact of shocks on vulnerability to poverty: Consequences for development of emerging Southeast Asian economies’ (hereafter DFG FOR 756).<sup>1</sup>The household survey includes 2,200 households that were randomly selected from the three provinces DakLak, ThuaThien Hue, and Ha Tinh in Vietnam in 2007, 2008, and 2010. The survey collected a broad set of information regarding the socio-demographic and economic conditions of the sampled households with the composition of the income source portfolio, production activities, borrowing, lending and expenditure patterns, and the exposure to shocks and risks. Migration activities include information about the migration duration period, the place of destination, the

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<sup>1</sup> See Hardeweg and Waibel (2009) for details on the data collection procedure.

reasons of migration and the remittances sent to and received from rural households. In this paper, migrants are defined as household members who migrate to urban areas for at least one month a year for any purposes. A similar definition has been used by de Brauw (2007, 2010) and de Brauw and Harigaya (2007) in their studies on seasonal migration, rural household welfare and agricultural production in Vietnam. However, they only focused on migration for employment, while our definition captures all types of migration including migration for employment, migration for education as well as for other purposes.

The questionnaire includes a detailed section on agricultural production. This information is collected for each crop that was cultivated by a household in one year. It covers cultivated land, production, the selling price, and cash cost for seeds or seedlings, hired labor, fertilizers, pesticides, insecticides, weeding, and the rental of machinery or service fees (mostly irrigation fee). The information on family labor is not directly taken from the questionnaire. Only information about household members who were engaged mainly or partly in agriculture is available. In this study, therefore, the family labor for crop production is estimated by deducting labor working days for other activities such as self-employment, off-farm employment, or else from the total labor working days.

#### 4.3.2 Methodology

In this paper, we use fixed effects regression models. The village-level fixed effects help to deal with the potential selection bias and the bias of unobserved factors that may influence the migration and dependent variables (agriculture production and diversification outcomes). They adequately capture the inter-village differences, such as quality of land, education attributes, local infrastructural development, geo-environmental attributes, and other village-level factors. A main assumption of the method is that unobserved variables are correlated with both, the outcomes and migration status, and unchanged in the period 2007 – 2010, thus controlling for endogeneity problems (Duncan et al., 2004). We also tested instrumental variables such as the education level of the most educated household member, share of migrants in village population, number of current friends and relatives in urban areas, but the results turned out to be biased. We thus followed the suggestion by Nguyen and Mont (2012), Duncan et al., (2004) and Vartanian

and Buck (2005) to exclude instrumental variables since invalid instruments can result in an even larger bias in impact estimates.

Additionally, similar to Damon (2010), we also use a lagged migration status variable, in which the migration status of rural households in 2007 explains outcomes of agricultural production only in 2008, and the migration status of rural households in 2008 explains outcomes in 2010. Specifically, the empirical model is specified as:

$$Y_{jit} = f(M_{i,t-1}, R_{i,t-1}, X_{it}) + e_{ijt} \quad (1)$$

$$Y_{jit} = \alpha_{ij} + \beta_1 M_{i,t-1} + \beta_2 R_{i,t-1} + \beta_3 X_{it} + \varepsilon_{ijt} \quad (2)$$

where  $Y_{jit}$  is the agricultural outcome  $j$  of household  $i$  in the time period  $t$ . Further,  $\alpha_{ij}$  is the village-level fixed effects estimator;  $M_{i,t-1}$  is the dummy variable referring to a migrant household without remittances transfer in the previous period ( $M_{i,t-1} = 1, 0$ ). Similarly,  $R_{i,t-1}$  is the dummy variable referring to a migrant household, who received remittances transfer in the previous period ( $R_{i,t-1} = 1, 0$ ) in comparison to the non-migrant household ( $M_{i,t-1} = 0, 0$  and  $R_{i,t-1} = 0, 0$ ).  $X_{it}$  is a vector of household characteristic control variables including age of household head, number of years in school of household head, total household members, squared of total household members, share of total household members younger than 15 years, share of total household members older than 65 years, irrigated land as a share of totally owned land, household engaged in self-employed activities, household engaged in livestock activities and participating in political or social organizations. Finally,  $\varepsilon_{ijt}$  is an independently distributed error term.

+ Outcomes:

Two groups of outcomes are used in this study. The first group includes indicators directly related to crop production; those are share of rice income of total crop income, the growth of land productivity and labor productivity.

Vietnam primarily has a rice-based agricultural economy. Rice is cultivated on about 80 percent of the arable land and is the main income source of rural residents. Rice cultivation is considered as labor-intensive, so that migration affects rice production by creating a

shortage of labor in rural areas. However, migration could also improve rice production technology through remittances and increased labor productivity.

Regarding the effect of migration on the efficiency of crop production, the indicators of the growth of land productivity and labor productivity are used. Land productivity is calculated as the ratio of crop income on total land used for crop production, and labor productivity is the ratio of crop income of total family working labor days for crop production activities (Fan and Chan-Kang, 2005). The growth of these ratios is calculated as the change between two years 2010 to 2008, and 2008 to 2007 (Butzer et al., 2002).

The second outcome group includes several diversification indicators. Empirically, several studies confirmed that rural households diversify their livelihoods to cope with risks (Dercon, 2002, Tongruksawattana et al., 2010). Among others, migration is considered as one of these strategies (Stark and Bloom, 1985). In this paper, we try to identify the effect of migration on rural household diversification through three diversification indicators including crop diversification, land diversification and labor diversification.

To measure diversification, the Simpson Index of Diversification (SID), as adopted by Minot et al. (2006), is used as follows:

$$SID = 1 - \sum P_i^2 \quad (3)$$

where  $P_i$  is the proportion of organisms that are classified in species  $i$ .

With respect to crop diversification,  $P_i$  is the proportion of income from crop  $i$  in total crop income, while in case of land diversification, it is the proportion of land used for cultivating crop  $i$  in total cultivated land of a household. The value of SID falls between 0 and 1. If a household grows only one crop, or has one land parcel, then  $P_i = 1$  and  $SID = 0$ . As the number of those proportions increase, the shares ( $P_i$ ) decline, as does the sum of squared shares, so that SID approaches 1. The larger SID means the more diversification.

Similarly with respect to the labor diversification index,  $P_i$  is measured as the proportion of number of laborers from production activity  $i$  in total laborers involved in all production activities of a household (Phung and Waibel, 2009). We estimate two labor

diversification indexes: the first one includes the migrant members in the cities, and the second index excludes them.

Regarding the controlled independent variables, the household characteristics include a set of variables on demographical characteristics such as age of household head, education of household head, household size, and proportion of people below fifteen and older than sixty five years. The dummy variable of a household who participated in political or social organizations indicates the social capital of a household. The share of irrigated land is expected to support agricultural production, while households engaged in livestock activity and households engaged in non-farm activities can be considered as competitive activities to agricultural production.

#### 4.4 Results and Discussion

This section presents first the descriptive and then the econometric results on the impacts of migration on household's agricultural production and diversification.

##### *a) Descriptive analysis*

**Table 1. Descriptive statistics for agricultural production**

	2007	2008	2010
Total crop income (\$US-PPP, 2005)	3,026	3,463	2,729
Share of income from rice production	0.46	0.44	0.47
Crop land (ha)	0.82	0.89	0.88
Annual agricultural working days (days)	435.11	470.48	463.41
Crop diversification	0.21	0.30	0.24
Land diversification	0.27	0.30	0.27
Labor diversification	0.38	0.38	0.38
Labor diversification excl. migration	0.29	0.31	0.32
Total observations	2,068	2,048	2,005

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

Table 1 shows some descriptive statistical results of some indicators related to agricultural production and diversification of rural households in 2007, 2008 and 2010.

The total income from crop production reached its highest level in 2008, the year of the food crisis, and then it decreased. In contrast, the share of income from rice production slightly fell from 2007 to 2008 and increased to 47 percent of total crop income in 2010. Accordingly, the land use for crop production and agricultural working days of family labor also increased from 2007 to 2008 and slightly decreased from 2008 to 2010. The Simpson index of crop and land diversification developed into the same direction. However, while the labor diversification of migrant households including migrant members remained the same over the three years, this index slightly increased over the years in case migrant members were excluded. These results indicate that agricultural diversification requires labor intensification, but it maintains a higher income than in case of specialization. The labor diversification strategy seems to be more important for rural households than the strategy of agricultural diversification.

Table 2 describes migration and remittances. The total number of migrant households in the sample increased from 690 in 2007 to 802 and 890 in 2008 and 2010. However, the share of migrant households who received remittances from their members in the cities decreased from 30 percent in 2007 to 25 percent in 2008 and increased to 34 percent in 2010. The total remittance income of an average household has decreased from 202 US\$ in 2007 to 182 US\$ in 2008 and increased to 301 US\$ in 2010.

**Table 2. Migration and remittances**

	<b>2007</b>	<b>2008</b>	<b>2010</b>
Migrant households	692	802	890
Migrant households who received remittances	204	203	310
Remittance income per annum (\$US-PPP, 2005)	202	182	301
Total observations	2,068	2,048	2,005

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

The relationship between migration and agricultural production and diversification is described in Table 3. The share of income from rice production is significantly higher for

migrant households with remittances than for non-migrant households and migrant household without remittances, while there is no statistically significant difference between the last two groups. The results from the T-test also show that land productivity and labor productivity of migrant households with remittances is higher than of migrant households without remittances and of non-migrant households. However, the indicators of land and labor productivity do not differ statistically significantly between the non-migrant households and migrant households without remittances.

**Table 3. Migration<sup>1</sup> and agricultural production**

	Non-migrant HH (1)	Migrant HH with remittances (2)	Migrant HH without remittances (3)	T-test		
				(1 - 2)	(1 - 3)	(2 - 3)
Share of rice income	0.45	0.50	0.45	***	ns	**
Land productivity (\$US/ha/year)	2,719	3,470	2,737	**	ns	**
Labor productivity (\$US/working day)	3.95	5.02	3.65	*	ns	*
Crop diversification	0.25	0.27	0.23	*	*	**
Land diversification	0.29	0.29	0.27	ns	*	*
Labor diversification	0.34	0.43	0.42	***	***	*
Labor diversification excl. migration	0.34	0.27	0.32	**	*	***
Number of households	2,432	405	1,087			

Note: \*significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%, ns- not significant. These numbers are calculated for the pooled data set of year 2007, 2008, and 2010.

All values are changed to PPP \$ 2005.

<sup>1</sup> Migration is defined as lagged migration.

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

Migrant households with remittances and non-migrant households diversify more in terms of income from different crops and land use for cropping. The labor diversification

index of migrant households is higher than for non-migrant households. However, excluding migrant members, migrant households seem to be more specialized, especially in case they had received remittances.

The comparative analysis confirms that migrant households are more efficient in crop production when remittances transfer took place. It also shows that migration is a diversification strategy in terms of labor allocation. However, the results could not explain the effect of migration on household production and resource allocation. The reason may be that migrant households are different from the non-migrant ones in terms of their inherent characteristics, such as being financially better off, having higher social capita or assets in comparison to non-migrant households. In the following, the fixed effects approach is used to further explain those effects of migration.

*b) Econometric estimation results*

*+ Migration and Crop production*

Table 4 presents the estimation results of the effect of migration on the share of rice income in total crop income, the growth of land productivity and labor productivity. Migration tends to decrease the share of rice income and the growth of labor productivity of rural households. However, while this effect on the share of rice income is statistically significant for migrant households with remittances, the effect on labor productivity is only statistically significant for migrant households without remittances. With respect to land productivity, the effect turns positive and statistically significant for migrant households with remittances, while it is negative and statistically insignificant for migrant households without remittances. These results suggest that migrant households tend to shift from rice production to other crops, especially when they receive remittances. This is consistent with the finding of de Brauw (2007, 2009).

Migrants are normally young people, and their absence decreases labor productivity. This effect becomes more prevalent in cases absence cannot be substituted by remittances. Remittances transfers help not only to reduce the decrease in labor productivity of migrant households, but they also increase land productivity by supporting the production of other crops than labor-intensive rice crop.

**Table 4. Migration, share of rice income, land and labor productivity growth**

Variables	Share of	Growth of	Growth of
	rice income	land	labor
	(1)	(2)	(3)
	coef/se	coef/se	coef/se
Lag of migrant HH with remittances (1-Yes, 0-No)	-0.026** (0.013)	0.265** (0.122)	-0.090 (0.066)
Lag of migrant HH without remittances (1-Yes, 0-No)	-0.008 (0.011)	-0.051 (0.105)	-0.133** (0.059)
Age of household head	-0.001** (0.001)	-0.007* (0.004)	-0.004** (0.002)
Years in school of household head	-0.005*** (0.002)	-0.015 (0.012)	0.006 (0.005)
Total household members	0.026** (0.011)	0.149 (0.093)	-0.021 (0.041)
Squared of total household members	-0.002* (0.001)	-0.012 (0.009)	0.001 (0.004)
Share of household members younger than 15 years old	-0.014 (0.030)	0.048 (0.270)	0.114 (0.116)
Share of household members >= 65 years old	-0.103*** (0.035)	0.317 (0.267)	0.018 (0.117)
Share of irrigated land on total own land	0.241*** (0.027)	1.112*** (0.162)	0.101 (0.072)
Household engaged in self-employed activities (1-Yes, 0-No)	-0.035*** (0.012)	-0.295*** (0.101)	-0.196*** (0.047)
Household engaged in livestock activities (1-Yes, 0-No)	0.041** (0.018)	0.224 (0.165)	0.151** (0.068)
HH participated in political or social organizations (1-Yes, 0-No)	-0.006 (0.018)	-0.155 (0.149)	-0.094 (0.079)
Constant	0.357*** (0.055)	-0.463 (0.338)	0.362** (0.158)
Number of observations		3,924	

Note: \*, \*\*, \*\*\* indicate statistically significant levels at 10%, 5% and 1%.

All standard deviations of the estimators are robust at village level.

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

Considering the household characteristics, similar to Damon (2010), the higher the age of the household head, the lower are the share of rice income as well as the land and labor productivities. The education level of the household head is negative and statistically significant in model (1) and it becomes negative but statistically insignificant in model (2) and positive and statistically insignificant in model (3). This could be explained by the fact that better educated household heads might be less likely to focus on crop production, especially rice, but it could help to improve the labor productivity to some extent.

The number of household members has a positive and statistically significant effect in model (1), but it becomes positive and statistically insignificant in model (2) and negative and statistically insignificant in model (3). The higher the number of household members, the higher the share of rice income in total crop production income, because rice production is a labor intensive activity. However, the squared household size is negative and statistically significant indicating that a household tends to move to other crops or non-farm activities when this number increases further.

The share of household members younger than 15 years and the share of household members older than 65 years show a negative effect on the share of rice income, and a positive one on land productivity and labor productivity. Nevertheless, it is only statistically significant with respect to the share of rice income. Therefore, households with higher shares of old members are more likely to cultivate other crops than rice, since rice production is very labor-intensive requiring more laborers than other crops.

With regards to the production conditions, the share of irrigated land in total agricultural land has a positive and statistically significant effect on the estimated models (1) and (2). This indicates that irrigation is very important for rice production, improving its efficiency.

Also factors related to substitutable or complementary aspects of crop production have been found to have an influence. On the one hand, the more the households are engaged in self-employed activities, such as small businesses or services, the lower the share of rice production and the less efficient is crop production in terms of land productivity and labor

productivity. On the other hand, a household engaged in livestock activities seems to complement crop production. It helps to increase rice production and labor productivity.

Finally, the participation of households in political or social organizations does not seem to support rice production and the efficiency of crop production. It is negative and statistically insignificant in all three estimated models.

*+Migration and Crop diversification*

The following part describes the effect of migration on crop diversification. The estimated results are presented in Table 5.

Migrant households with remittances seem to support crop diversification, indicated by the positive sign. Unfortunately, this variable is statistically insignificant in both models. At the same time, migration without remittances transfers is negative and statistically significant in both, crop and land diversification. This means that on the one hand, production shifts to other crops than rice and land productivity increases but the diversification of their crop production has not increased. On the other hand, migrant households without remittances specialize more in crop production and reduce their labor productivity. Therefore, the latter tend to be more risk loving in crop production.

The control variables age and education level of the household head are statistically insignificant in the two estimated models. However, those characteristics affect the diversification indexes in different directions. While the age of household head somehow supports crop diversification, the education level reduces it.

Similarly, the higher the number of household members, the more likely are households to diversify their crops and the higher the rice income. However, when this number further increases, a household would reduce its land diversification. This indicates that rural households tend to shift to non-farm activities.

The share of household members younger than 15 years has a negative effect on the diversification indexes, while the share of household members older than 65 years is positive. This could be explained by the fact that the higher number of household members

below 15 years is associated with a lower number of household laborers which again decreases the crop diversification of a household.

Irrigation is also very important for the diversification strategy. The higher the share of irrigated land, the less likely a household diversifies its land. When an irrigation system is implemented, the households tend to become more specialized.

Households who are engaged in self-employed activities are less likely to diversify their crop production, while they are more likely to diversify their crops when they engaged in livestock activities. Those results are consistent with previous results from Table 4. Therefore, self-employed activities are substitutes to crop production, while livestock activities are complementary activities. Finally, similarly to previous estimations, the participation of households in political or social organizations does clearly not promote their diversification in crop production activities.

*+ Migration and Labor diversification*

Table 6 presents the estimated results of the impact of migration on the labor diversification of rural households. The estimated model (6) shows the effect of migration on household labor allocation as a whole (including migrant members), and model (7) presents the effect of migration on the allocation of only household labor members who did not migrate (excluding migrant members).

Migration is considered as a diversification strategy to cope with risks (Stark and Bloom, 1985). This is confirmed by the estimated model (6) by positive and statistically significant results. However, the effect of migration on labor diversification becomes negative as if their migrant members are excluded. It is statistically significant in case migrant households received remittances transfers. In other words, migration is considered as a labor diversification strategy of rural households as a whole, but the remaining household members who did not migrate, specialize on employment at origin places, especially, when remittance transfers have taken place.

**Table 5. Migration and crop diversification strategy**

Variables	Crop diversification (4)	Land diversification (5)
	coef/se	coef/se
Lag of migrant HH with remittances (1-Yes, 0-No)	0.011 (0.009)	0.014 (0.009)
Lag of migrant HH without remittances (1-Yes, 0-No)	-0.017** (0.008)	-0.016* (0.009)
Age of household head	0.000 (0.000)	0.000 (0.000)
Years in school of household head	-0.001 (0.001)	-0.000 (0.001)
Total household members	0.024*** (0.007)	0.025*** (0.008)
Squared of total household members	-0.001 (0.001)	-0.001* (0.001)
Share of household members younger than 15 years old	-0.058*** (0.021)	-0.056** (0.023)
Share of household members ≥ 65 years old	0.019 (0.023)	0.024 (0.026)
Share of irrigated land in total own land	0.003 (0.012)	-0.025* (0.013)
Household engaged in self-employed activities (1-Yes, 0-No)	-0.034*** (0.009)	-0.039*** (0.009)
Household engaged in livestock activities (1-Yes, 0-No)	0.060*** (0.010)	0.063*** (0.012)
HH participated in political or social organizations (1-Yes, 0-No)	0.013 (0.011)	0.002 (0.010)
Constant	0.114*** (0.032)	0.166*** (0.035)
Number of observations	3,924	

Note: \*, \*\*, \*\*\* indicate statistically significant levels at 10%, 5% and 1%.

All standard deviations of the estimators are robust at village level.

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

**Table 6. Migration, income and labor diversification strategy**

Variables	SID_labor (including migration) (6)	SID_labor (excluding migration) (7)
	coef/se	coef/se
Lag of migrant HH with remittances (1-Yes, 0-No)	0.081*** (0.011)	-0.019* (0.011)
Lag of migrant HH without remittances (1-Yes, 0-No)	0.058*** (0.009)	-0.004 (0.010)
Age of household head	0.000 (0.001)	-0.001*** (0.000)
Years in school of household head	-0.002 (0.001)	0.001 (0.001)
Total household members	0.034*** (0.009)	0.046*** (0.009)
Squared of total household members	-0.003*** (0.001)	-0.004*** (0.001)
Share of household members younger than 15 years old	0.008 (0.030)	-0.008 (0.026)
Share of household members ≥ 65 years old	-0.249*** (0.031)	-0.134*** (0.026)
Share of irrigated land on total own land	0.051*** (0.013)	0.075*** (0.012)
Household engaged in self-employed activities (1-Yes, 0-No)	0.096*** (0.010)	0.154*** (0.010)
Household engaged in livestock activities (1-Yes, 0-No)	0.025* (0.014)	0.024* (0.013)
HH participated in political or social organizations (1-Yes, 0-No)	0.024* (0.013)	0.044*** (0.013)
Constant	0.181*** (0.042)	0.119*** (0.041)
Number of observations	3,924	

Note: \*, \*\*, \*\*\* indicate statistically significant levels at 10%, 5% and 1%.

All the standard deviations of the estimators are robust at village level.

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

Considering to the control variables, the age of household head is negative and statistically significant in model (7). When the household head becomes older, the household would be more specialized in their production activities in case of missing migrant members.

Similar as in the case of crop diversification, households with more members are more likely to diversify their labor allocation. However, these labor allocations become more specialized, when the number of household members becomes abundant. The share of household members older than 65 years is negative and statistically significant. It is clear that labor diversification depends on the number of labor members in a household.

The condition of the irrigation system is also very important for diversifying labor allocation. Water availability is a very important resource in rural places, not only for crop production, but also supporting production activities such as fishing, husbandry, or transportation.

Finally, a household who engages in self-employment, husbandry or participates in political or social organizations increases the propensity of labor diversification.

#### **4.5 Conclusions**

This paper investigates the interaction of agricultural production, diversification strategies and rural-urban migration in Vietnam. Migration is hypothesized to be a strategy to reduce risks and financial liquidity constraints of rural households; as a result, it may affect the re-allocation of resources in several ways depending on the institutions and the market conditions. To avoid selection bias and endogeneity problems, a fixed effects estimation approach is applied to panel data of a stratified sample of about 2,000 households.

The results suggest that migration is a diversification strategy of rural households. However, the effect of migration on agricultural production and diversification depends on the remittance transfers of migrants to their rural households. If remittance transfers take place, migrant households in rural areas of origin shift from rice production to other crops, and increase their land productivity. It also increases migrant households' specialization

rather than diversification at rural places. In case of missing remittances, migration leads rural households to decrease their labor productivity and crop diversification.

Therefore, the hypothesis of the NELM is only supported in case of available remittances. These help rural households to compensate for the lack of labor and to specialize in more efficient income generating activities.

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## Appendices

### Appendix 1. Summary statistics of dependent variables

Variables		Mean	Std.			Observations
			Dev.	Min	Max	
Share of rice income	overall	0.46	0.41	0.00	1.00	N = 3924
	between		0.38	0.00	1.00	n = 1986
	within		0.14	-0.04	0.96	T-bar = 1.98
Growth of land productivity	overall	0.09	2.58	-13.99	11.60	N = 3924
	between		1.65	-6.99	9.56	n = 1986
	within		2.07	-10.46	10.64	T-bar = 1.98
Growth of labor productivity	overall	0.15	1.34	-8.09	6.40	N = 3924
	between		0.67	-3.42	3.42	n = 1986
	within		1.17	-4.59	4.88	T-bar = 1.98
Crop diversification index	overall	0.25	0.24	0.00	0.81	N = 3924
	between		0.21	0.00	0.75	n = 1986
	within		0.13	-0.16	0.65	T-bar = 1.98
Land diversification index	overall	0.29	0.26	0.00	0.83	N = 3924
	between		0.23	0.00	0.81	n = 1986
	within		0.11	-0.09	0.66	T-bar = 1.98
Labor diversification index	overall	0.37	0.23	0.00	0.80	N = 3924
	between		0.23	0.00	0.80	n = 1986
	within		0.03	0.06	0.69	T-bar = 1.98
Labor diversification index excluding migrants	overall	0.31	0.25	0.00	0.75	N = 3924
	between		0.21	0.00	0.74	n = 1986
	within		0.13	-0.05	0.67	T-bar = 1.98

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

**Appendix 2. Summary statistics of independent variables**

Variables		Mean	Std. Dev.	Min	Max	Observations
Lag of migrant HH (1-Yes, 0-No)	overall	0.38	0.49	0.00	1.00	N = 3924
	between		0.43	0.00	1.00	n = 1986
	within		0.23	-0.12	0.88	T-bar = 1.98
Lag of migrant HH with remittances (1-Yes, 0-No)	overall	0.10	0.37	0.00	1.00	N = 3924
	between		0.29	0.00	1.00	n = 1986
	within		0.23	-0.34	0.66	T-bar = 1.98
Lag of migrant HH without remittances (1-Yes, 0-No)	overall	0.28	0.42	0.00	1.00	N = 3924
	between		0.32	0.00	1.00	n = 1986
	within		0.27	-0.27	0.73	T-bar = 1.98
Age of household head	overall	49.09	13.00	20.00	94.00	N = 3924
	between		12.92	23.00	93.00	n = 1986
	within		1.69	26.09	72.09	T-bar = 1.98
Years in school of household head	overall	6.78	4.06	0.00	20.00	N = 3924
	between		3.99	0.00	19.00	n = 1986
	within		0.81	-2.22	15.78	T-bar = 1.98
Total household members	overall	4.39	1.72	1.00	14.00	N = 3924
	between		1.61	1.00	12.50	n = 1986
	within		0.60	1.39	7.39	T-bar = 1.98
Squared of total household members	overall	22.20	17.39	1.00	196.00	N = 3924
	between		16.24	1.00	156.50	n = 1986
	within		6.19	-35.30	79.70	T-bar = 1.98
Share of children younger than 15 years old	between	0.18	0.19	0.00	0.75	N = 3924
	within		0.19	0.00	0.69	n = 1986
	between		0.05	-0.07	0.43	T-bar = 1.98
Share of old people ≥ 65 years old	overall	0.08	0.19	0.00	1.00	N = 3924
	between		0.18	0.00	1.00	n = 1986
	within		0.03	-0.42	0.58	T-bar = 1.98
Share of irrigated land	overall	0.53	0.44	0.00	1.00	N = 3924

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	between		0.40	0.00	1.00	n = 1986
	within		0.20	0.03	1.03	T-bar = 1.98
Household engaged in self-	overall	0.28	0.45	0.00	1.00	N = 3924
employed activities (1-Yes,	between		0.42	0.00	1.00	n = 1986
0-No)	within		0.18	-0.22	0.78	T-bar = 1.98
Household engaged in	overall	0.86	0.35	0.00	1.00	N = 3924
livestock activities (1-Yes,	between		0.31	0.00	1.00	n = 1986
0-No)	within		0.16	0.36	1.36	T-bar = 1.98
HH participated in political	overall	0.88	0.33	0.00	1.00	N = 3924
or social organizations (1-	between		0.26	0.00	1.00	n = 1986
Yes, 0-No)	within		0.20	0.38	1.38	T-bar = 1.98

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Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008 and 2010.

## **5. Rural-Urban Migrants in Vietnam: Should we Stay in the Cities or Return Home?**

This chapter is a working paper in Institute of Environmental Economics and World Trade.

### **Abstract**

This paper investigates the factors determining the length of migration and return plans of rural migrants within Vietnam. Panel data of about 2,000 households in rural Vietnam covering the period 2007-2010 and a tracking survey of 299 migrants from 2010 are used for the analysis. Empirical evidence from a random-effects Tobit model shows that migrants coming from rural households that faced a higher number of idiosyncratic shocks increase their stays in the cities, while those from original households that experienced transient shocks shorten the length of their stays in the cities. An increased length of migration is also observed among migrants and households with higher human capital. A decreased income gap between destination and original provinces due to the higher economic growth of original places also increases the duration of migration. The results of the analysis on the migration intensity imply that the plans of migrants to return not only increase in case they face shocks in the cities, but also with the improvement of the living conditions at their original places.

Keywords: Migration Intensity, Length of Migration, Random-Effect Tobit Regression, Vietnam

## **5.1 Introduction**

Internal migration in emerging countries such as Vietnam increasingly attracts scientists' and policy-makers' attention. Industrialization and urbanization create employment opportunities motivating labor to move out of the agricultural sector which is characterized by labor surplus problems. The nexus between migration and development has been widely discussed in the literature. Migration may influence the socioeconomic development of both, departure and destination regions.

In the literature, decisions to migrate may not simply reflect the goals or needs of the migrant, but the household decision to maximize household incomes or minimize risks (Dercon, 2002; Stark and Bloom, 1985). Thus, migration is not only a coping strategy in response to shocks, including income and environmental shocks, but also a strategy for livelihood diversification of original households. Our previous research discussed rural-urban migration as well as its welfare effects in Vietnam (Nguyen et al., 2013). It confirmed that migration is a livelihood support strategy for rural households coping with agricultural and economic shocks. It is more likely to occur in educated households being more financially stable. Then, migration helps reducing poverty and improving the welfare of rural households by increasing their per capita income.

Although migration strongly contributes to economic development in destination areas by providing labor with low wage, it is also a source of several development problems. Due to the limitations of infrastructure in urban areas, migration exerts pressure on existing infrastructure and urban services such as housing, education, health care, water, sanitation and transportation with numerous economic, social and health consequences (UNFPA, 2010). The Government, both at the national and provincial levels are concerned that overcrowding and poverty in major cities which tend to worsen because of migration from the countryside. There have also been concerns about migrants contributing to social disorder, including crime, drug or vulnerability to HIV/AIDS (UNFPA, 2010). Therefore, a household registration system is still considered as an important tool to regulate the population movement, although this regulation may limit migrants' access to social protection programs which makes them more vulnerable (Le et al., 2011).

Therefore, studying migration in emerging market economies such as Vietnam must assess the costs and benefits of the multi-faceted migration phenomenon. Lipton (1980) argued that the impact of migration not only depends on the transfer of remittances and the number of migrants involved but also the length of absence. However, most empirical studies only focus on the impact of remittances (Lucas and Stark, 1985). At the same time, most studies on migration in Vietnam focus on determining the decision to migrate and the effect of this decision on the welfare of rural communities (Nguyen et al., 2008; Nguyen et al., 2009). Studies on the extent and length of rural-urban migration are still lacking.

Obviously, the length of migration is seen to be important for the development strategy of both, rural and urban places. The duration of migrants living outside of communities directly affects labor supply for rural production. The temporary migrants return to the villages to reduce the labor shortage at harvesting time, while a longer absence of migrants makes rural communities change their long-term production strategies moving towards less labor-intensive activities. At the same time, the longer the length of migrants' stays, the higher may be the pressure of an overcrowded population on infrastructure, social problems, and environmental pollution in the cities.

Against this background, the migrants in the cities have to decide whether to stay longer in the cities or to return to the countryside. This decision affects not only their rural households, but also determines the socio-economic development strategies of both, rural and urban authorities. Accordingly, the overall objective of this paper is to analyze the decision on the length of rural-urban migration in Vietnam.

The paper is structured as follows: in the next section a brief review of the literature is presented. In section III the data base used for the descriptive and econometric analysis is introduced followed by section IV that describes the methodology including the econometric models. Section V presents the results of the study including the factors that determine whether migrants stay or return. Finally, section VI concludes.

## **5.2 Literature Review**

The migration literature widely focused on determining the decisions of migrants (whether to migrate or not) and the impact of related remittances on development. There

are only a few studies on the length of migration. Djajic and Milbourne (1988), Galor and Stark (1990) and Dustmann (1995) analyzed the importance of migration as part of a lifetime utility maximization plan with given budget (and liquidity) constraints. The decision on whether to migrate or not as well as the optimal point to return is considered as the decision of the individual with the purpose to achieve a lifetime utility maximization. Dustmann (2003) added different macro factors to this basic framework. He used data from the German Socio-Economic Panel and a simple dynamic model to determine the optimal migration duration. He found that the duration of migration decreases when the economic disparity between the sending region and the receiving region increases. An increase in the receiving region wage will increase the marginal value of stay (relative wage effect). At the same time, it decreases the marginal utility of wealth since the migration costs such as the living costs at destination increase. Migrants, on the one hand, would like to remain at their destination as a response to increasing wages; on the other hand, the gain from staying decreases and this has a counteracting effect. Therefore, higher wages in destination areas may have a positive or negative effect on the optimal duration of migration.

Borodak and Tichit (2013) determined the duration of stay of migrants from Moldova and found that the expected wage difference between Moldovan and destination places (mostly in EU) had no effect on the duration of migration. Instead, individual characteristics including age and education level have a positive effect on the length of migration. Family ties (migrant as a household head, or the spouse or having a child at home), however, have a strong negative influence on the duration of stay of a migrant.

Steiner and Velling (1994) analyzed the expected duration of guest workers staying in Germany. They showed that, apart from employment, the expected length of stay is strongly affected by the family context in the host country, e.g. education stage of the children, possessing a property at home or abroad, and the amount of remittances delivered to the country of origin. In addition, social networks increase the length of migration, especially through the support and information that are provided on the economic and labor market conditions in the host country (Constant and Massey, 2003). Carrion-Flore (2006) examined the optimal migration duration of Mexican immigrants in

the United States and found that an expected labor wage increase in the US acts as a “pull” factor being the main reason for increasing the duration of migration. Social networks in destination areas also increase, while family ties with original household decrease, the duration of migration.

Demurger and Xu (2013) examined the effect of left-behind children on the length of internal migration, or the optimal duration migration in China, by determining several factors of individual and family and origin hometown characteristics. They found that on the one hand, both economic (having a job at destination) and non-economic factors (education level and household size) have a positive effect on the duration of migration. On the other hand, leaving behind children has a negative impact on the length of stay and the intention of parent migrants to settle in cities.

In order to measure the extent to which migrants are engaged in the destination area, Kaufmann (2007) developed the concept of migration intensity; this is defined as the degree to which a migrant shifts his or her attachment, association and engagement from his or her place of origin to the place of destination. According to Kaufmann (2007), remittance behavior, choice of migration pattern, and localized investment behavior are likely to be correlated; these behaviors also depend on the location of origin or destination of migrants, consequently affecting the intention of migrants to return or stay. Sending remittances to original households may be evidence that migrants remain attached to the origin and that they plan to return home. Similarly, the selected location (original or destination place) of investment regarding physical, human and social capital would be correlated with the return plan of a migrant (Steiner and Velling, 1994; Kaufmann, 2007).

In summary, in order to address the question whether a migrant should continue to stay in cities or return to the countryside, this paper will follow two specific steps. In the first step, the factors that motivate the decision of temporary migrants to stay longer in the cities are identified. In the second step, the migration intensity is constructed and determined.

### **5.3 Data and Methodology**

#### 5.3.1 Data

The empirical analysis of the study is mainly based on a data set from the project “Vulnerability to poverty: A consequence for development of emerging Southeast Asian countries” (DFG 756) of the German Research Foundation.

This data set includes some 2,000 rural households from Vietnam, who had been surveyed in 2007, 2008 and 2010 in Ha Tinh, Thua Thien Hue and Dak Lak provinces. The dataset is unique as it combines comprehensive household level data, including information on household composition and dynamics, occupation, education, income by source, assets, consumption as well as several types of shock experiences. The household head or a representative also provides information on migrant household members. Migration information includes the duration that a migrant was absent from his or her original household, the migration destination and the remittances transfers between migrants and their households. In this study, only adult members are included in the sample. In total, about 7,000 individual household members of about 10,000 are available for the analysis in each survey wave.

Simultaneously, a migrant tracking survey of about 300 migrants of those rural households was carried out in 2010 in Ho Chi Minh City and two surrounding provinces, namely Dong Nai and Binh Duong. This survey explored the migrants’ history, working and living conditions, their social integration, remittances transfers between migrant members and their families, and their shock experiences in the cities.

Moreover, a village head survey was carried out in the local communities of the rural households to collect general information about the communities, including geographical situation, living and production physical infrastructure, and demographic characteristics of the community.

To identify the effect of macro level indicators on the length of migration, secondary data such as GDP growth and income gap between the main destination and original provinces were also included in the analysis. This data was taken from the Vietnam General Statistics Office (GSO) and the World Bank database.

### 5.3.2 Methodology

In this study, two specific estimation models have been developed to determine the length of migration and the migration intensity.

#### *(i) Determining the length of migration*

In the literature, most studies on the duration of migration were based on the decision of migrants to return home and the proportion hazard model was then used to identify whether migrants changed their situation to be non-migrants or how long a migrant remained a migrant (Demurger and Xu, 2013; Borodak and Tichit, 2013; Carrion-Flore 2006). Migration, especially internal migration, however, is a dynamic activity in which a person could change between a migration and non-migration situation several times. Therefore, the proportion hazard model is not suitable for measuring the length of temporary migration, which is characterized by household members moving away from their families during several months in a year to find a job.

Moreover, the distribution of the length of migration is left as a censored variable, in which the length of those who did not participate in migration were all reported as zero (80-90 percent of the observations). In addition, migration is a self-selected rather than a randomly assigned process, in which the unobservable variable may affect both, the decision of migration and the decision regarding the length of migration. A Tobit regression is developed to deal with the censored dependent variable. Since the study used panel data, a random-effect Tobit model is employed in this study. According to Boman (2011), a Tobit I model with random effect estimations produces less biased results than heckit or double hurdle models, or than using instrumental variables. Our model is described as:

$$y_{it}^* = \beta x_{it} + v_i + \epsilon_{it} \quad (1)$$

Where  $y_{it}^*$  is the latent variable that is observed for values greater than zero and censored otherwise. The observed  $y_{it}$  is defined by the following measurement equation:

$$y_{it} = \begin{cases} y_{it}^* & \text{if } y_{it}^* > 0 \\ 0 & \text{if } y_{it}^* < 0 \end{cases} \quad (2)$$

$y_{it}$  is the length of migration of household members staying outside of their original household each year. The decision on how long a migrant remains at a destination depends on several factors such as employment opportunity, the migrant's characteristics, and the household and community situation. The employment opportunity at destination and original places can lengthen or shorten the duration of migration. In this study, the growth of GDP per capita at national level, the disparity of income between the main destinations and original provinces, and the share of agricultural production value in total GDP are used as indicators of employment opportunity. The economic growth in Vietnam increased significantly, and the heterogeneity of economic growth among the regions motivates population mobility (UNFPA, 2010). However, its effect on the length of migration is still ambiguous (Dustmann, 2003).

Similar to Demurger and Xu (2013), Borodak and Tichit (2013), and Carrion-Flore (2006), independent variables such as individual household members, household characteristics and village characteristics are used to determine the length of migration. The descriptive statistics of these variables are presented in Appendix 1.

*(ii) Determining the migration intensity*

This section includes both subjective and constructed indexes to measure the migration intensity or the return plans of migrants. The subjective index is based on questions from both, the household questionnaire and the migrant questionnaire; it refers to the plan to stay in the destination, or return home or to some other place in the future.

Similar to Kaufmann (2007), the constructed migration intensity index indicates the extent to which a migrant shifts his or her attachment, association and engagement from his or her place of origin to the migration destination. This includes both, economic and social variables related to the behavior of the migrant regarding the length of migration in the destination, remittances transfer behavior and localized physical assets and social capital. In this study, these variables are defined as follows:

*The length of migration:* indicate the average proportion of total time that a migrant spends in the destination in a year. In general, a migrant spends more time at his or her

original place, indicating that he/she intends to return to the village and the migration intensity is lower than for those spending more time in the destination area.

*Remittances transfers*: is defined as the proportion of the income of a migrant remitted to the original household in the village in a year.

*Localized physical assets*: indicate whether a migrant owns a house in the place of destination, and is less likely to return home than those that do not have a house.

*Localized social capital*: is defined as the social integration in the place of destination. It is characterized by the proportion of close friends living in the destination area based on the question asked to migrants to indicate their five best friends. It is hypothesized that a migrant with a higher level of social integration is less likely to return home.

A principal component analysis approach is used to construct the migration intensity index, as follows:

$$Y = a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 \quad (3)$$

where  $Y$  is the constructed migration intensity index,  $a_i$  are the principal component coefficients and  $X_i$  is a set of variables including the length of migration, remittances transfers, localized physical assets and localized social capital.

Finally, the Ordinary Least Squares (OLS) regression is used to determine the factors affecting the migration intensity index.

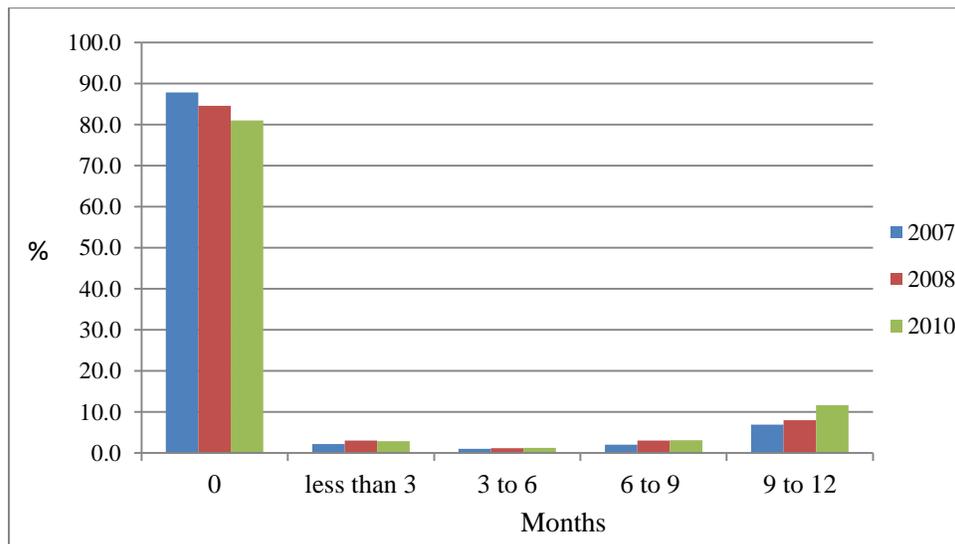
$$Y = f(IND_i, HH_j, Vill_k) \quad (4)$$

where  $IND_i$  are the individual characteristics of migrant  $i$ ,  $HH_j$  is the migrant household characteristics  $j$  and  $Vill_k$  refer to the village characteristics  $k$ . For achieving robust estimated results, a bootstrap technique is used. The descriptive statistics of these variables are presented in Appendix 6.

#### **5.4 Results and Discussion**

This section presents the results of the study with the first sub-section discussing the determinants of the length of migration, and the second one presenting the results on the migration intensity.

*(i) Determining the length of migration*

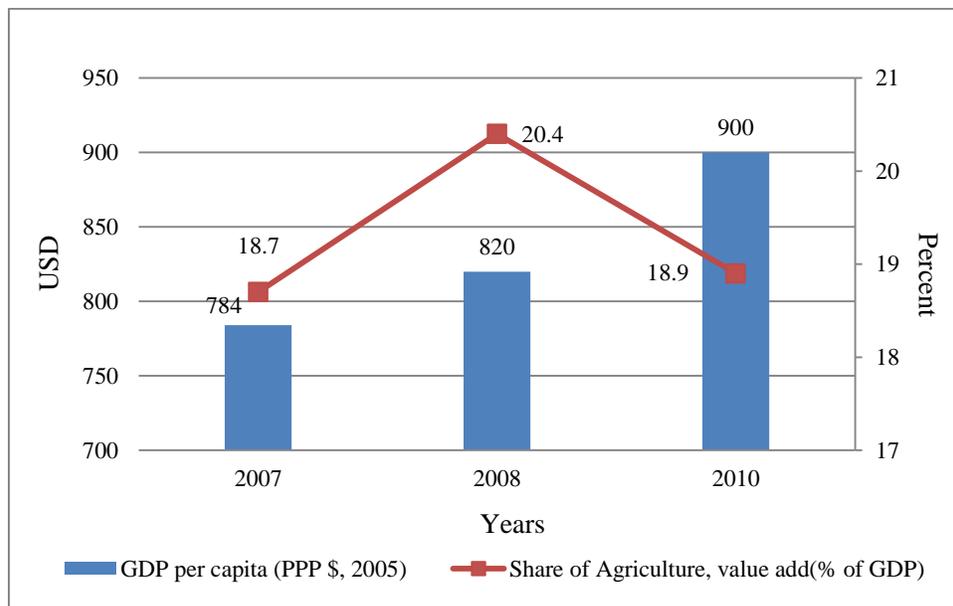


Source: Based on the DFG Rural Household Surveys 2007, 2008 and 2010.

**Figure 1. The length of migration (percent)**

Figure 1 describes the length of migration by month in 2007, 2008 and 2010. As can be seen, the percentage of non-migrants has declined from 88 percent to 81 percent indicating that migration has become an important activity of rural households. The number of migrants increased from 854 migrants in 2007 (12 percent of total sample) to 1,323 migrants in 2010 (19 percent of total sample). In addition, rural-urban migrants prefer moving out for longer periods, more than nine months, rather than for shorter ones; this is indicated by 57 percent, 52 percent and 62 percent of the total migrants in 2007, 2008 and 2010, respectively.

Considering the macro indicators, the growth of GDP per capita and the share of agricultural production value in total GDP were collected from the World Bank dataset. The growth of GDP per capita indicates the economic development and is hypothesized that it ‘pulls’ people out of rural areas into urban ones. According to the World Bank dataset, the GDP per capita in Vietnam has increased from 784 USD in 2007 to 820 USD in 2008 and to 900 USD in 2010. This process is expected to spur further rural-urban migration.



Source: World Bank Data.

<http://data.worldbank.org/indicator/NV.AGR.TOTL.ZS/countries>

**Figure 2. GDP per capita and share of the agricultural sector in total GDP**

The share of agricultural production value in total GDP mainly comes from rural areas, or it represents the share of income from rural areas in total GDP. The increase in income in rural areas indicates that living conditions may be improving; combined with concerns about migration risks in the new places, it could make rural residents become less likely to move out of their village. However, rural residents with higher incomes who live under poor living conditions, such as low quality of transportation, communication infrastructure, and education and health services, may prefer to migrate out to the cities with better living conditions. Therefore, the effect of this variable is ambiguous.

Finally, Table 1 presents the disparity of income between the main destinations (Ho Chi Minh City, Dong Nai and Binh Duong provinces) and the original provinces (Ha Tinh, Thua Thien Hue, and Dak Lak). Since VHLSS was not conducted in 2007, this study depends on data from 2006 for this year. On average, the income disparity is about 2.5 times but has slightly narrowed down over time. This implies that the growth rate of income in the original provinces is higher than the growth rate of income in destination places. Therefore, it has also positive and negative effects on the length of migration.

**Table 1. Disparity of income of main destinations and original provinces**

Original provinces	200	200	2010
	6	8	
Ha Tinh	2.97	3.05	2.86
Thua Thien Hue	2.30	2.26	2.27
Dak Lak	2.34	2.31	2.25
<b>Average</b>	2.54	2.54	2.46

Source: Vietnam General Statistics Office.  
<http://www.gso.gov.vn/default.aspx?tabid=417&idmid=4&ItemID=12428>

The random-effect Tobit regression model of determinants of the length of migration is presented in Table 2. Model 1 represents individual, household, and village characteristics and provincial dummy variables. In models 2, 3 and 4, macro indicators are included separately as explanatory variables.

With respect to individual characteristics in model 1, the variables “Number of years in school” and “Marital status” are positive and statistically significant; this indicates that single migrated household members with higher education are more likely to stay longer in the cities. Moreover, the higher the age of migrants, the longer they stay in the cities. However, the older they are, the less time they spend in the cities, indicated by the negative and statistical significance of variable “Squared of age”.

With regard to household characteristics, the variable “Female household head” is negative and statistically significant. Households with female heads account for about 13 percent of total households, and migrants from these households leave their village for shorter periods than the ones who come from households with a male head. This can be explained by the fact that migrants of these households work outside of their village for not only supporting their household income, but they also return home to the village for supporting their households with activities such as harvesting crops.

**Table 2. Random Effect Tobit regression**

	<b>model1</b>	<b>model2</b>	<b>model3</b>	<b>model4</b>
	<b>coef/se</b>	<b>coef/se</b>	<b>coef/se</b>	<b>coef/se</b>
<b><i>Individual characteristics</i></b>				
Female (1-Yes; 0-No)	0.113 (0.357)	0.089 (0.356)	0.117 (0.357)	0.056 (0.356)
Number of years in school	0.599*** (0.045)	0.588*** (0.045)	0.603*** (0.045)	0.578*** (0.045)
Marital status (1-Single; 0- Others)	6.584*** (0.463)	6.592*** (0.461)	6.487*** (0.464)	6.549*** (0.460)
Age (Years)	1.746*** (0.094)	1.693*** (0.094)	1.752*** (0.094)	1.610*** (0.094)
Square of age	-0.028*** (0.001)	-0.027*** (0.001)	-0.028*** (0.001)	-0.026*** (0.001)
<b><i>Household characteristics</i></b>				
Female head (1-Yes, 0-No)	-0.920* (0.514)	-0.866* (0.513)	-0.934* (0.514)	-0.895* (0.511)
Number of years in school of HH head (Years)	0.113** (0.051)	0.109** (0.050)	0.110** (0.051)	0.094* (0.050)
Age of HH head(Years)	0.277*** (0.018)	0.264*** (0.018)	0.276*** (0.018)	0.243*** (0.018)
Dependency ratio	-8.158*** (0.909)	-8.485*** (0.908)	-8.674*** (0.935)	-9.484*** (0.915)
HH engaged in non-farm activities (1-Yes; 0-No)	0.666* (0.340)	0.538 (0.339)	0.684** (0.340)	0.380 (0.339)
Total own land (ha)	-0.084 (0.082)	-0.079 (0.081)	-0.087 (0.083)	-0.109 (0.084)
Total number of demographic shocks	0.396** (0.198)	0.194 (0.199)	0.513** (0.203)	0.204 (0.197)
Total number of social shocks	1.179** (0.527)	0.675 (0.529)	1.277** (0.529)	0.049 (0.531)
Total number of agricultural shocks	-0.489*** (0.150)	-0.673*** (0.152)	-0.351** (0.160)	-0.709*** (0.150)
Total number of economics shocks	0.346 (0.438)	0.140 (0.437)	0.440 (0.439)	0.172 (0.434)
<b><i>Village characteristics</i></b>				
Number of enterprises	-0.102	-0.092	-0.101	-0.078

	(0.091)	(0.091)	(0.091)	(0.091)
Access to internet (% of households)	0.074***	0.061***	0.079***	0.023
	(0.023)	(0.023)	(0.023)	(0.024)
Log of distance to district town	-0.168	-0.080	-0.175	-0.057
	(0.210)	(0.209)	(0.210)	(0.209)
Ha Tinh province (1-Yes, 0-No)	3.052***	14.439***	3.081***	3.092***
	(0.466)	(1.554)	(0.466)	(0.465)
Thua Thien Hue province (1-Yes, 0-No)	3.511***	3.077***	3.563***	3.576***
	(0.454)	(0.455)	(0.454)	(0.452)
<b>Macro indicators</b>				
Income gap between destination and original provinces		-17.402***		
		(2.266)		
Share of agricultural production in total GDP			0.422**	
			(0.173)	
Growth of GDP per capita				25.645***
				(2.126)
Constant	-59.197***	-17.372***	-67.365***	-227.072***
	(1.983)	(5.694)	(3.924)	(14.219)
/sigma_u	9.099***	9.111***	9.099***	9.129***
	(0.239)	(0.238)	(0.239)	(0.236)
/sigma_e	8.955***	8.877***	8.951***	8.793***
	(0.162)	(0.160)	(0.162)	(0.158)
Number of observations	21,045	21,045	21,045	21,045

Note: \*, \*\*, \*\*\* indicate statistically significant levels at 10%, 5% and 1%.

Source: Own calculations based on the DFG Rural Household Surveys 2007, 2008, 2010.

In addition, more educated household heads support their migrants by motivating them to stay longer in the cities with the expectation of improving knowledge and achieving a better quality of life. The higher the age of household heads, the longer migrants tend to stay in the cities. However, the high dependency ratio significantly reduces the length of migration. This result is consistent with Demurger and Xu (2013), namely the higher the number of elderly and children in the original households, the shorter the length of migration.

Migrants of households who engage in non-farm activities tend to stay longer in the cities. Engaging in non-farm activities makes household members familiar with non-farm jobs, which are popular in the cities. Migrants could then find a better job and improve their living conditions and therefore, prefer to stay in the cities longer. At the same time, the variable “Total own land”, which refer to agricultural production, is negative but statistically insignificant. Agricultural production is considered as a labor-intensive activity, therefore, the more land a household has, the more labor is required which could shorten the length of migration. Unfortunately, this variable is statistically insignificant in this model.

Regarding the types of shocks, demographic shocks refer to illness or death of a household members; social shocks to a household facing problems of theft or conflict with neighbors in the village; agricultural shocks include floods, droughts, crop pests or livestock diseases; whereas economic shocks relate to job loss, collapse of business, strong increase of input prices, or strong decrease of output prices. Households that experienced a higher number of demographic and social shocks make their migrated members stay longer in the cities, while households that experienced a higher number of agricultural shocks reduce the length of absence of their migrated members. It can be said that idiosyncratic shocks of rural households such as illness (demographic shocks) or social unsafety (social shocks) determine if migrants stay longer in the cities. In contrast, transient shocks such as weather damages, or crop and livestock epidemics shorten the length of stay of migrants in the cities.

Considering the village characteristics, the variable “Access to internet” is positive and statistically significant, which indicates that better communication infrastructure in the village could improve the capacity of communication of rural households and their migrants in the cities. This makes migrants willing to increase their length of migration.

Finally, migration is more likely to occur in Ha Tinh and Thua Thien Hue provinces (Nguyen et al., 2013), and the duration of migration of these migrants is more likely longer than the duration of migration of migrants from Dak Lak province. Since Dak Lak province is located in the High Land region where the job opportunities are plenty in coffee and wooden processing sectors, rural residents are less likely to outmigrate to find a job and

migrants also have to return home for taking care their household's business. Ha Tinh and Thua Thien Hue provinces (located in the Central Coast region) are characterized by small-scale agricultural production and scarce non-farm job opportunities, making migrants staying longer in the cities to earn money (UNFPA, 2010).

In model 2, the income gap between destination and original provinces is included as a macro indicator in the model. Consistent with Dustmann (2003), this indicator is negative and statistically significant. It can be said that the wider the income gap between destination and original places, the shorter the length of migration in a year. The widening of income gap between the destination and original places can be explained by the fact that the income growth at the destination place is faster than the growth of income at the original rural place. Since migrants are considered to be a low income group in the cities (UNFPA, 2010), the increase of their income also leads to increasing living cost. Therefore, they are more likely to shorten the length of migration to reduce cost.

In other words, the negative and significance of this variable can also explain that the narrowing income gap between destination and original provinces increases the length of migration. The narrowing of the income gap resulted from the higher income growth in original provinces in comparison to the growth of income in destination places. Therefore, it can be said that migrants would also stay longer in the cities even if the economic growth at original provinces is faster than the economic growth at destination places.

This argument is supported by model 3, where the variable "Share of agricultural production in total GDP" is positive and statistically significant. Agricultural production occurs in rural areas and the increase in agricultural production in total GDP reflects increasing income at the original places, thus increasing the length of migration. Finally, in model 4, as expected, economic growth at the national level is indicated by the growth of GDP per capita and this causes an increase in the length of migration.

#### *(ii) Migration intensity*

In this section, we first discuss the subjective return plan of migrants and their households' expectations of living places for their children in the future. This is followed by the construction of migration intensity and its determinants.

Table 3 presents the subjective return plan of migrants in the cities and households' expectations of living places for their children in the future. On the one hand, both migrants and household representatives do not want to stay in large cities in the future; only about 17% of migrants plan to stay in the cities, and 26% of household representatives consider large cities as a living place for their children. On the other hand, rural households are also less likely to expect their children to live in their home village in the future; they prefer their children to stay in the provincial city. This result indicates how important it is to consider the characteristics of the family since family members want to stay close to each other. Although, living in large cities such as Ho Chi Minh City or its surrounding provinces, rural-urban migrants could have a chance to improve their living conditions, they may also face several unpredictable events, which make them more vulnerable (Le et al., 2011). Therefore, they are more likely to return to their home villages. On the other hand, the instability of rural household livelihoods makes rural villages not an ideal place for their children to stay. Finally, the plan to live in the provincial city becomes a reasonable solution for both, migrants and their households.

**Table 3. Subjective plan of future location of migrants and their households**

		Subjective return home village plan of migrant			Total
		yes	undecided	no	
Household's expectation of living place of children	Village	58	12	17	87
	Provincial city	65	19	9	93
	HCM/Hanoi	32	17	14	63
	Total	155	48	40	243

Source: Own calculations based on the DFG Migrant Survey in 2010.

Table 3 indicates that about 13% (32) of migrants plan to return to their home village, although their households expect them to stay in the large cities. On the other hand, 7% (17) of the migrants plan to stay permanently in the destination areas, while their households expect them to return to the village in the future. Therefore, the inconsistency between household expectation and plan of the migrant to return motivates the

construction of the migration intensity index, which is a composite index of several indicators presented in Table 4.

In Table 4, the first group with the lowest migration intensity index reflects migrants who are more likely to return to their home village, while the fourth group with the highest migration intensity index includes migrants who are less likely to return to their home village, or they intend to stay more permanently in the cities.

The results are also in line with the assumptions related to migration intensity. The lowest migration intensity index refers to migrants who spend shorter times in the cities in a year, send large shares of their income to their rural households, and do not own any property in the city. The highest migration intensity index refers to migrants who stay all their time in the cities (they do not return home within a year), and do not send any remittances and own a house in the cities. The variable of “Social integration in the cities” also illustrates the same trend meaning that the higher the migration intensity, the higher the social integration of migrants in the cities; however it is not too clear since the value of this indicator in the first group is higher than the value in the second group.

**Table 4. Migration intensity index**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>Average</b>
Share of time in the cities	0.928	0.999	0.999	1.000	0.981
Social integration in the cities	0.179	0.058	0.330	0.790	0.269
Share of remittances	0.022	0.001	0.000	0.000	0.006
Own house in the cities	0.000	0.000	0.000	0.153	0.030
Average score	-1.53	0.290	0.505	0.984	
Number of migrants	70	150	25	43	

Source: Own calculations based on the DFG Migrant Survey in 2010.

The comparison of the migration intensity index, the subjective return plan of migrants, and the household expectations of a future living place for their children are presented in Appendices 4 and 5.

In the following part, the result of what determines migration intensity is presented. The independent variables include the characteristics of migrants in the cities, household characteristics and rural village characteristics.

The results show that migrant characteristics such as the number of years in school or experienced with shocks in the cities are statistically significant. The positive sign of the variable “Number of years in school” indicates that migrants with more education are more likely to stay permanently in the cities. The variable “Experienced to shocks in the cities” is negative showing that the more the migrants experience shock in the cities, the less likely they settle in the cities or they are more likely to return to their home village. It can be explained that migrants with higher levels of education can find better jobs with higher salary and better working conditions. This will enable them to achieve better living conditions. They prefer to stay in the cities instead of returning home where less job opportunities and vulnerable living conditions exist. At the same time, migrants experiencing shocks tend to return home, since it is too risky for them to stay longer in the cities, especially in case the government support is not working well.

In contrast to Kaufmann (2007), the variable “Total household members” is positive and statistically significant implying that migrants from households with a higher number of members tend to stay longer in the cities. A high number of household members characterized by small-scale cultivated land motivate the re-allocation of rural citizens; therefore, migrants tend to not return to their home village.

With regard to the village characteristics, the variable “Access to internet” is negative and statistically significant. This can be explained by the fact that access to the internet improves the possibility of communication with the migrants. Access to information and knowledge could also reduce the migration intensity or make migrants more likely to return to their home village. It can be said that improving the living conditions in the villages motivates migrants to return in the future. This argument is slightly supported by the positive sign of the variable “Access to public water” though it is statistically insignificant.

**Table 5. Determinant of migration intensity (OLS regression)**

	Coef	se
<b><i>Migrant characteristics</i></b>		
Female migrant (1-Yes,0-No)	-0.052	0.191
Marital status (1-Single, 0-Others)	-0.120	0.239
Age (Years)	0.161	0.131
Squared of age	-0.002	0.003
Number of years in school (years)	0.053**	0.027
Government support (1-Yes, 0-No)	0.292	0.272
Experienced to shocks in the cities (1-Yes, 0-No)	-0.334*	0.185
<b><i>Household characteristics</i></b>		
Female household head (1-Yes, 0-No)	0.164	0.265
Log of total land own (ha)	-0.048	0.118
Total household members	0.087*	0.049
Household participated on non-farm activities (1-Yes, 0-No)	-0.008	0.172
<b><i>Village characteristics</i></b>		
Access to public water supply (% households in village)	-0.001	0.002
Access to internet (% households in village)	-0.011*	0.007
Number of enterprises	0.188*	0.106
Number of social problems	0.139	0.120
<b>Constants</b>	<b>-3.470*</b>	<b>1.811</b>
<b><i>Number of observations</i></b>	<b>243</b>	
<b><i>Bootstrap with Replications</i></b>	<b>1000</b>	
<b><i>Wald chi2(1)</i></b>	<b>32.25</b>	
<b><i>Prob&gt;chi2</i></b>	<b>0.006</b>	
<b><i>R-squared</i></b>	<b>0.1068</b>	

Note: \*, \*\* indicate statistically significant levels at 10% and 5%.

Source: Own calculations based on the DFG Rural Household Surveys and DFG Migrant Survey in 2010

The variable “Number of enterprises” is positive and statistically significant which indicates that the higher the number of enterprises in the village, the higher the migration intensity or migrants’ intention to stay in the cities. This could be explained by the fact that rural households in the village with higher number of enterprises have a chance to improve

their income, thus, causing migrants not to send any remittances. These migrants can focus on improving their living conditions in the cities. Therefore, improving living conditions is more important than providing job opportunities to attract migrants to return to their home villages.

## **5.5 Conclusions**

In order to address the research gap on the length of migration in Vietnam, this study used a random-effect Tobit regression model to analyze panel data of about 2,000 households in Vietnam from 2007, 2008 and 2010, and to determine the factors affecting the number of months that rural-urban temporary migrants live outside of their village. Moreover, the study tracked about 300 migrants from the household data set with principal component analysis and Ordinary Least Squares regression model to construct and explore the migration intensity measuring the intent of the return plan of migrants.

The empirical evidence from random-effect Tobit regression suggests that single migrants with higher education levels tend to stay longer in the cities. In addition, household characteristics such as education level of household head and household engagement in non-farm activities also increase the length of migration. However, households with female heads and with higher number of elders and/or children do not support the choice of migrants to remain longer in the cities. The length of migration is likely to be longer for households experiencing idiosyncratic shocks as illness or personal reasons, and the shocks of unsafety in the communities. However, transient shocks such as weather damage, or crop and livestock epidemics shorten the length of their stay in the cities. In general, migrants tend to stay longer in the cities if their villages have internet access and if they are from Ha Tinh and Thua Thien Hue provinces where the job opportunities are scarce. Finally, the evidence of macro indicators show that the national economic growth and the narrow income gap between destination and original places indicated by the higher growth rate of income of the original provinces (in comparison to the growth rate of the destination places) increases the time of stay in the cities.

With respect to the migration intensity, the descriptive analysis shows that migrants do want to stay permanently in the cities, while most household representatives prefer

provincial towns to the original village. The result of the constructed index of migration intensity also indicates that most migrants plan to return home in the future. The education level of migrants is an important factor increasing their plan to stay in the cities. The larger the household size, the longer the migrants tend to stay in the cities. Moreover, migrants from villages with higher number of enterprises also plan to stay in the cities longer. On the other hand, the plan of migrants to return to their home village increases with their experience of facing shocks in the cities. Additionally, the plan to return to the home village of migrants also increases with the improvement of the living conditions at the original places.

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## Appendices

### Appendix 1. Summary statistics of independent variables of random-effect Tobit regression model

Variables	Obs	Mean	Std. Dev.	Min	Max
<i>Individual characteristics</i>					
Female (1-Yes; 0-No)	21,045	0.50	0.50	0	1.00
Number of years in school	21,045	7.90	4.06	0	20
Marital status (1-Single; 0-Others)	21,045	0.42	0.49	0	1.00
Age (Years)	21,045	30.20	13.38	11	64
Square of age	21,045	1090	905.4	121	4096
<i>Household characteristics</i>					
Female head (1-Yes, 0-No)	21,045	0.13	0.33	0	1.00
Age of HH head(Years)	21,045	48.55	10.76	20	99
Numbers of years in school of HH head	21,045	6.87	3.99	0	20
Dependency ratio	21,045	0.22	0.20	0	0.8
HH participated in non-farm activities (1-Yes, 0-No)	21,045	0.28	0.45	0	1.00
Total own land (Ha)	21,045	0.95	2.53	0	62.22
Total number of demographic shocks	21,045	0.41	0.67	0	6.00
Total number of social shocks	21,045	0.06	0.24	0	2.00
Total number of agricultural shocks	21,045	0.74	0.91	0	6.00
Total number of economics shocks	21,045	0.06	0.31	0	3.00
<i>Village characteristics</i>					
Number of enterprises	21,045	0.18	1.77	0	30
Access to Internet (% of households)	21,045	0.98	5.01	0	100
Log of distance to district town	21,045	2.31	0.82	-1.61	4.32
Ha Tinh province (1-Yes, 0-No)	21,045	0.31	0.46	0	1.00
Thua Thien Hue province (1-Yes, 0-No)	21,045	0.33	0.47	0	1.00
Dak Lak province (1-Yes, 0-No)	21,045	0.37	0.48	0	1.00

Source: Own calculations based on the pooled data of DFG Rural Household Surveys 2007, 2008, 2010.

**Appendix 2. The income per capita of selected destination and original provinces  
(thousand VND per month )**

	<b>2006</b>	<b>2008</b>	<b>2010</b>
Ho Chi Minh City	1,480	2,192	3,653
Dong Nai	867	1,318	1,763
Binh Duong	1,215	1,929	2,698
Ha Tinh	400	595	840
Thua Thien Hue	517	804	1,058
Dak Lak	507	785	1,068

Source: Vietnamese General Statistic Office.

<http://www.gso.gov.vn/default.aspx?tabid=417&idmid=4&ItemID=12428>

**Appendix 3. The correlation of variables using for Principal Component Analysis**

	<b>Share of time in the cities in year</b>	<b>Social integration in the cities</b>	<b>Share of remittances in total income</b>	<b>Own house in the cities</b>
Share of time in the cities in year	1			
Social integration in the cities	0.0931	1		
Share of remittances in total income	-0.3958	-0.063	1	
Own house in the cities	0.0439	-0.0694	-0.0451	1

Source: Own calculations based on the DFG Rural Household Surveys and DFG Migrant Survey in 2010

**Appendix 4. The interaction of migration intensity and the return plan of migrants**

		Subjective return plan			Total
		Yes	Undecided	No	
Migration intensity index	1	52	10	8	70
	2	72	19	14	105
	3	15	6	4	25
	4	16	13	14	43
Total		155	48	40	243

Source: Own calculations based on the DFG Rural Household Surveys and DFG Migrant Survey in 2010

**Appendix 5. The interaction of migration intensity and the expectation of household about the future plan of their children**

		Expected living place of children			Total
		Village	Provincial		
			city	HCM/Hanoi	
Migration intensity index	1	28	26	16	70
	2	42	42	21	105
	3	8	12	5	25
	4	9	13	21	43
Total		87	93	63	243

Source: Own calculations based on the DFG Rural Household Surveys and DFG Migrant Survey in 2010

**Appendix 6. Summary statistics of independent variables of OLS regression**

<b>Variables</b>	<b>Obs</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Migration intensity	243	-0.09	1.27	-8.92	1.98
<b><i>Migrant characteristics</i></b>					
Female migrant (1-Yes,0-No)	243	0.53	0.50	0.00	1.00
Marital status, 1-Single, 0-Others)	243	0.78	0.41	0.00	1.00
Age (Years)	243	24.40	5.33	15.00	47.00
Squared of age	243	623.58	291.46	196	2209
Number of years in school (Years)	243	10.62	3.75	2.00	19.00
Government support (1-Yes, 0-No)	243	0.05	0.23	0.00	1.00
Experienced to shocks in the cities (1-Yes, 0-No)	243	0.42	0.49	0.00	1.00
<b><i>Household characteristics</i></b>					
Female household head (1-Yes, 0-No)	243	0.16	0.36	0.00	1.00
Total land own (ha)	243	0.74	1.14	0.00	12.05
Total household members	243	6.43	1.65	2.00	11.00
Household participated on non-farm activities (1-Yes, 0-No)	243	0.63	0.48	0.00	1.00
<b><i>Village characteristics</i></b>					
Access to public water supply (% households in village)	243	32.97	40.93	0.00	100
Access to internet (% households in village)	243	3.50	10.93	0.00	100
Number of enterprises in the village	243	0.13	0.54	0.00	5.00
Number of social problems in the village	243	0.42	0.68	0.00	3.00

Source: Own calculations based on the DFG Rural Household Surveys and DFG Migrant Survey in 2010