DRIVERS OF INCOME GROWTH AND POVERTY REDUCTION IN RURAL PHILIPPINES, 1990-2012

A Dissertation

Submitted to the Faculty of the National Graduate Institute for Policy Studies (GRIPS)

in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY IN DEVELOPMENT ECONOMICS

by

Quimba, Francis Mark Antonio

September, 2016

ABSTRACT

DRIVERS OF INCOME GROWTH AND POVERTY REDUCTION IN RURAL PHILIPPINES, 1990-2012

by

Quimba, Francis Mark Antonio

Dissertation Chair:

Professor Jonna P. Estudillo

September, 2016

Poverty reduction is a key goal of development. This dissertation explores, in three main chapters, the underlying forces that shape the strategies of rural households in moving out of poverty. These forces are population pressure, urbanization, human capital and infrastructure, which are initially feared as causes of impoverishment and inequality. On the contrary, this study shows that these forces of modernization have served as the main drivers of income growth and poverty reduction in rural Philippines.

The first chapter explores the role of population pressure, urbanization, human capital growth and infrastructure development in increasing household income and reducing poverty. This chapter has shown that nonfarm activities have become an important source of household income growth as the importance of agricultural income declines overtime. High-value revolution in horticulture, livestock and other high-value products has become important as a livelihood portfolio of households in remote areas. Higher education has a positive impact on income particularly from wage work and even in the production of high value products.

The second chapter explores the relationship between remittances, and health and schooling investments. Households receiving more remittances tend to allocate a higher share of household budget to these two. Using individual-level panel data of school-age children, this chapter shows that domestic remittances significantly increase the likelihood of keeping a child in secondary school, and all income sources are important in keeping a child in tertiary school.

The third chapter presents a socio-economic history of a village in Central Luzon. Using a panel data set spanning four decades, this chapter explores the dynamic impacts of four modernizing factors (population pressure, urbanization, infrastructure, and human capital)

on land and labor markets and livelihood opportunities in the village. This chapter has shown that the four forces have changed the livelihood profile in the village that eventually assisted the households to move out of poverty.

This dissertation has four important policy implications for rural poverty reduction in the Philippines: (1) inasmuch as nonfarm wage income has become the main source of income growth, rural development policies should focus, not only in agricultural modernization, but also in improving the industrial base of the country; (2) as migration is an important pathway for income growth and poverty reduction, there should be focus on improving the human capital stock of the country; (3) as the rural poor remains in agriculture, agriculture development policies should promote infrastructure investments; and, finally, (4) in order to improve schooling participation of children, primary and secondary schools should be made easily accessible to households.

Dedication

To the loves of my life: Rose, Patrick and Lester

Acknowledgements

This paper would not have been completed without the unwavering support of my supervisor, Professor Jonna P. Estudillo, who has spent hours going through versions of my paper. I am also grateful to Professor Yonosuke Hara, Professor Roberto Leon-Gonzalez, Professor Kei Kajisa and Professor Alistair Munro for their comments and suggestions in further improving my papers.

I would also like to thank my institute, the Philippine Institute for Development Studies for allowing me to use the FIES and LFS datasets. I would also like to thank the GRIPS Emerging State Project (JSPS KAKENHI Grant Number 25101002) for generously funding the data gathering pursued in the Central Luzon Village. The enumerators in the CLV (Cristy, Jhona, Bernie, Jason and Ailyn) and the encoders (Chrissie, Jocie and Ia) also deserve special mention for their positivity despite the hard work.

I owe special thanks to my family and friends, especially my Mom, Lester, Kuya PJ and Ate Madel from whom I have asked countless prayers. I would also like to thank Kris, Jenny, Jeff, Anna, Danica, and all the other pinoys who have been a part of this journey. I owe Lester special thanks for keeping me company all these years. I acknowledge the friendship that my classmates especially, Long, Yang, Rhoda, and Yoko Sakai, have shared with me.

Finally, all glory, honor and thanksgiving be to Almighty God, from whom all knowledge, wisdom and graces flow. I am also grateful for the intercession of the Blessed Mother of Lourdes, France to whom I have written countless times. I close my acknowledgements with the Latin phrase, *Ut in omnibus, Glorificetur Deus"* (That in all things, God may be glorified).

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION 1
1.1 Background 1
1.2 Research objective 9
1.3 Contribution 10
1.4 A road map to this dissertation 11
CHAPTER 2 PATHWAYS OUT OF POVERTY OF RURAL HOUSEHOLDS IN THE PHILIPPINES 14
2.1 Introduction 14
2.2 Pathways out of poverty in literature and testable hypotheses 15
A. Agricultural Entrepreneurship or Farming 16
B. Off-farm and nonfarm work 23
C. Migration 26
D. Testable hypotheses 28
2.3 Philippine Policies related to sources of growth and poverty reduction 33
A. Urbanization in the Philippines 33
B. Infrastructure development 34
C. Human Capital Policies 39
D. Structural transformation and poverty reduction 42
2.4 Data description 47
A. Sources of data 47
B. Classification of provinces 54
2.5 Sources of household income growth 57
A. Drivers of change 57
B. Sources of Income Growth 59
C. Potential of high-value products 63
D. The model 64
2.6 Regression results 66
A. Population pressure 68
B. Urbanization 69
C. Human Capital 71
D. Infrastructure 73

E. Role of Distance 76
2.7 Conclusions and policy implications 77
CHAPTER 3 REMITTANCES AND CHILDREN'S SCHOOLING IN RURAL PHILIPPINES 81
3.1 Introduction 81
3.2 Determinants of Child Schooling and Testable Hypotheses 82
A. Child characteristics 82
B. Household Characteristics 85
C. Village Characteristics 90
D. Testable Hypotheses 90
3.3 Migration and Remittances in the Philippines 91
A. History of International Migration 91
B. Who migrates? Where do workers go? What jobs? 93
C. Internal Migration 94
D. Uses of Remittances 96
3.4 Datasets and Description of Households and Children 96
A. Merging of Data 96
B. Description of Households and Children 98
3.5 Determinants of Investments in Child Schooling and Progress of Children in School 101
A. Expenditure analysis 101
B. Controlling for Endogeneity of Per Capita Expenditure 102
C. Progress in Schooling of Children 107
3.6 Summary and Conclusion 116
CHAPTER 4 SOCIO-ECONOMIC HISTORY OF A VILLAGE IN CENTRAL LUZON, 1977-2013 120
4.1 Introduction 120
4.2 History of the village 121
A. Early settlement 122
B. History of infrastructure 124
C. Implementation of land reform 128
D. History of land tenure 130

E. Evolution of land transactions 132
F. The rise of *porcientuhan* workers 133
4.3 Modernizing forces 136
A. Population pressure 138
B. Urbanization 139
C. Human capital 141
D. Infrastructure 143
4.4 Changes in household welfare 145
A. Changes in Household income structure 145
B. Pathways out of poverty 147
C. Land and Income Inequality in the CLV 152
4.5 Summary and conclusions 155
CHAPTER 5 CONCLUSION 158
5.1 Research objective and main findings 158
5.2 Policy recommendations 161
5.3 Prospects for future research 161
Appendix 163
Appendix 1. Sources of income, by island group and by distance, 1991 and 2012 163
Appendix 2. Serial correlation tests for dependent variables in the provincial regression 165
Appendix 3. Seemingly unrelated regression results 166
Appendix 4. Panel estimation with fixed effects 169
Appendix 5. Hausman tests of Independence of Irrelevant Alternatives (IIA) assumption 172
Appendix 6. Results of bivariate probit expressed as marginal effects 173
Appendix 7. Results of mulrinomial probit expressed as marginal effects 177
Appendix 8. Distribution of households in the CLV by districts 181
Appendix 9. Distribution of population of CLV, 1977-2013 182
Appendix 10: Transition of Poverty 1992, 2004, 2013 183
References 184
Tables 195
Figures: 241

List of Tables

Table 1.1 Proportion of people living on less than $1.25 a day, 1990-2015 195
Table 1.2 Proportion of poor people in the Philippines, by Region, 1990-2012 196
Table 2.1. Macroeconomic indicators in the Philippines, 1980-2012 197
Table 2.2. Poverty and inequality indicators in the Philippines, 1991-2012 198
Table 2.3. Number of provinces, by proximity to major cities and by island group, in the Philippines, 1990 199
Table 2.4. Provincial indicators of population pressure, urbanization, and infrastructure in the Philippines, 1991 and 2012 200
Table 2.5. Sources of household income in the Philippines, 1991 and 2012. 202
Table 2.6 Area harvested and revenue from traditional crops and high-value products in agriculture in the Philippines, 1990 and 2012 204
Table 2.7. Growth rates of value of agricultural commodities in the Philippines, 1961-2012 205
Table 2.8. Determinants of income (provincial level) in rural Philippines, 1991-2012 ... 206
Table 2.9. Determinants of income (household level) in rural Philippines, 1991-2012 ... 208
Table 2.10. Determinants of income (household level) in the Luzon island, 1991-2012 210
Table 2.11. Determinants of income (household level) in the Visayas, 1991-2012 212
Table 2.12. Determinants of income (household level) in the Mindanao I, 1991-2012 ... 214
Table 2.13. Determinants of income (household level) in the Mindanao II, 1991-2012 . 216
Table 2.14. Determinants of agricultural revenue (provincial level) in rural Philippines, 1991-2012 218
Table 3.1. Number of sample households and number of school-age children in rural Philippines, 2006 and 2009 219
Table 3.2. Characteristics of rural households in the Philippines with school-age members, 2006 and 2009 220
Table 3.3 Progress in school of children aged 6–21 years old in rural Philippines, 2006 221
Table 3.4. First-stage regression results of the log of per capita expenditure 224
Table 3.5. Second stage regression results 225
Table 3.6. Results of multinomial logit expressed as relative risk ratios 228
Table 4.1. Number of Migrant Households in the Central Luzon Village, 1992-2013 232

Table 4.2. Adoption of modern rice technology profile in the Central Luzon Village, by season, 1977-2013 232

Table 4.3. Land tenure in the Central Luzon Village, 1992 to 2013 233

Table 4.4. Evolution of land sales in the Central Luzon Village, 2004 and 2013 233

Table 4.5. Socioeconomic characteristics of *porcientuhan* households in the Central Luzon Village, 2004 and 2013 234

Table 4.6. Distribution of sample households by general occupation in the Central Luzon Village, 1977-2013 235

Table 4.7. Demographic characteristics and Indicators of population pressure of the Central Luzon Village, 1977-2013 235

Table 4.8. Distribution of households by distance to urban area, 2004 and 2013 236

Table 4.9. Number and per cent of respondents and family members by educational attainment in Central Luzon Village, 1977-2013 236

Table 4.10. Infrastructure indicators for the CLV, 1992-2013 237

Table 4.11. Distribution of income (PPP in 2005) of Central Luzon Village households, by source, 1977-2013 238

Table 4.12. Poverty indicators and its decomposition 1992-2013 239

Table 4.13. Distribution of household types by categories of poverty transition 240

Table 4.14. Gini coefficients for Land holdings and total income of households in the CLV, 1992-2013 240

Table 4.15. Decomposition of total income by income source 240

List of Figures

Figure 1.1 Modernizing Forces and Pathways out of Poverty 241
Figure 2.1 Wages and hours of work in the Philippines, 2001-2011 242
Figure 3.1 Filipino overseas migrants and remittances, 1975-2011..... 243
Figure 4.1. Location of the CLV 244
Figure 4.2. Population growth of Cities near the CLV..... 244
Figure 4.3. Poverty transition in the Central Luzon Village for adjacent survey years ... 245
Figure 4.4. Income and Land distribution in the Central Luzon Village, 1992-2013 246

CHAPTER 1 INTRODUCTION

1.1 Background

Poverty in the Millennium Development Goals

The United Nations Millennium Development Goals (MDGs) was keenly monitored by the international community from 2000 to its deadline in 2015**.** The poverty reduction target—cutting the proportion of people living in extreme poverty to half the 1990 level—has been achieved 5 years ahead of 2015. This was despite setbacks brought about by the global financial crisis, as well as the food and energy crises in 2008-09 (United Nations, 2013). The major contributor to this global decline in poverty is the decline in extreme poverty from 61 per cent in 1990 to just 4 per cent in 2015 in East Asia (China only) (Table 1.1), which has experienced robust economic growth in the past few decades (United Nations, 2012). Data for 2011 show that about one billion people (14.5 per cent of the world's population) remained in extreme poverty—i.e., those living on less than $1.25 per day (World Bank, 2014).

<Table 1.1 about here>

After 2015, the term Millennium Development Goals (MDGs) was replaced by Sustainable Development Goals (SDGs). The SDGs are twofold (World Bank, 2014): first, to eliminate extreme poverty by reducing the share of people living on less than $1.25 a day to less than 3 per cent of the world's population by 2030; second, to promote shared prosperity by improving the living standards of the bottom 40 per cent of the population. While economic growth is the major driver of poverty reduction during the MDG years between 1990 and 2015 (United Nations, 2012), policies may

have a greater role to play in the post-2015 era. Poverty reduction in this period should be both sustainable and inclusive of the poor in the population. "Sustainability" refers to growth transcending across generations. "Inclusiveness" means the poor has the ability to participate in and benefit from economic growth.

Poverty around the World

IFAD (2010) reports that about 70 per cent of the poor live and work in rural areas. The poor are described as follows: those who live in remote areas, cultivate dry and marginal land, cannot read or write, have bigger families and high mortality, suffer from hunger and disease, members of female-headed households, women and children, and with few opportunities off-farm (IFAD, 2000). Table 1.1 shows that Sub-Saharan Africa and Southern Asia have the highest level of poverty in the world. While poverty is more prevalent in Sub-Saharan Africa, a large majority of the poor people live in South Asia. India alone has about 30 per cent of the world's poor; Bangladesh has 6 per cent (World Bank, 2014).

Moving out of poverty means "having a good job" (Fields, 2012; World Bank, 2013) in as much as labor is typically the most abundant asset of the poor. Good jobs are those that are steady and secure, pay well, offer benefits, meet labor standards, and offer social protection (Fields, 2012). Jobs move people out of poverty and could be an effective driver of development because jobs increase living standards, raise labor productivity, and strengthen social cohesion (World Bank, 2013).

Poverty in the Philippines

In the Philippines, most of poor live in the Mindanao island group. Table 1.2 shows that the distribution of the poor is highly skewed, with a number of the poor found in provinces in Mindanao. Regions in Mindanao (Zamboanga Peninsula, Northern Mindanao, Davao Region, Caraga and ARMM) have relatively high proportions of poor people, often brought about by unfavourable socio-economic environment in the area, limited infrastructure, vulnerability to disasters, and frequent incidents of conflict.

<Table 1.2 about here>

In 2012, 9 out of the 15 poorest provinces belong to Mindanao while Luzon and Visayas only have 3 provinces each. The poorest provinces in Luzon (Ifugao, Apayao and Masbate) are characterized as far flung rural areas. Ifugao and Apayao are mountainous areas in Northern Luzon, and have limited access to physical infrastructure. Meanwhile, Masbate is an island province isolated from the main island of Luzon.

The poor provinces in Visayas (Eastern Samar, Negros Oriental and Northern Samar) are characterized by frequent typhoons. Areas that are prone to disaster also report relatively high poverty rates. This is evident in the poverty ratios of Bicol Region (32 per cent in 2012) and Eastern Visayas (37 per cent in 2012).

Regardless of location, the poor households in the Philippines are described as having difficulty in accessing basic infrastructure (e.g. electricity, safe drinking water and toilet), living in vulnerable areas, and lacking home ownership. Poor households also face limited access to health services and lack opportunity in improving schooling beyond primary level (ADB 2009).

The Philippines is highly likely to obtain the MDG target on poverty in 2015. Table 1.2 indicates that the poverty incidence is 30 per cent in 1991 and 17 per cent in 2012 (which is very close to the target of 15 per cent).

Drivers of income growth and poverty reduction

There are four modernizing forces that, at the same time, could serve as drivers of income growth and poverty reduction. These are (1) population pressure, (2) urbanization, (3) human capital, and (4) infrastructure.

Population pressure means high growth rates of labor force on a closed land frontier. The main thesis of the Boserupian process of agriculture intensification posits that population pressure induces intensification of agriculture.. The fixed supply of land induces farmers to increase their use of labor per unit of land. Brush and Turner (1987) extends the Boserupian theory of agricultural intensification by incorporating intensive input subsidies and market demand. For Brush and Turner, the increasing pressure in agricultural land may lead to not only increasing investment and use of labor inputs but also intensive use of production inputs (requiring the need for input subsidies). The authors further observed that the interaction of social and market demands for land has complicated the analysis of agricultural intensification. Studies have shown rapid population growth has induced agricultural intensification in a variety of ways. For the Philippine Village of San Jose, population growth has induced households to explore high-value crop production, particularly vegetables like spinach, beans, cabbage, shallots and eggplant (Eder 1999). Eder attributes this behavior to the availability of input subsidies and technology. A time series analysis of the experience of Bangladesh showed that agricultural intensification during the mid-1900s occurred in stages. What

is notable is that intensification led significant increases in land productivity because of access to irrigation.

Agricultural intensification due to population pressure has also been observed to have negative consequences. Turner et al. (1993) observed that increasing agricultural output to met increasing demand at the cost of increasing returns to input can lead to a reduction in social and economic welfare of households. In Nigeria, Iheke and Arikaibe (2012) found that rural farm households that have not practiced agricultural intensification are poorer. This is particularly visible for households who have experienced a decline in size of farmland.

The decrease in the size of farmland could increase poverty because farmland is an important source of household income (Hayami and Kikuchi, 2000). Indeed, landless households and smallholder farmers are documented to be the poorest in rural Asian communities (Otsuka, Estudillo, and Sawada, 2009). As total labor force increases, and land becomes more scarce relative to labor force, households would rely less on agriculture as sources of income. Households with limited land sizes may also choose to diversify income activities away from own-farm work and into off-farm and nonfarm activities (Haggblade, Hazell and Reardon, 2007; Winters et al. 2009). Conversely, investments in agriculture technology (irrigation, modern rice varieties and farm machinery) would improve productivity of land relative to labor. This results to labor being driven away from nonfarm activities towards agricultural activities.

Urbanization describes the transformation that occurs in rural areas shifting economic activity away from agriculture to industry and services. Urbanization induces migration and stimulates a more diversified consumer diet, triggering the onset of the so-called high-value revolution in agriculture, which could bring in a new wave of

employment and productivity growth. De Janvry et al. (2005) found that in China, proximity to a town is a determinant of obtaining nonfarm employment of rural households. Gibson and Olivia (2009) showed that the case is similar for Indonesia, i.e., communities nearer the provincial capital are associated with higher shares of income from nonfarm enterprises. While urbanization leads to the expansion of the rural nonfarm economy and increased business activity, it is often feared to bring about risks of rising inequality because poor households are engaged in low-productivity rural nonfarm activities (Haggblade, Hazel and Reardon, 2007).

Human capital is important to increase returns to labor since labor is commonly the most abundant asset of the poor. Schooling is particularly important in increasing income from nonfarm work where skill requirements are higher. Many studies show the importance of household member's level of education as a determinant of participation in nonfarm activities (Zezza et al., 2008; Otsuka, Estudillo and Sawada, 2009; Reardon, 1997, Barrett et al., 2001; and Lanjouw and Lanjouw, 1995, 2001). Higher level of education also provides households the opportunity to maximize benefits from irrigation (Van de Walle 2000), roads (Balisacan 2003) and agriculture technology (Rahman 2008).

Improved infrastructure has a direct impact on household income growth by increasing income from wage work and self-employment activities, and by releasing women's time from housework, enabling them to spend more time on paid work. Roads, irrigation, and electricity are the main areas of intervention that could, through various channels, reduce poverty in rural areas. Rahman (2008) has shown that, in Bangladesh, irrigation access effectively determines whether the farmer will adopt modern rice varieties or not. Relatedly, the presence of irrigation and developed infrastructure in

tandem increases the farmer's probability of adopting a more diversified cropping system. This is especially true in vegetable production that requires good access to markets, which, in turn, requires a good road network. Krishna et al. (2004) emphasized the need for rural infrastructure in Kenya to improve crop yield and agricultural productivity, particularly for household members who are unable to migrate, and thus, rely heavily on agriculture for their livelihood.

Pathways out of poverty

There are three complementary pathways out of poverty: (1) agricultural entrepreneurship, (2) off-farm and nonfarm work, and (3) migration. Employment in agriculture comes in the form of self-employment or off-farm wage work. In earlier years of the green revolution in Asia, wage income in agriculture comprises a larger share of the landless households' income (David and Otsuka, 1994), whereas in most recent years, nonfarm income has become more important (Estudillo et al., 2008). The Asian green revolution initially stimulated the demand for labor, while later adoption of direct seeding, tractors, and threshers led to a subsequent decline in labor employment opportunities in rice farming (Jayasuriya and Shand, 1985).

The "high-value revolution" (coined by the World Bank [2008], p. 208) in horticulture, livestock, and other high-value products offers another potential for employment growth in agriculture (World Bank, 2008). Vegetable production can require up to five times more labor input than cereal production (Weimberger and Lumpkin, 2005). In northern Vietnam, wives of rice farmers remain on the farms, producing fruits and vegetables, growing flowers, and raising livestock while their husbands migrate to other villages to engage in nonfarm work (Estudillo and Otsuka,

2016). There has been increasing participation of women as wage workers in export-oriented agribusiness firms in labor-intensive processes such as packing and processing of fresh products, including vegetables, fruits, and flowers (Lastarria-Cornhiel, 2006). To date, the role of high-value revolution in poverty reduction (which is one of the main focuses of this study) has been left largely unexplored.

As farmland becomes scarce and households increasingly derive their income from nonfarm sources, the expansion of the rural nonfarm sector could be a way to reduce poverty (Lanjouw, 2007; Lanjouw and Lanjouw, 2001). The nonfarm sector involves a large and diverse set of activities in manufacturing, commerce, finance, construction, and community and personal services (Haggblade, Hazell, and Reardon, 2007). These possibly create employment opportunities to a wide spectrum of people, including the poor. In the Philippines, Ramos et al. (2012) reported that the less educated members of the labor force are employed in the informal part of the trade, transport, and communication sector. This means nonfarm income has become the most important source of household income growth in some countries in Asia and Africa (Otsuka, Estudillo, and Sawada, 2009).

Migration is an important decision for the poor who are living in remote and vulnerable areas where employment opportunities are limited and returns to labor are low. Rural-to-urban migration decision is dictated by urban-rural real wage differential and the probability of obtaining a job in the urban area (Todaro, 1969). With globalization, international migration is becoming more common, and most of the international migrants are skilled workers (World Bank, 2008). Jobs are also migrating across international borders and across space within a country through delocalization

and outsourcing of production activities. These bring in jobs to households living far from major urban areas.

1.2 Research objective

The literature remains elusive on the underlying factors that shape household decisions on their choice of a strategy, or combination of strategies, in fighting poverty. Households dynamically allocate their endowments to various activities where returns to endowments are rising (Baulch, 2011). The main objective is to investigate the impacts of the four modernizing forces – namely population pressure, urbanization, human capital, and infrastructure – on income growth and poverty reduction of rural Filipino households.

Population pressure tends to increase poverty while the other three tend to decrease poverty. Figure 1.1 illustrates the general framework of this dissertation by relating household choice of pathways and how the four modernizing factors have induced such choice.

<Figure 1.1 about here>

Figure 1.1 illustrates how poverty reduction can be achieved through a combination of pathways. Figure 1.1 shows that population pressure, urbanization and infrastructure development were classified as exogenous factors while human capital is identified as an endogenous factor which can affect and be affected by off-warm work and the migration of household members (note the two-way arrows in Figure 1.1). These underlying modernizing factors may accelerate or impede the reduction of poverty. Each chapter of this dissertation will focus on how the modernizing factors

effectively enable the households to choose strategies for income growth and poverty reduction.

1.3 Contribution

For poverty reduction, it is necessary to give special attention to the severely disadvantaged groups which are bypassed by economic growth. Some of these poor people live in marginalized communities far from the markets. How can we help the poor in remote areas move out of poverty? This study compares the dynamic processes of income growth and poverty reduction between areas that are near major cities, as well as those far away. This author has found the importance of high-value revolution in agriculture in crops, livestock, and fishing as a pathway out of poverty for the poor in remote areas. The high-value revolution has not been highlighted by many authors in poverty studies, including the World Bank (2008), mainly because of lack of data and lack of focus on remote areas. This study, thus, provides an additional insight on yet another unexplored and promising pathway out of poverty.

Using nationally representative data on households, Chapter 3 contributes to the body of existing literature on education policy by providing a national perspective on the impact of remittances on schooling investment of rural households. Yang (2008) has looked at a national picture without distinguishing between rural and urban households, while Estudillo, Sawada and Otsuka (2009) focused on the specific case of rural households in four villages which may have limited external validity. The major finding is remittances are used to finance schooling which shows the complement between migration and schooling investment as pathways out of poverty.

Hayami and Kikuchi (2000) is the only comprehensive review of the impacts of modernizing forces on the socio-economic fabric of rural Filipino community using historical data from a village in Southern Laguna, spanning a quarter of a century. This author followed the Hayami-Kikuchi approach through the lens of irrigation development that affected the land and labor market and sources of livelihood of a village in Central Luzon using data for four decades. This work will be valuable to readers interested in village studies in Southeast Asia and importantly to policy makers in the Philippine government who are interested on the impact of irrigation.

1.4 A road map to this dissertation

This dissertation has three main chapters: Chapter 2 aims to give insights on the relative importance of the development of the nonfarm sector and the high-value revolution on income growth and poverty reduction across different localities. Chapter 3 explores the relationship between remittances and human capital investment. By tracing the evolution of a Central Luzon Village, Chapter 4 analyzes the dynamic impacts of four modernizing factors on agricultural activities of rural households, land and labor markets, livelihood opportunities and poverty in the village.

By pooling data from labor force surveys and income and expenditure surveys, we found in Chapter 2 that (1) nonfarm activity serves as a major driver of household income growth and poverty reduction; (2) nonfarm activities proliferate more in areas near major cities; (3) the development of the nonfarm sector is the most important propelling force of income growth and poverty reduction; (4) income is higher and poverty is lower in areas nearby major cities; (5) higher education has a positive impact

on increasing income from high value products; and (6) the importance of agriculture income declines overtime.

In Chapter 3 it is discussed how migration can be a pathway for rural households to move out of poverty by investing in child schooling. The Philippines was chosen because of the large proportion of the population who are migrants (about 10 per cent of its population are overseas migrants) and remittances have become an importance source of income, particularly in more recent years. The Philippines stands as one of the major labor exporting countries, and a major recipient of international remittances next to big countries such China and India. Chapter 3 has the following findings: (1) a child from a household that receives remittances is more likely to be in school and is more likely to progress in school; (2) a household with higher income is more likely to continue in school beyond primary level; (3) households receiving remittances tend to allocate a higher share of household expenditure on children's health and schooling.

Chapter 4 presents the dynamic evolution of a Central Luzon Village from the lens of four modernizing factors—population pressure, urbanization, and infrastructure development and human capital. Chapter 4 explores how the four modernizing forces have affected the evolution of land and labor markets, and the livelihood opportunities in the village. It also shows to what extent these four have induced income growth and poverty reduction. The Central Luzon Village was selected because of the dramatic socio-economic changes that occurred, spanning almost four decades. The research not only contributes to poverty reduction research in the Philippines, but it also contributes to the impact evaluation research of irrigation in rural areas as the data used for the analysis captures the impact of construction of the Casecnan National Irrigation system.

Finally, Chapter 5 summarizes the findings and recommends policies. This dissertation has four important policy implications for rural poverty reduction in the Philippines: (1) to promote farm and nonfarm development, policies should focus on both agricultural modernization and industrial development; (2) improving the human capital stock of the country is imperative because migration has become an important pathway for moving out of poverty; (3) agriculture development policies should promote infrastructure investments because more than two-thirds of the Filipino poor depend on agriculture for their livelihood; and, finally, (4) primary and secondary schools should be made easily accessible to households.

Overall, the research finds that the choices of pathways to poverty reduction of rural households are governed by external factors that affect rural households differently. The modernizing forces may impede or enhance the income generating opportunities of rural households by fostering changes in the social and economic environment in which rural households reside. As in the case of the Central Luzon Village, we find that the four modernizing forces which are feared to lead to rural impoverishment were ironically the same forces that served as drivers of income growth poverty reduction in the rural Philippines at large.

CHAPTER 2 PATHWAYS OUT OF POVERTY OF RURAL HOUSEHOLDS IN THE PHILIPPINES

2.1 Introduction

This chapter has two objectives: (1) explore the pathways out of poverty of rural households and (2) identify the factors underlying the choice of pathways, with focus on the role of population pressure, urbanization, agricultural technology, infrastructure, and human capital. Specifically, this study aims to give insights on the relative importance of the development of the nonfarm sector and the high-value revolution on income growth and poverty reduction across different localities. To date, the impact of high-value revolution on poverty reduction remains unexplored presumably because of the scarcity of data across space and time.

We focus on rural Philippines because poverty in this country remains high (one in every five Filipinos was poor in 2012) and in the same year, about 70[1] per cent of poor Filipinos live in rural areas. This country is also characterized by a high population growth rate, 2.1 per cent annually on the average, from 1990 to 2007 (ADB, 2009); urbanization (3 per cent annually as of 2005)[2]; and a relatively higher level of human capital compared with that in other ASEAN countries. The Philippine schooling system is historically patterned after the American system since the colonial period (around 1900-1950).

[1] Author's unofficial estimates using 2012 FIES and previous definitions of urban and rural areas
[2] *UN World Urbanization Prospects* calculates rate of urbanization, which is defined as the rate of expansion of the urban areas of the country.

This chapter has the following remaining sections. Section 2.2 reviews the literature on the pathways out of poverty and presents testable hypotheses. Section 2.3 surveys policies related to the sources of income growth and poverty reduction in the rural areas. Section 2.4 presents the data sources. Section 2.5 discusses the sources of household income growth using the data. Section 2.6 presents and discusses the regression results. Section 2.7 concludes and provides policy recommendations.

2.2 Pathways out of poverty in literature and testable hypotheses

The UNDP (2014) reported that the poverty target—"Halve, between 1990 and 2015, the proportion of people whose income is less than $1.25 a day"—has been achieved 5 years ahead of the 2015 deadline. Success in reducing poverty, however, is not uniformly distributed across countries because country-specific endowments and market conditions affect the progress of poverty reduction (Banerjee and Duflo, 2011; Lipton and Ravallion, 1995; World Bank, 1990). World Bank (1990) has identified the broad fundamentals of a poverty reduction program: (1) ensuring that the rural sector develops and the urban sector can provide employment; (2) increasing access of the poor to assets (e.g., land and livestock) and services (credit, education, public services); and (3) facilitating outmigration in extremely depressed areas. World Bank (2000) expanded our understanding of the multifaceted aspects of poverty by including opportunities, empowerment, security, and reduced market barriers into the fundamentals of poverty reduction programs.

One issue on poverty reduction is the so-called poverty trap, which means that households are largely handicapped in moving out of poverty and that external forces need to pull them out. An example of such force is international aid. Banerjee and

Duflo (2011) discuss two competing views on poverty traps. Sachs holds the view that the poor are poor because they are in a situation that prevents them from earning a decent amount of income (e.g., living in a geographically harsh area). In such a case, international aid could be essential in moving households out of this poverty trap. On the other hand, Easterly believes that poverty trap does not exist and that international aid could only increase the speed with which households increase their income.

While international aid might be important, many believe that economic growth is the major underlying force in poverty reduction. Fields and Bagg (2003) argue that overall economic growth shifts labor away from the less productive sectors to the more productive ones, transforming vulnerable workers (e.g., own-account and contributing family workers) to formal wage workers.[3] Economic growth opens up opportunities for households to track pathways that could bring them out of poverty. In this review, we explore three complementary pathways: (1) agricultural entrepreneurship or farming, (2) rural labor and rural nonfarm participation, and (3) out-migration.

A. Agricultural Entrepreneurship or Farming

Agriculture continues to be a fundamental instrument for poverty reduction because three out of every four people in developing countries live in rural areas and depend on agriculture for livelihood (World Bank, 2008; IFAD, 2010). Increasing agriculture productivity improves rural incomes directly by increasing farmers' income and

[3] Supporting this finding would be the case of Indonesia and Taiwan. During Indonesia's period of rapid growth prior to the Asian Crisis in 1997, it was observed that employment in agriculture has gone down to 41 per cent of total employment while employment in industry doubled. Similarly, for Taiwan, from 1970 to 2000, the share of agriculture employment has declined to 8 per cent from a high of 37 per cent. More significantly for poverty reduction, the share of formal wage work rose from 51 per cent to 71 per cent as the share of unpaid family work decreased (Fields and Bagg, 2003).

increasing opportunities to find work in the agriculture sector (DFID, 2004). Lower staple food prices benefit poor people living in urban areas and net buyers of agricultural products in rural areas (including the poor marginal farmers and landless workers).

Agricultural growth creates labor employment opportunities in the nonfarm economy through production and consumption linkages (Haggblade, Hazell and Dorosh, 2009). Production linkages could be through backward linkages for inputs (e.g., fertilizer stores, machine repair shops, and distributors of imported inputs) and forward linkages in agro-based industries (e.g., processing, milling, and food preservation). Consumption linkages are deemed stronger as they could generate sizable income and employment multipliers in the rural nonfarm economy. For example, a $1 initial increase in agricultural income could generate between 30 and 80 cents of additional rural income spent primarily on rural nonfarm goods and services and perishable agricultural commodities (World Bank, 2008).

World Bank (2008) provides key points on making agriculture an effective instrument in poverty reduction: (1) increasing assets of poor households, (2) making smallholder farming competitive, (3) diversification into off-farm and nonfarm activities, and (4) facilitating migration. Instruments (1) and (2) will be discussed in the subsequent section; instrument (3) will be tackled in the section on off-farm and nonfarm work, and instrument (4), in the section on migration.

a. Increasing assets of the poor

There are three important assets in agriculture: (1) physical assets (farmland), (2) knowledge of modern agricultural technology, and (3) human capital. Adams and He

(1995) show that, in Pakistan, growth in crop productivity has increased income inequality because land is mainly owned by the rich, thereby weakening the impact of agriculture on poverty reduction.[4] While land ownership is important for agricultural development, households with limited access to land may also choose to diversify income activities away from own-farm work and into off-farm and nonfarm activities (Haggblade, Hazell and Reardon, 2007; Winters et al., 2009). These studies imply that for a rural household, the decision to engage in agriculture is related to access to basic assets such as agricultural land, water supply, and modern agricultural technology.

In the Northeast and Central Plains, "the rice bowl" of Thailand, ownership of land is associated with increase in income from rice production (Cherdchuchai, Estudillo and Otsuka, 2009). This is also true in Central Luzon, the Philippine "rice bowl," where ownership of land is associated with a positive increase in per capita farm income (Estudillo and Otsuka, 1999; Takahashi and Otsuka, 2009). Conversely, lack of access to land could lead to lower income and consequently a fall into the poverty trap. An analysis of poverty dynamics made by Krishna et al. (2004) in Kenya revealed that small landholdings are associated with increases in the likelihood of households falling below the poverty line.

Knowledge of modern agricultural technology could be another asset, which could make agriculture a pathway out of poverty. Examples of these technologies involve the use of irrigation, modern rice varieties, and farm machinery. Irrigation has a positive impact on rice production, increasing yield and cropping intensity (Estudillo and Otsuka, 2006), thereby increasing farm income. In Central Luzon, Philippines

[4]In later stages of development when nonfarm income becomes the more important source of household income, the relationship between land access and total income may weaken (Estudillo and Otsuka, 2010; Winters et al., 2009).

(Estudillo, Fujimura and Hossain, 1999) and in southern Vietnam (Estudillo and Fujimura, 2015), acceleration in rice yield is attributed to the continuous adoption of newly released modern varieties of rice with higher yield and greater tolerance for pests and diseases. The initial increase in farm income brought about by the adoption of modern rice technology in the Philippines was used as funds to send children to school, importantly girls, who, upon receiving secondary and tertiary schooling, migrated to engage in nonfarm and overseas work and sent remittances that became a major source of income growth and a main contributor to poverty reduction (Quisumbing, Estudillo and Otsuka, 2004; Estudillo, Sawada and Otsuka, 2005).

Human capital is another important asset. Van de Walle (2000) shows that, in rural Vietnam, those who have more education are the ones who benefit the most from irrigation. Thus, to fully realize the benefits from irrigation, investment in education is necessary. Balisacan (2003) found that, in the Philippines, while schooling per se is not statistically significantly related to poverty reduction in the rural areas, interaction of schooling with access to markets and social services (proxied by roads) has a positive impact. In Bangladesh, educational attainment of farmers positively affects the decision to adopt a more diversified cropping system as education gives farmers the ability to respond to changing market demands (Rahman 2008). Krishna et al. (2004) showed in Kenyan villages that despite stagnant growth and deterioration in the provision of social services by the government, around 19 per cent of the sample households managed to escape poverty by establishing links with the urban economy and diversifying their income sources.

In contrast, providing access to education may lead to the weakening of the farm sector. Davis et al. (2010), using the RIGA database pooling data from a number of

countries compiled by the World Bank, have found that access to education is associated with households moving away from agriculture toward non-agricultural activities because of higher income obtained from such activities. Nargis and Hossain (2006) found that, in Bangladesh, households that were able to move out of poverty are those who were able to double their landholding and those who were able to improve the level of education of their household members, allowing them to move from agriculture to the non-agriculture sector and to migrate to find jobs locally or abroad. Many studies (Zezza et al., 2008; Otsuka, Estudillo and Sawada, 2009; Reardon, 1997, Barrett et al., 2001; and Lanjouw and Lanjouw, 1995, 2001) show the importance of household member's level of education as a determinant of participation in nonfarm activities. Davis et al. (2010) found that such relationship becomes stronger as the economy continues to grow.

Overall, increasing the assets of the poor gives them an opportunity to improve their income position and move out of poverty. There is a strong complementary interaction between physical assets, modern agricultural technology, and human capital for income growth and poverty reduction.

b. Making smallholder farming competitive

Smallholder farming could be made competitive by stimulating the so-called high-value revolution in horticulture, livestock, and other value activities (World Bank, 2008, p.208) and by providing infrastructure such as good-quality roads, irrigation, and electricity.

Gulati et al. (2005) found that countries with the highest growth rate of gross domestic product (GDP) and rapid urbanization are those that have experienced the

highest growth rate in the consumption of high-value agricultural commodities. For example, in Vietnam and China, per capita demand for vegetables grew at 4 per cent, whereas that for cereals grew at less than 1.2 per cent in Vietnam and declined by 1.3 per cent in China, indicating a shift of consumption away from cereals to vegetables. Pingali (2006) reported the transformation of the Asian diet— a reduction in per capita consumption of rice and a rise in per capita consumption of protein and high-energy foods—because of the increase in income, rapid urbanization, and global integration.

Using data from the Integrated Family Life Survey of Indonesia, McCulloch et al. (2012) found that agriculture has an important role to play in poverty reduction through the process of diversification into high-value production. These authors revealed that about 80 per cent of poor farmers remain involved in agricultural activities and more than half of them were able to get out of poverty after having diversified their agricultural activities. Weerdt (2010) presents a similar case in Kagera, Tanzania, where agriculture is a pathway out of poverty for those who have shifted to a more diversified farming activity, which incorporates traditional crops and high-value crops and livestock. Importantly, Weerdt (2010) found that those who continued to plant traditional crops (e.g., bananas and coffee) have failed to move out of poverty, even though they have sufficient endowments of land and human capital. Birthal et al. (2007) reported that, in India, smallholder farming of fruits and vegetables has the largest potential for poverty reduction because it is labor-intensive. Compared with fruit production, vegetable production is more profitable to small farmers because fruits have long gestation periods and require substantial capital investment.

Pingali (2006) considers the potential of the livestock sector in reducing poverty, given the rapidly changing Asian diet in favor of animal sources of protein. Burke et al.

(2007), using household-level panel data in 1997, 2000, and 2004 in Kenya, found that movement of households across income groups depends largely on farm size and ownership of livestock. For poor households, livestock income comprises a major share of total income, which may imply that households would have been worse off had it not been for income from livestock. Pica-Camarra (2011), in their study of 12 countries, found that while the contribution of livestock to household income is not substantial, livestock serves as an effective insurance mechanism for unexpected large household expenditures. The importance of livestock in poverty reduction comes only when households have access to markets.

Roads, irrigation, and electricity are the main areas of intervention that could, through various channels, reduce poverty in rural areas. Rahman (2008) has shown that, in Bangladesh, irrigation access effectively determines whether the farmer will adopt modern rice varieties or not. Relatedly, the presence of irrigation and developed infrastructure in tandem increases the farmer's probability of adopting a more diversified cropping system. This is especially true in vegetable production that requires good access to markets, which, in turn, requires a good road network. Krishna et al. (2004) emphasized the need for rural infrastructure in Kenya to improve crop yield and agricultural productivity, particularly for household members who are unable to migrate and thus rely heavily on agriculture for their livelihood.

While agriculture remains important in poverty reduction, there are growing concerns that such a role may be eroded by three factors: (1) declining farm size that increases the incidence of landless households with low income, (2) decline in wages because of excess supply of labor brought about by high population growth in rural areas, and (3) lack of physical infrastructure in rural areas that limits the impact of

modern agricultural technology on less favorable areas (Kumanayake, Estudillo and Otsuka, 2014). Participation in the high-value revolution that responds favorably to changes in market demand could further strengthen the role of agriculture in poverty reduction. Indeed, Davis et al. (2010) clarify that while diversification away from farm and into nonfarm activities is increasingly becoming the norm among rural households, the contribution of agriculture to income growth and poverty reduction cannot be disregarded.

B. Off-farm and nonfarm work

Off-farm work refers to agricultural activities carried out outside the household's own farm, which is commonly in the form of casual daily wage employment. Nonfarm work refers to all activities in the rural areas, except for agriculture, livestock, fishing, and hunting. Off-farm wage work is hardly the source of income growth because incentives for farm laborers to work under wage contracts are inherently low and the cost of monitoring the work efforts of such laborers is high in spatially dispersed and ecologically diverse farm environments (Hayami and Otsuka, 1993). Therefore, agricultural wage laborers are employed only for simple tasks amenable to easy supervision, such as weeding, planting, harvesting, and threshing, but not for care-intensive activities, such as plowing, water and pest management, and fertilizer application. Inasmuch as simple tasks do not require much skill or experience, agricultural wage rates are generally low and the demand for agricultural labor is not only uncertain but also limited. In recent years, there has been accelerated use of labor-saving technologies such as tractors, threshers, and direct seeding in rice farming in Asia because of the rise in wages (Shand and Jayasuriya, 1985; Estudillo, Fujimura and

Hossain, 1999). New prospects for increased employment in agriculture lie in the high-value crop and livestock sectors. Yet, because of low elasticity of demand for food, employment opportunities in agriculture will inevitably decline in the long run (World Bank, 2008).

Nonfarm activities are important sources of income and livelihood. In the early stages of development, the share of rural income derived from non-agricultural sources may be only 20 to 30 per cent; in the later stage, in urbanizing economies, it could be as high as 60 or 70 per cent (World Bank, 2008). Nonfarm employment can play key roles in risk mitigation and risk management of poor households and could be important to women who are largely not in agricultural self-employment because of lack of access to farmland. The magnitude of the size of the rural nonfarm economy, however, is underestimated because nonfarm activities are undertaken during slack season as secondary employment, many of these not remunerated (particularly those done by women), and that nonfarm goods and services produced at home are underestimated because they are not traded in the market (Lanjouw and Lanjouw, 2001).

Nonfarm employment has an important impact on poverty reduction. Using data from Hubei, China, de Janvry et al. (2005) found that 72 per cent of households in the rural areas obtain nonfarm incomes and that poverty gap and severity of poverty are lower for households who participated in the nonfarm economy. McCulloch et al. (2007), using the individual-level panel data from the IFLS in rural Indonesia, found that less than one-fifth of those engaged in rural nonfarm activities between 1993 and 2000 remain poor, indicating the importance of nonfarm work in income growth. In Kenyan villages, Krishna et al. (2004) found that, for about 73 per cent of households that escaped poverty, the employment of one member of the household (in government

or in the private sector) is the major route for escaping poverty. In the Philippines, Vietnam, Bangladesh, and Sri Lanka, an increase in nonfarm income, most importantly coming from formal jobs, has served as an important driver of income growth, indicating the importance of job quality in poverty reduction (Estudillo et al., 2013).

Who is most likely to participate in nonfarm activities? FAO (1998) found that households living in difficult agroclimatic zones would have a greater incentive to diversify their activities away from farm and into nonfarm activities, indicating a push to diversify, whereas those households with access to markets because of good infrastructure are more likely to participate in the nonfarm economy. de Janvry et al. (2009) found that, in Hubei, China, education and near proximity to a town are crucial in assisting household members to obtain rural nonfarm employment. Less educated women in rural Laos are pushed to cross the border to Thailand and participate in the informal sector, largely in Bangkok, in view of the decline in farm size and limited availability of jobs in the nonfarm sector of Laos (Estudillo, Mano and Seng-Arloun, 2013). In Honduras, as a result of social programs that target nonviable peasants, rural nonfarm income from wage work and self-employment activities rose to as high as 31 per cent in 1998. This led to a marked increase in total household income (Isgut, 2004). In addition, Isgut (2004) found that education, access to electricity, and proximity to urban centers explain the movement of peasants from farm to nonfarm activities.

Using cross-section and panel data analysis, Gibson and Olivia (2009) show that proximity of communities to the provincial capital and access to electricity are associated with a higher share of income from nonfarm enterprises in Indonesia. Haggblade, Hazell and Reardon (2007) found that improved rural infrastructure can promote growth of rural areas delinked from agriculture through stimulating businesses

and promoting competition. Oseni and Winters (2009) mentioned household participation in nonfarm activities as a means of overcoming lack of access to credit in Nigeria; they likewise noted that education has a positive correlation with nonfarm participation. While there exist strong evidences that participation in the nonfarm economy reduces poverty, Burke et al. (2007) state that nonfarm activities may be a two-edged sword: it can be a source of additional income for households that can push them out of poverty, but it can also trap households in low-productivity activities that can lead them into a poverty trap.

C. Migration

Migration could be a pathway out of poverty for migrants and for those who stay behind in the villages. According to Todaro (1969), rural-urban migration is affected by the urban-rural real wage differential and the probability of obtaining an urban job. The second factor could be the more important one as Todaro cites the case of the American agriculture during the depression when urban wages still were considerably higher and falling much less rapidly than rural wages. Ironically, there was a reverse migration of unskilled workers from the cities back to the farm because of the severe lack of job opportunities in the depressed factories.

World Bank (2009, Box 5.5, p.161) presents the different view of Lewis and Lucan on rural-urban migration. Lewis models each migrant to the city as lowering the probability of employment and raising congestion cost. Lucas, on the other hand, models each migrant as a source of human capital that can drive the agglomeration engine of growth in the cities. The new insight from Lucas is that, while returns to scale

in agriculture are constant, returns to scale in industry and services are increasing in such a way that transfer of labor to human-capital-intensive sector and clustering of human capital could have an enormous impact on growth.

Lately, migration is viewed as a strategy to diversify income portfolio (Stark, 1980; Banerjee and Duflo, 2011). Receiving remittances is an important coping mechanism in the face of hydro-meteorological disasters in the Philippines (Estudillo, 2013). Migration could lead to brain drain (loss of human capital) or brain gain (network, return migration, incentives for young people to increase their skills) of the sending countries. World Bank (2009) found that migration increases wages in the sending country (e.g., Philippines and Mexico) and decreases unemployment, whereas, in the receiving country, there is no effect or a very small negative effect on the labor earnings of the locals. In more recent years, overseas migration from developing countries is becoming more skilled (or people with more education are more likely to move overseas). At the same time, many temporary, seasonal workers with little or no education also migrate as in the case of people from Cambodia, Laos, and Myanmar going to Thailand (World Bank, 2009, Box 5.2, p. 153).

For those who are left behind in the villages, remittance income is the link between migration and movement out of poverty.. The experience of rural-urban migrants in Kenya showed that remittances coming from the migrants are used to invest in agricultural innovation (Krishna et al., 2004). In the same study, the presence of a connection to urban areas (possibly through an established relative or some benefactor) is found to be more important for migration than education (Krishna et al. 2004). In Pakistan, remittances are used to buy farmland and returning migrants set up non-agricultural business (World Bank 2008). Awumbila and Arday Fio-Schandorf (2008)

describe Ghana's pattern of rural-urban migration as a switch from a predominantly male migrant composition to one that is predominantly female. This phenomenon is a counter-example of migration as a means of escaping poverty because migrant women have a higher tendency to engage in low-paying, risky, and difficult labor, which would more likely keep them in poverty.

While people are moving, jobs are also moving through delocalization and outsourcing of manufacturing tasks from industrialized countries to developing countries. Manufacturing jobs, for example, have migrated away from high-income countries (World Bank, 2013). Offshoring and outsourcing of service tasks to developing countries (e.g., computer systems design and management consulting, IT-related services) have emerged in India and the Philippines. Since these tasks could be performed by women and men alike, women are able to have a far greater access to these employment opportunities, thereby inducing households to invest more on women's schooling (e.g., sending girls to English schools in India) (World Bank, 2012). With offshoring and outsourcing of services, the service sector could be the new engine of economic growth.

D. Testable hypotheses

The amount of endowments and market returns to endowments dictate what strategy or combinations of strategies households will pursue in order to move out of poverty. Endowments and returns to endowments, on the other hand, are affected by four exogenous factors—population pressure, urbanization, human capital, and infrastructure. Haggblade, Hazell and Reardon (2007) show that population growth on limited land

resources could lead to scarcity of farmland and a decline in labor productivity, which pushes rural workers to engage in nonfarm work. Urbanization promotes new and varied consumer expenditure patterns that favor nonfarm goods and services. Human capital, particularly secondary and tertiary schooling, has a positive impact on increasing household income from nonfarm sources in Asia and Africa (Otsuka, Estudillo and Sawada, 2009). Roads, irrigation, and electrification are the main infrastructure that have direct impacts on household sources of livelihood and thus could reduce poverty in various channels (Ali and Pernia, 2003). Here, we present several testable hypotheses regarding the relationship between the four catalysts of development and income growth and poverty reduction.

Structural transformation refers to the shift in the "center of gravity" of economic activity away from agriculture to industry and the service sectors (Hayami and Godo, 2005). This is induced mainly by the changes in the structure of demand that favor nonfarm goods and services. The rise in economic importance of the nonfarm sector means a rise in household nonfarm income and total income, which then stimulates the emergence of a more diversified diet, therefore triggering the onset of high-value revolution in agriculture. We hereby present Hypothesis 1 (H1):

> *H1: "Catalysts of change" Population pressure, urbanization, and infrastructure induce rural households to engage in nonfarm activities. Subsequently, income from nonfarm activities serves as a major driver of household income growth and poverty reduction.*

Empirical studies have pointed out that proximity to urban centers could dictate the sources of household income and household participation in nonfarm activities.

Gibson and Olivia (2009) found that the proximity of communities to the provincial capital is associated with a higher share of income from nonfarm enterprises in Indonesia. Barrett et al. (2001) showed that weak infrastructure in far-flung areas discourages participation in nonfarm activities and encourages farming. Distance to urban centers is also found to be an important determinant of the location of industries (Sonobe and Otsuka, 2006). The development of infrastructure could increase the connectivity of far-flung rural areas to urban centers. Increased supply of better quality roads, for example, effectively facilitates subcontracting arrangements between urban traders and rural firms, thereby promoting rural industrialization (Kikuchi, 1998). Increased access to electricity and telecommunications exposes rural consumers to a wide range of consumer goods, thus giving rise to a more diversified rural demand and supply for both farm and nonfarm goods. Haggblade, Hazell and Reardon (2007) mention that improved rural infrastructure can promote growth of rural areas delinked from agriculture through stimulating businesses and promoting competition. We hereby propose Hypothesis 2 (H2) on the role of distance:

> *H2: "Role of distance" Nonfarm activities tend to proliferate more and their economic importance is higher in areas located near major cities where population pressure is higher, rate of urbanization is faster, and infrastructure is more developed.*

Because of the low income elasticity of demand for agricultural products, the importance of agriculture as a source of income and livelihood is bound to decrease in the course of economic development. The potential for income growth and poverty reduction appears to have evolved in the high-value sector within agriculture. In spite

of this potential, nonfarm activities could be more important as demand for nonfarm goods and services rises as household income increases with economic growth and development. We hereby present Hypothesis 3 (H3):

> *H3: "Importance of nonfarm sector" The contribution of nonfarm activities to income growth and poverty reduction is higher compared with all other income sources, indicating that the development of the nonfarm sector is the most important propelling force for income growth and poverty reduction.*

People living in areas far from urban areas and where the labor market is not well-developed have the greater tendency to migrate. Estudillo, Sawada and Otsuka (2008), using household-level panel dataset in the Philippines, found that villages far from the cities and were initially poor were able to increase their income vis-à-vis villages that are near cities and that have better access to new agricultural technology. The decline in income gap is because of the rise in nonfarm income and remittances, indicating the importance of the development of the nonfarm sector and labor mobility in income distribution. We propose Hypothesis 4 (H4):

> *H4: "Catching up" In the early stage of development, while income is higher and poverty is lower in areas near major cities, income growth and poverty reduction have become faster in faraway areas, leading to a better distribution of income.*

Mincer (1958) and Becker (1964) highlighted the importance of education in raising individual income because education and cognitive skills are intimately linked

with labor productivity and is thus expected to stimulate the development of the rural nonfarm economy. Higher levels of education, importantly secondary and tertiary schooling, significantly increase income from nonfarm activities in many developing countries (Estudillo and Otsuka, 2010; Reardon, 1997; Barrett et al., 2001; Lanjouw and Lanjouw, 1995, 2001). In the high-value crop sector within agriculture, educational attainment of farmers positively affects the decision to adopt a diversified cropping system as this would require access to information and the ability to process these pieces of information to make an informed decision (Rahman, 2008). It is important to mention that, as the development of the nonfarm sector deepens, labor demand increases in the sector and the sector is thus able to provide employment opportunities, even to the unskilled and the uneducated, who form the bulk of the rural poor (Ramos et al., 2011) We therefore propose Hypothesis 5 (H5):

> *H5: "Role of human capital" Higher education has a positive impact on increasing income from high-value products in agriculture and from nonfarm activities.*

The potential for income growth and poverty reduction appears to have evolved in the high-value sector within agriculture. Haggblade, Hazell and Reardon (2007) showed that conditional on having supporting infrastructure, growth in the rural areas located far from urban centers can be achieved from agriculture diversification. We therefore propose Hypothesis 6:

> *H6: "Role of high-value products" In the course of economic development, the importance of agricultural income, in general, and*

income from high-value products in particular declines over time while it contributes modestly to income growth in remote provinces.

2.3 Philippine Policies related to sources of growth and poverty reduction

A. Urbanization in the Philippines

During the 1990s, development projects outside major cities promoted the urbanization of areas in the periphery of major cities through migration of industries from major cities to the peripheries. Projects such as the CALABARZON Regional Project (1990), the Cebu Integrated Area Development Master Plan (1993) and the Central Luzon Development Program (1993-95) have facilitated the migration of industries to city peripheries by providing infrastructure support such as roads and telecommunications in these areas. Because of such projects, migration of people increased at the peripheries of Metro Manila, particularly in Central Luzon and CALABARZON; the peripheries of Metro Cebu have also experienced rapid urbanization (Porio, 2009). In recent years, the urbanization of areas in the peripheries of cities may be attributed also to the passage of laws related to housing. Navarro (2013) found that most of the policies (e.g., Presidential Decree 933 in 1976, Presidential Decree 1396 in 1978, and the Urban and Housing Development Act in 1992) related to urbanization and urban planning have centered on addressing the problem of housing.

While industrialization policies of the national government have promoted urbanization of areas at the periphery, migration to nearby towns from the far-flung rural areas (which Haggblade, Hazel and Reardon [2007**:** 88] call the "stagnant rural zones") could be attributed to rapid urbanization of rural towns. Stagnant rural zones are characterized by rapid population growth in the presence of stagnant agriculture, leading to scarcity of farmland and decreased farm production. Given this unfavorable

scenario, agricultural labor force is pushed to engage in nonfarm activities or migrate to local towns and cities and overseas.

Mallaque III and Yokohari (2007), in analyzing the areas near Metro Manila, found that rapid land use conversion, which began in the 1990s, has resulted in abandonment or selling of agricultural land. The rapid conversion of agricultural land for non-agricultural uses can be partly explained by political motivations of local government units as non-agricultural land use generates higher income tax revenue. Another reason that could partly explain the rapid urbanization is the weak land reform program. This has contributed to rapid conversion of agricultural land as agricultural land owners decide to convert their land for non-agricultural purposes in order to avoid land reform coverage (David, 1999). In brief, increased urbanization since the 1990s has motivated rural households to engage in nonfarm work and to migrate to other villages.

B. Infrastructure development

a. Electricity

From around the late 1980s to the early 1990s, the Philippines enacted and implemented the Build-Operate-Transfer Law (Republic Act 6957) to solve the power crisis gripping the country. The law has enabled the construction of around 33 power projects that not only solved the energy crisis at that time but also addressed the increasing demand for electricity (Ricote, 2006). In May 1994, the Build-Operate-Transfer Law was amended to include not only power and transportation services but also telecommunications and ICT, sewerage and solid waste management, markets, slaughterhouses, and others.

One of the pillars of the Arroyo administration (2004-10) was the provision of energy access through the passage of the Electric Power Industry Reform Act (EPIRA) of 2001 (Republic Act 9136), which aims to accelerate the complete electric coverage in the country. It also aims to reduce the cost of electric power and improve access to power supply by consumers through increased private participation in the industry. Data from the Medium-Term Philippine Development Plan (MTPDP) showed that, for 2003, most of the barangays in Luzon have access to electricity with electrification rate at 96 per cent. However, Visayas and Mindanao have slightly lower electrification rates of 90 per cent and 81 per cent, respectively (NEDA, 2004). These figures indicate a relatively highly unequal distribution in terms of access to electricity between regions and island groups. Across households, the disparity is also clear between income groups. In comparing the percentage of families with access to electricity between 2002 and 2004, ADB (2009) found that only around 53 per cent of households belonging to the bottom 30 per cent income stratum have access to electricity in contrast to the 91 per cent access for the upper 70 per cent.

Electricity is important in Philippine agriculture— "a 1 percentage point increase in the number of households with electricity relative to the total number of households is associated with an increase of about 22 million pesos/agricultural worker in agriculture productivity" (Llanto, 2011: p. 3). The availability of electricity has induced an expansion of labor employment opportunities in a wide variety of nonfarm activities, including formal salary work, trade and transport, and communications. The higher electricity coverage significantly affects the flow of foreign and domestic remittances to the rural areas (Ramos et al., 2012). Thus, it is clear that electricity could

serve as an important catalyst of income growth and poverty reduction in rural villages in the Philippines.

b. Roads

During the presidency of Ferdinand Marcos (1965-86), especially between 1978 and 1982, there was substantial improvement in highway networks in the country. Most of the government funds were allocated for road construction: total road length rose from around 89.4 thousand kilometers in 1972 to 117.7 thousand kilometers in 1977. However, when President Corazon Aquino took power from 1986 to 1992, emphasis on road construction has mostly been in the development of rural feeder roads to support the development of the agriculture sector by reducing the transport costs of bringing agricultural products from farms to markets. Llanto (2004) reports that a common problem in the Corazon Aquino administration is the overly zealous construction of roads with minimal emphasis on quality as most of the village roads are macadam-type, which cannot support large volume of vehicles carrying heavy and perishable agricultural goods.

Paying attention to the need to improve the quality of the roads, President Fidel Ramos, during his term in 1992-98, tried to improve the quality of national and secondary roads by upgrading the roads into the all-weather type. Thus, by the end of the Ramos administration, more than 80 per cent of the national roads have been improved to become all-weather roads. In general, Llanto (2004) reports that in the post-Marcos regime from 1986 onwards era, there was a strong focus on the rehabilitation of existing roads and the expansion of feeder and secondary roads. This is

particularly true during the administration of Corazon Aquino when there are limited resources that can be allocated for the construction of new roads.

As the term of President Joseph Estrada had been limited to only 2 years (1998-2001), his contribution to the expansion of the road network was minimal at only 1 per cent of the total new roads (Llanto, 2004 p. 17). The Gloria Macapagal-Arroyo administration (2001-10) contributed to the expansion of the road network (around 1.3 thousand kilometers were added to total national roads) and in improving the farm-to-market road network. Importantly, Arroyo initiated the computerization of road databases that would include information on the length and quality of the roads. Furthermore, online information on bidding procedures and documents related to projects have been made available, allowing greater private participation in road construction. The current administration of Benigno Aquino III has been criticized to have made very slow progress in the construction of essential infrastructure. While the Philippines is classified as a middle-income country among the 10 members of the Association of Southeast Asian Nations (ASEAN), the quality of its infrastructure is ranked the third lowest and is lower compared with that of low-income countries such as Cambodia and Laos.

Suzuki (2013) blames the lack of sufficient background studies in the formulation of country's infrastructure development plan and the lack of ability of government offices to implement infrastructure projects. Llanto (2004) also highlights the weakness of monitoring and maintaining infrastructure in the Philippines. For example, when the national government devolved many of its functions in 1992, the local government took full responsibility for the expansion and maintenance of local roads, while the national government continued to make decisions on national roads.

Since the local governments are largely dependent on the Internal Revenue Allotment (IRA) from the national government for financing infrastructure investments, as stipulated in the Local Government Code of 1991, the expansion of local roads under the local government could have been done in 'piece meal' fashion, concentrated only in a few favored localities where the local official could gain a larger number of votes. Overall, since roads are the lifeline of domestic trade, the low quantity and quality of roads could be a major impediment in the expansion of the nonfarm sector, which has become the major source of livelihood of a large majority of Filipinos.

c. Water

During the Marcos administration, governance of the delivery of water services to cities and rural areas involved a centralized residential water service delivery under the Metropolitan Waterworks and Sewerage System. Water service was initially focused on highly urbanized areas; eventually, the rural areas were considered as well through the Rural Waterworks Development Corporation. After Marcos was deposed, the Corazon Aquino administration decentralized water service delivery to the local government units through the passage of the Local Government Code in 1991, which enabled provinces, municipalities, and barangays (or villages) to contract infrastructure projects related to water service delivery. To further provide direction to water service delivery, the Ramos administration rationalized the functions of Local Water Utilities Administration (LWUA), which ensured that only viable water districts will receive financing. Llanto (2004) and Ricote (2006) also acknowledged the importance of the amended Build-Operate-Transfer Law, which enabled the participation of the private sector in the provision of water services after the devolution in 1992. The most

noteworthy policy implemented by the Arroyo administration was the shift to a concessionaire system and away from the usual Build-Operate-Transfer system. The concessionaire system gave water service access to the private sector, creating competition in the water industry. According to the World Bank (2004), the concessionaire system has reached even the hard-to-reach poor households in Metro Manila and even reduced water cost to poor households by as high as 25 per cent.

For poverty reduction, it is important to have time-saving devices such as electricity and water to release women's time for paid work and away from household work and to have good-quality roads to reduce transport time to go to work. Needless to say, electricity and roads stimulate the development of small- and medium-enterprises that create jobs for the poor. Thus, we expect that good policies that effectively increase the supply of roads, electricity, and water could increase household income and reduce poverty.

C. Human Capital Policies

One of the most significant contributions of the Marcos administration is the passage of the Education Act of 1982, which has outlined the basic structure of education in the Philippines. Pre-school is for children between 3 and 6 years old. Elementary school, which is for 6 years, is for children between 6 and 12 years old. Secondary school, which is for 4 years, is for children between 12 and 16 years old. Tertiary education typically begins at age 16 after graduating from secondary school. Other types of post-secondary education are also possible like the 2-3-year technical or vocational courses.

The state also provides services for out-of-school youth and adult education for adults who wish to complete their education. In June 2011 during Benigno Aquino's term, the structure of education was modified, increasing the number of years of basic education (primary and secondary combined from 10 to 13, including compulsory kindergarten).

The Education Act of 1982 tried as well to improve the quality of basic education in the country by initiating a process of voluntary accreditation for private schools. Solon and Floro (1993) found that between 1976 and 1987, the proportion of Philippine labor force with secondary education (completed or partial) rose sharply from 22 per cent to 30 per cent. The authors attribute this sharp increase to government efforts to stimulate private secondary schools to expand by voluntary accreditation.

Primary schools have been numerous and spread out across the country since the American colonial period from around 1900 to 1950. Important educational reforms were implemented by Corazon Aquino. The new Constitution, which was ratified in 1987, specifically highlights the importance of education. Article XIV, Section 2 of the 1987 Constitution states that "the state shall give highest budgetary priority to education." To further improve access to secondary education, the Free Public Secondary Education Act of 1988 (Republic Act 6655) was passed. It was also during this administration that the management of education in the Philippines is modified to include three agencies through the passage of the Higher Education Act of 1994 (Republic Act 7722) and the Technical Education and Skills Development Act of 1994 (Republic Act 7796). Through these laws, a division has been defined: basic education is to be handled by the Department of Education, Culture and Sports (DECS), tertiary education is to be handled by the Commission on Higher Education (CHED), and skills

and vocational education is to be handled by the Technical Skills Development Authority (TESDA). Orbeta (2003) found that while Republic Act 6655 may have resulted in more enrolment in public secondary schools than in private schools, its impact on ensuring equity of access to secondary education across income groups seems nil.

After the implementation of Republic Act 6655, education indicators such as simple and functional literacy have improved while other indicators such as participation, survival, and achievement have risen only slightly, if at all. Using data from the Functional Literacy Education and Mass Media Surveys collected by the National Statistics Office in 1989 and 1994, Herrin and Pernia (2003) and Manasan (2000) revealed a sharp increase in simple and functional literacy between the two periods, with simple literacy increasing from 90 to 95 per cent and functional literacy increasing from 73 to 84 per cent. Thus, the impacts of Republic Act 6655 on marketable skills remain unclear.

The Governance of Basic Education Act of 2001 (Republic Act 9155) changed the name of DECS to DepEd to focus on the delivery of basic education. More importantly, it also empowered and made more accountable the school heads (the school principals). The Act also laid the foundation for school-based management founded on transparency and accountability. Republic Act 9155 also clarified that basic education, which covers Grades 1-6, is compulsory, but that secondary education is not. In 2006, the Philippines also adopted the Education for All Initiative that was initiated in 1990.

Suzuki (2013) notes that one of the major accomplishments of Benigno Aquino III administration is the basic education reform through the passage of the Enhanced

Basic Education Act (Republic Act 10533), which saw to the implementation of the K to12 policy. According to the Official Gazette of the Philippine Government[5], the K to 12 program allows for a "more balanced approach to learning that will enable children to acquire and master lifelong learning skills (as against a congested curriculum)". Under this program, students who finish Grade 10 and a Technical-Vocational-Livelihood track in Grade 12 can obtain Certificates of Competency (COC) or a National Certificate Level I (NC I)/Level II (NC II), respectively. The NC II will be awarded on the condition that students pass the competency-based assessment of TESDA. These certificates increase the possibility of employment for students who do not have a college diploma. The K to 12 program is intended to develop marketable skills of young Filipinos to make them suitable for jobs overseas.

D. Structural transformation and poverty reduction

The Philippine population was 95 million in 2012 (Table 2.1) and it rose to 100 million in 2014, making this country one of the most populous in Southeast Asia. Annual population growth rate was 2.73 per cent in 1980-89 and decreased to 1.85 per cent in 2000-12. Given the high population growth, the labor force as a share of the total population increased from 53 per cent in 1980 to 61 per cent in 2012, reflecting the entry of younger cohorts to the labor force. The recent high economic growth rate is attributed mainly to availability of relatively young and more educated labor force (Whaley, 2012; Lorenciana, 2015). Female labor force participation (FLFP) rose from 49 per cent in 1990 to 53 per cent in 2013 (World Bank, 2013), reflecting the positive

[5] "The K to 12 Basic Education Program," Official Gazette. Accessed at http://www.gov.ph/k-12/#implementation on 4/21/15.

impact of economic development (in terms of growing economic opportunities), lower fertility, and higher women's education on FLFP (World Bank, 2008).

For a period of about 30 years between 1980 and 2012, the size of arable land rose by only about half of a million hectares, indicating that there had been no further opening of new land for cultivation. Meanwhile, population rose by 48 million in the same period. As population growth presses hard on the closed land frontier, arable land per labor force declined from 0.28 ha in 1980 to 0.14 ha in 2012 (Table 2.1). This may mean that the agricultural sector may not be able to provide a sufficient amount of employment to the growing labor force and that the nonfarm sector must take up the slack.

<Table 2.1 about here>

Structural transformation is indicated by the declining share of agriculture in gross domestic product (GDP) and employment. The share of agriculture in total GDP declined from 26 per cent in 1980 to 12 per cent in 2012, whereas the combined share of industry and service sectors rose from 74 per cent to 88 per cent in the same period (Table 2.1). The service sector had a large share in the GDP even as early as 1980 and its share rose by 20 percentage points from 1980 to 2012. The share of industry in the GDP remained fairly the same and was consistently more than double its share of employment from 1980 to 2012, indicating high labor productivity in the sector. This is in contrast with agriculture, which employed 33 per cent of the labor force, but contributed only 12 per cent to GDP in 2012. Meanwhile, the share of the service sector in both GDP and employment was fairly the same in 1980-2012. In brief, structural transformation in the Philippines appears to be a move away from agriculture to services.

The major subsectors in agriculture are traditional crops, nontraditional crops, livestock and poultry, fishery, and forestry. In industry, major subsectors are mining and manufacturing, construction, and electricity, gas and water. Under services are transportation, trade and finance, real estate, and public and private services. Traditional crop still comprises the largest subsector in agriculture; meanwhile, the high-value subsector (non-traditional crops, livestock and poultry, and fishery) is growing in size and importance within the agricultural sector. In industry, mining and manufacturing comprise the largest subsector and remains the major driver of growth. While all subsectors in the service sector have been growing, the transportation subsector registers the fastest growth; its share of the GDP rose from 5 per cent in 1980 to 23 per cent in 2012. The real estate subsector and public and private services have exhibited a fairly reasonable growth rate.

Structural transformation was accompanied by an increase in GDP per capita from $2,807 purchasing power parity in 2005 (PPP 2005) in 1980 to $3,801 PPP 2005 in 2012 (1.35 times) (Table 2.1). While the service sector (the biggest sector) was the largest contributor to the increase in GDP per capita, labor productivity rose faster in industry than in services: the gross value added per employment in industry rose by 13.7 from 1960 to 2012 while that of services rose by only 8 times and that of agriculture declined by 6.8 times in the same period. Lower labor productivity in agriculture, in tandem with scarcity of farmland, could create poverty. Engaging in nonfarm employment, either in wage work or in self-employed entrepreneurial activities in industry and services, and migrating overseas could be important strategies to avoid poverty or move out of it.

Rice yield, which is an important indicator of the adoption of modern rice technology, had risen modestly from 2.2 to 3.7 tons per ha in 1980-2012 (Table 2.1). This is because of the release of modern varieties (MVs) of rice with multiple pest- and disease-resistance traits incorporated. The first MV (IR36) was released by the International Rice Research Institute (IRRI) in 1976 and immediately gained wider acceptance among farmers. Rice yield doubled following the release of IR36. The breeding program at IRRI then shifted to developing rice varieties with shorter growing period, enabling farmers to have two or three cropping seasons per year. As a result, rice production grew at a high 2 per cent per annum in 1980-89. Rice production growth decelerated in 1990-99 because the 1990s was the decade when rice prices were at a historically low level and external funding for irrigation was depressed. Pressed by the need to economize on public funds, the National Irrigation Administration devolved the maintenance of irrigation system to farmer-irrigator associations. The gravity irrigation system deteriorated because of the failure to make local communities strong enough to avoid the free riding problems (Hayami and Kikuchi, 2000). Rice yield growth once again accelerated in 2000-2012 because of government efforts to implement rice breeding and extension programs in order to avoid a repeat of the domestic rice shortage during the 2008-09 Asian food crises.

The agricultural sector is undergoing a high-value revolution. There has been a shift of production away from traditional crops (rice, corn, coconut, sugarcane, and abaca [or manila hemp]) to nontraditional crops (banana, mango, pineapple), livestock, poultry, and fishery. The growth rate of total revenue from traditional crops was negative in 1990-2012 because of the decline in production of non-cereal traditional crops such as coconut, sugarcane, and abaca due to declining world prices. The fastest

growing sector in agriculture is livestock and poultry, which has grown at 9.1 per cent in 1990-2012. It is clear that agriculture is transforming to match the evolving demand for a more diversified consumption basket.

The biggest subsector in industry is mining and manufacturing and its share of the GDP was highest in 1980 (38 per cent) (Table 2.1). The 1980s is the decade when labor-intensive industries have blossomed with the shift of production away from the newly industrializing countries in East Asia (where wages were rising) to Southeast Asia, including the Philippines. In the service sector, the biggest subsectors are transportation, trade and finance, and public and private services. Real estate is an important emerging subsector because of the rising demand for private housing and the increasing number of public and private construction projects.

Poverty head count ratio at $1.25 PPP a day decreased from 30.1 per cent in 1991 to only 16.5 per cent in 2012 for the whole Philippines (Table 2.2). The decline in poverty was much more pronounced in urban areas, which started with a 19.2 per cent poverty incidence in 1991 and declined to 6.6 per cent in 2012. Rural areas started with a very high poverty incidence of 46.3 per cent which has been steadily declining. The latest figure for 2012 shows that poverty incidence in rural areas is at 22.6 per cent.

<Table 2.2 about here>

Overall, structural transformation in the Philippines has been accompanied by a modest expansion of GDP and changes in labor employment pattern that favor the nonfarm sector. Importantly, the agricultural sector, which is a source of livelihood for many of the poor, is also undergoing a revolution in high-value products, which could create a wave of new employment and increased productivity.

2.4 Data description

A. Sources of data

The datasets for this paper were obtained from a number of sources. The major data sources are the following:

1. Family and Income Expenditure Survey (FIES) of the National Statistics Office (NSO). The FIES is a national survey undertaken by the NSO every 3 years. The survey includes questions pertaining to sources of income (in cash and in kind) and consumption (by different expenditure items). The FIES is the main source of information on expenditure patterns and levels of living of Filipino households for a certain year. To accurately capture the income and expenditure patterns for a given year, enumeration using exactly the same questionnaire is done twice every survey year. The first visit is done in July covering the first semester (January to June) of that year and the second visit is in January of the following year to cover the second semester (July to December). The number of households surveyed has been increasing every year: from about 24,000 households surveyed in 1991 to around 40,000 in 2012. For this paper, the FIES of 1991, 1994, 1997, 2000, 2003, 2006, 2009, and 2012[6] were used. The FIES is conducted as a rider survey to the July and January (of the succeeding year) rounds of the LFS (see number 2).

2. Various rounds of the Labor Force Survey (LFS) of the NSO. This is a quarterly conducted, nationally representative survey undertaken by the NSO every

[6] FIES 2012 was only used for the provincial regression analysis as pertinent household information cannot be obtained from LFS-January 2013 as merging variables have been modified.

January, April, July, and October of the survey year. It is used to measure the characteristics of members of the labor force and the performance of the economy in terms of providing employment. Unlike the FIES, the enumeration for the LFS is only once, with the reference period being the previous 7 days. On the average, around 51,000 individuals are surveyed for each round of the LFS.

For this paper, the data from various rounds of the LFS in 1990-2012 were used. Summaries of variables at the provincial level (e.g., percentage of household members in the province who are of a certain age, who have primary level of education, who are females, etc.), were obtained from the October rounds of the LFS. These rounds were used because they would have already captured information for the three quarters of the year, especially those pertaining to schooling. Then, the provincial data obtained from the LFS were merged with provincial data obtained from the FIES using provincial codes.[7]

For regressions at the household level, information on household members were obtained only through the LFS as FIES does not contain demographic information on household members, except that of the head. . Versions of the FIES were merged[8] to either the July or January round of the LFS in order to obtain household member information on gender, age, and educational attainment.

[7] New provinces created after 1990 were reclassified under their previous province in order to form a balanced panel.

[8] Merging was done using a set of variables that together would uniquely identify the households. The merging variables are region, province, municipality, barangay, and housing control number. All five variables are common in the LFS and FIES, except for 2012, when the merging variables have been modified. The merging procedure is as follows: for each household in the LFS, summary variables pertaining to the member composition were first generated (e.g., number of household members belonging to a certain age group or sex, etc.). Then, each household-level variable in the LFS is merged to the corresponding household in the FIES.

3. CountryStat by the Bureau of Agricultural Statistics (BAS) is a database maintained by the bureau to provide national and subnational information on food and agriculture statistics, including information on production, price, and input use. For this paper, pertinent sections would be related to agricultural production and land use. The data on volume of production of crops, livestock and poultry, and fisheries are reported annually with some information being disaggregated by region or by province. Data on the volume of production[9] of crop are reported on an individual crop basis (66 crops, excluding rice and corn). These have to be individually downloaded, processed, and reclassified according to major crop groups.

   Information on volume of production of livestock and poultry are not available by province so a proxy variable was used—i.e., animals slaughtered in slaughterhouses and birds dressed in poultry dressing plants were used, respectively. The data are collected quarterly by BAS through its survey of slaughterhouses and poultry dressing plants.

   Land use is captured by the area harvested or area planted. Area harvested is defined as "actual area from which harvests are realized" while area planted refers to the "actual physical area planted" (BAS Country Stat). The main difference between area harvested and area planted is that the former pertains to temporary crops while the latter pertains to permanent crops or multi-harvest temporary crops. For the analysis in this paper, area harvested and area

[9] Crop production pertains to the quantity produced and actually harvested for a particular crop. Crops that were damaged, stolen, consumed, given away, etc. are counted in the production as long as the crops were harvested. Crops left in the field for some reason do not count in crop production.

planted would be used interchangeably. Land use data are collected by the BAS through the Crop Production Survey.

The indicators obtained from the aforementioned data sources are discussed in the following paragraphs.

Income: We used household income and household agricultural revenue as measurements of income at two levels of disaggregation at the household and provincial levels. Household income and agricultural revenue at the provincial level is simply the average of incomes and revenues of all households living in a province. Household income was drawn from the FIES while agricultural revenues were calculated by the authors using available data from CountryStat for the provincial-level analysis.

FIES has collected and classified the data on household income according to sources. There are three major groups of income: wage income, income from entrepreneurial activities, and other income. Wage income includes agricultural wage income and non-agricultural wage income. Income from entrepreneurial activities includes income from agriculture activities such as crop farming, livestock and poultry raising, fishing and forestry activities; from industry, manufacturing, mining and construction; and from services, wholesale and retail trade, transportation services, and others. Other income includes remittances from abroad and those sourced domestically, income from rental of non-agricultural land, pensions, and dividends.[10] The income variables were summarized, by province, for the provincial-level analysis of the determinants of income of rural households. For the household-level analysis, no aggregation was conducted. Using the PPP 2005 conversion factor for consumption

[10] For the purpose of this analysis, other income has been removed from total income as this is not a regular labor income and is subject to large variation.

from World Bank's world development indicators (WDIs), the income aggregates for the province and the incomes of households were converted into PPP in international dollars at 2005 prices.

We disaggregated agricultural revenues into revenues from (1) nontraditional crops, (2) traditional crops, (3) livestock, and (4) poultry. To analyze income from production of traditional crops[11], nontraditional crops, livestock, and poultry, the revenue from agricultural production at the provincial level was used as the dependent variable. The components needed to calculate the value of agricultural production at the provincial level were obtained from CountryStat. The value of agricultural production of traditional crops and nontraditional crops was calculated by multiplying production in a given province by the farmgate price of the product. Similar to income from FIES, the value of agricultural production was converted into PPP$ at 2005 prices using WDIs (World Bank, 2013).

To characterize the determinants of income or agriculture revenue, the following covariates were compiled from the aforementioned data sources.

Population pressure: We used total agricultural area in the province per labor force in the province as an indicator of population pressure. Total agricultural area for crops in the province was estimated using the total harvested area[12] for all 67 crops reported in CountryStat. Labor force for the province was calculated from the LFS, taking the total of all employed and unemployed people in the province.

[11]Traditional crops are palay, corn, sugarcane, coconut, and abaca (manila hemp).

[12] Total harvested area is typically smaller than reported agricultural area because harvested area would only consider the area where crops were actually harvested during the reference period; land where crops were damaged is excluded. Since data on arable land is not available as long time series, total harvested area was used as a measure of land supply.

Urbanization: Urbanization was captured by the percentage of households living in the urban areas. This indicator was obtained from the LFS and summarized at the provincial level. In the 2010 Census of Population and Housing, the NSO defined an urban area to be any barangay that satisfies any of these criteria: (1) a population of 5,000 people or more, (2) presence of at least one establishment with a minimum of 100 employees, or (3) existence of at least five establishments with 10 to 99 employees, and at least five facilities within a 2-kilometer radius from the barangay hall. Examples of the facilities that were considered are townhall, church, market, public building (school, hospital, library), postal office, fire station and seaport (NSO 2010). However, for consistency in comparing urban areas across time, we used the 1990 definition used by the NSO.

Infrastructure: This variable is represented by a number of indicators. These include access to electricity, national road density, and access to irrigation. Households with access to electricity were obtained from the LFS. Data on roads were obtained from the Department of Public Works and Highways (DPWH) reports. Because of government decentralization, the DPWH in 2005 stopped monitoring and producing reports on local roads as this task became the mandate of local government units. Only national road data were made avail131able starting in 2006. Thus, to make the data on roads more consistent over the years and across provinces, only data on national roads from 1990 to 2012 were used. Road density was calculated as the proportion of national roads per 1000 hectares of area in the province. Data on irrigation was obtained from BAS Country Stat. The information is in terms of percentage of harvested area of rice, by irrigation type (irrigated vs rainfed), during both cropping seasons.

Human capital: We represented human resources by the number of working members and their characteristics presented as the proportion of the labor force by gender, age, and education. The percentage of labor force in the province was summarized directly using data at the provincial level. At the household level, human capital indicators were summarized from data obtained from the merged FIES-LFS datasets. Because the FIES is a rider survey of the LFS, all of the observations of the FIES could be merged with the LFS. The FIES for the given year was merged with either the July round of the LFS of the same year or the January round of the LFS of the succeeding year, depending on data availability. The merged LFS-FIES would allow us to quantify the characteristics of households that were included in the FIES rounds as FIES does not give information on gender, age, and education of members of households, except those of the household head.

Distance: Distance information was obtained from an online distance calculatori[13]. We divided the provinces into four island groups: Luzon, Visayas, Mindanao I, and Mindanao II. Each island group was further categorized into (I) provinces near a major city and (II) provinces far from a major city. In Luzon, the main city is Metropolitan Manila; it is Metro Cebu in the Visayas, Cagayan de Oro City in Mindanao I, and Metro Davao in Mindanao II. We have 11 provinces in Luzon, 4 provinces in the Visayas, 6 in Mindanao I, and 4 in Mindanao II under category I. Category II provinces numbered 26 in Luzon, 10 in the Visayas, 7 in Mindanao I, and 5 in Mindanao II (Table 2.3).

<Table 2.3 about here>

[13] Accessible at: http://distancecalculator.globefeed.com/Philippines_Distance_Calculator.asp

Distance was calculated as the aerial distance from the capital city of the province to the capital city of the major urban area in the four groupings. For provinces within Luzon Island, a province is considered near Metro Manila if the distance of the capital of the province to Metro Manila is less than 110 kilometers. For provinces within the Visayas island group, a province is considered near Metro Cebu if the distance of the capital of the province to Metro Cebu is less than 120 kilometers. For provinces in the Mindanao I group, a province is considered near Cagayan de Oro City if the distance of the capital of the province is less than 110 kilometers. Similarly, for provinces under Mindanao II, a province is considered near Metro Davao if the distance of the capital of the province is less than 110 kilometers. The additional 10 kilometers for the Visayas island group takes into consideration that most of the provinces are in other islands, unlike provinces in Luzon and Mindanao that are located mostly within a major island.

B. Classification of provinces

The provincial grouping used in the analysis of this paper follows the 1991 provincial classification, which only has 73 provinces (excluding Metro Manila and its districts as there are no rural areas in Metro Manila). This section tries to discuss the characteristics of agricultural production, by province or by region, to provide some background on the agricultural activities common in these areas.

Historically, Central Luzon (Region III) has been known as the “rice bowl” of the Philippines because the area is known for large plains of land suitable for rice planting. Western Visayas (Region VI) is also known as a rice-producing area mainly for interisland export of rice in the Visayas region. Northern Mindanao is known for the

production of agricultural exports such as fruits. In particular, certain plantations of pineapple and papaya can be found in the province of Bukidnon.

Gonzales (1987), in analyzing the potential of certain provinces in the Philippines for crop diversification, found that, in the 1970s, certain regions have a comparative advantage in the production of certain crops. For instance, Ilocos and the Cordillera Autonomous Region (Region I) and Cagayan Valley (Region II) are efficient producers of tobacco, cotton, onion, garlic, and vegetables. In Central Luzon (Region III) and Southern Tagalog (Region IV), garlic, onion, and vegetables are financially and economically viable crops (Gonzales, 1987). Major cereals and grains such as rice, corn, and sorghum are also financially viable in these two regions. The regions within the typhoon belt, Bicol, Western Visayas, Central Visayas, and Eastern Visayas (Region V and Visayan Regions VI, VII, and VIII, respectively) are abundant in root crops and fiber crops so crops like abaca (manila hemp), cassava, corn, and rice are economically viable in these areas. Regions in Mindanao (Western, Northern, Southern and Central Mindanao) have food and feed grains as the most viable economically and financially.

Cabbage and white potato are mainly produced in the Cordillera Autonomous Region, accounting for about 80 and 85 per cent of production, respectively (JBIC, 2002). While Northern Mindanao comes as a distant second in the production of white potato at 14 per cent, no other region can be considered a major cabbage producer in the country. Majority of the onions are produced by Central Luzon provinces, with more than 70 per cent of total production coming from this region. Like cabbage, no other province in the country is known as a major producer of onions. Saba (local plantain) is mainly grown in Mindanao provinces with Northern Mindanao, Southern Mindanao,

and Central Mindanao collectively contributing around 54 per cent of total saba production.

As for fruits and vegetables, JBIC (2002) found that the Ilocos Region (Region I) is the major grower (35 per cent of total area), but eggplant is also grown relatively well in other regions such as Central Luzon (15 per cent) and Southern Tagalog (16 per cent). Other island groups also have regional producers of eggplants. Western Visayas (9 per cent) and Central Mindanao (7 per cent) are major producers of eggplants in the Visayas and Mindanao island groups, respectively. Using 2011 data from BAS, Herradura (2011) showed that major producers of bananas in the Philippines are the Mindanao regions: Northern Mindanao (Region X), Davao Region (Region XI), and Region XII (SOCCSARGEN). Together, these regions account for about 73 per cent of the country's annual banana production. Mangoes are mainly produced in the Ilocos Region (Region I), about 62 per cent of total production. Other regions known for mango production are Western Visayas (Region VI) and SOCCSARGEN (Region XII).

As to basic grains like rice and corn, major producers of rice in Luzon are Central Luzon (17 per cent of total area), Cagayan Valley (13 per cent), and Ilocos (9 per cent). Western Visayas is also known for producing and supplying rice in the Visayan region as it accounts for 13 per cent of total rice production. For corn, the major growing area in Luzon is Cagayan Valley, with 11 per cent of total production of yellow corn coming from this region. However, three regions in Mindanao have larger production shares: Southern (18 per cent), Central (16 per cent) and Northern (15 per cent). These statistics show that for purposes of poverty reduction, there exist economically viable high-value crops that could be an important source of income.

2.5 Sources of household income growth

A. Drivers of change

Table 2.4 illustrates how the four catalysts of development have changed over time in the two groups of provinces—those near a major city and those far off from a major city. Population pressure is determined by dividing total harvested area in 1000 hectares by the labor force. Labor force is defined as the pool of population between 15 and 60 years old. On the average, there was about 0.58 hectare per unit of labor force in 1990; in 2012, it went down to 0.45 hectare. This is because of high population growth, which translates into a larger number of people in the labor force.

<Table 2.4 about here>

The proportion of people living in urban areas (a measure of urbanization) has also increased from 24.8 per cent in 1990 to 32 per cent in 2012 (Table 2.4). Further analysis would show that urbanization is rapidly taking place in provinces near major cities as urban population has increased by 11.4 percentage points compared with the 4.8-percentage-point increase in provinces far from major cities. This difference in the growth of urban population between nearby and far-off provinces is presumably because of in-migration as natural population increase is expected to be lower in areas near cities where preference for smaller number of children seems to be the norm.

We considered three important kinds of infrastructure that could have an impact on economic transformation—electricity, national road, and irrigation. Electricity could induce the development of small- and medium-scale industries and services and lessen the drudgery of housework, thus releasing women's time for paid work. Roads could

induce the relocation of industries away from urban centers to the peripheries. Irrigation has a direct impact on increasing agricultural production of traditional crops and, more importantly, high-value nontraditional crops.

Electrification shows relative importance being given to provinces far from major cities (Table 2.4). There was a sharp increase in electrification, especially in provinces far from major cities. The percentage of households with access to electricity in these provinces was about 43.9 per cent, which has just about doubled to 82.45 per cent in 2012. On the other hand, patterns on national road construction and irrigation access have shown that provinces near major cities are given priority. Road density has increased to 1.48 kilometers per 1000 hectares of provincial area in 2012 for provinces near major cities, but, for provinces far from major cities, the corresponding figure is only 1.17 kilometers. In addition to national roads, we have provincial roads (but data are not available because provincial roads in 2006 were placed under the jurisdiction of local government units).

Irrigation indicators also show evidence that provinces near major cities have been prioritized. For provinces near a major city, the proportion of rice land that received irrigation has increased from 74.3 percent in 1991 to 82.0 percent in 2012 while provinces far from a major city only has 57.9 percent of irrigated rice land in 2012 (up from 51.9 percent in 1991).

Investments in human capital are also evident from the proportion of the labor force in the province with secondary education and tertiary education. For the entire country in 2012, on the average, about 42.4 per cent of the labor force had secondary education, 45.2 per cent for provinces near major cities and 40.9 per cent for provinces far from major cities. While it may seem that Category II provinces have a lower figure,

this figure represents a 13.6-percentage-point increase in the proportion of the labor force with secondary education, highlighting marked investments in human capital in far-off provinces. Unfortunately, these patterns were not observed in tertiary education, which slightly increased by just 4 percentage points, on the average, for the entire country. This pattern was seen in all provinces, regardless of distance from major cities.

B. Sources of Income Growth

To identify pathways out of poverty, we explored household sources of income. We classified household income into two major components: (I) agricultural income consisting of wages and income from the production of crops, livestock, and others such as fishery, forestry, and hunting and (II) nonfarm income consisting of wages, nonfarm self-employment incomes, and overseas and domestic remittances (Table 2.5). Production of crops, livestock, and others refer to agricultural entrepreneurship or farming as a strategy to fight poverty; farm wages, nonfarm wages, and nonfarm self-employment income refer to off-farm and nonfarm work as a strategy to overcome poverty; and overseas and domestic remittances refer to migration as a strategy to get out of poverty.

<Table 2.5 about here>

Even as early as 1991, the main source of household income was nonfarm income (88 per cent of average total income), whereas agricultural income was only 12 per cent (Table 2.5). Nonfarm wage income was the most important source, consisting of 65 per cent of the total, followed by foreign remittances (15 per cent), and agricultural wages (7 per cent). This means that the most important strategy to earn income and to fight poverty is to engage in nonfarm wage work, migration, and off-farm

work in agriculture. While the structure of household income did not change much between 1991 and 2012, foreign remittances and domestic remittances became even more important, indicating that migration has become a more important strategy in recent years. These findings give support to Hypothesis 3 on the relative importance of the nonfarm sector in poverty reduction. The role of agricultural wages and high-value production in agriculture appears to be modest in 1991 and their relative importance decreased in 2012 as their share in total income declined.

Since income from labor earnings is becoming important, it appears that labor remains the most important asset of rural Filipino households. The relative importance of foreign and domestic migration indicates a push factor to leave the villages, like population pressure or increasing scarcity of farmland, which was traditionally a major source of income. Urbanization could be a strong pull factor among local towns and cities because of higher wages and presence of urban amenities. Overseas migration has become more attractive over time partly because of increased globalization and creation of government support programs for overseas Filipino workers (OFW) with the establishment of the Commission on Overseas Filipinos in 1980. While the income share of agricultural wages has gone down, it has nonetheless contributed modestly to income growth, particularly in far-off provinces. This may mean that the rise in labor demand in the nonfarm sector has siphoned off labor from agriculture, leading to a decrease in the supply of labor and a rise in wages in agriculture. Similarly, while the income share of crop and livestock has decreased, it nevertheless has contributed modestly to income growth in faraway provinces, indicating the potential of high-value revolution in remote areas. The contribution of nonfarm self-employment activities to total household income has remained fairly similar between 1991 and 2012, at less than

5 per cent. Poverty levels also seem to have converged between areas near urban centers and areas farther off as the discrepancy in the head count ratio between the two areas has gone down, from about 19 percentage points in 1991 to about 15 percentage points in 2012. Overall, the Philippine case shows that labor earnings are important pathways out of poverty inasmuch as labor is the most abundant asset of the poor.

Since labor income is a major driver of income growth, we investigated the trends in hours of work and wages in all sectors. Hours of work per month increased from 2001 to 2007 and declined thereafter, whereas wages rose consistently from 2001 to 2011 (Figure 2.1). This means that much of the growth in total household income comes from the rise in wages brought about by the rise in labor demand, importantly, from the nonfarm sector. The expansion of the nonfarm sector has clearly benefited the poor because the rise in wages is accompanied by poverty reduction.

Further insights can be obtained when we disaggregated incomes by distance of the province from a major city (Table 2.5). Regardless of distance to a major city, nonfarm income (most importantly nonfarm wages) remained the most important source. Households living in provinces far from major urban areas tended to depend more on agriculture than those living near a major city. This dependency, however, declined in 2012 when the share of agricultural income of households in far-flung areas declined from 23 per cent in 1991 to only 13 per cent in 2012 because of the decline in income share of both agricultural wages and crop and livestock income. Overseas and domestic migration has become more important for these households in 2012 as shown by the rising share of remittance income. Foreign remittance income has the same share of income in 2012 for provinces near and far from major cities, while the importance of

domestic remittances has become more pronounced in far-off provinces, with income share of domestic remittances rising from only 5 per cent in 1991 to 10 per cent in 2012. Poverty incidence at $1.25 declined from 30.8 per cent in 1991 to only 23.2 per cent in 2012 in all Philippines (Table 2.5). The decline in poverty was much more pronounced in provinces far from major cities, which started with a high poverty incidence (41.5 per cent in 1991). This is because the growth rate of per capita income was higher in far-off provinces than in those near major cities (16.3 per cent compared with only 11.6 per cent per year). Income ratio between nearby and far-off provinces declined from 2.1 in 1991 to only 1.7 in 2012. This supports Hypothesis 4 ("Catching up") with respect to faraway provinces. This is made possible primarily by the growth of nonfarm income in faraway provinces and the rise in importance of foreign and domestic remittances. This may mean that nonfarm work and migration are channels through which the poor in relatively remote areas are able to increase their income, move out of poverty, and improve their relative income position.

We further expanded our analysis by looking at the disaggregation by island groups: Luzon, Visayas, Mindanao I, and Mindanao II. The importance of agriculture as a main source of income was more pronounced in the Mindanao I and II groups of provinces regardless of distance to a major city compared with provinces in the islands of Luzon and the Visayas. We have the following findings from Appendix 1. First, provinces in Luzon and the Visayas had higher total income and higher income coming from nonfarm sources compared with Mindanao I and II and provinces far from major cities were more dependent on agriculture in all the island groups. Luzon Island is landlocked, characterized by a relatively good infrastructure system, and this is where Metro Manila is located. Second, the shift of household income structure away from

farm to nonfarm sources was more pronounced in the Luzon and Visayas provinces and in those near major cities in Mindanao I and II, giving support to Hypothesis 2, "Role of Distance". Third, the shift away from agriculture in the Visayas, Mindanao I, and Mindanao II was accompanied by the increased importance of foreign and domestic remittances, indicating that migration has become more important than work in agriculture. Fourth, agricultural wages were relatively important as a source of income in faraway provinces in Luzon, Visayas, and Mindanao I, although its importance has declined over time. Fifth, households in the Visayas were more dependent on overseas remittances (comprising about 20 per cent of total household income in 2012) presumably because many Filipino seafarers come from this island group and the Philippines stands as the largest supplier of seafarers (sea-based migrant Filipino workers) in the world. Sixth, and finally, regardless of island and distance to a major city, nonfarm entrepreneurial income remained a minor source of income, which is made up largely of retail trade and services.

C. Potential of high-value products

While the contribution of crops and livestock to household income has declined over time, their contribution to household income growth in faraway provinces remained modest from $176 PPP 2005 in 1991 to $196 PPP 2005 in 2012 (Table 2.5). Agriculture income as a source of household income declined in importance as consumer demand shifted away from food to nonfood items. Yet, the high-value sector within agriculture has potential as a source of income growth. This is particularly noticeable in Mindanao I, which is traditionally engaged in fish production and

processing and in the production of export crops such as banana and pineapple. The most promising sector is livestock and poultry mainly raised in the backyard. The gross revenue from livestock production in nearby provinces rose by 5.2 times; in faraway provinces, it rose by about 6.0 times, with the volume of revenue much higher in provinces near major cities presumably because these products are perishable and are thus non-tradable in remote areas (Table 2.6). A greater potential for income growth lies in poultry, whose gross revenue rose by 7.8 times in nearby provinces and by 72.4 times in faraway provinces (gross revenue was much higher in nearby provinces in 2012). The value of poultry products grew by 10.54 per cent per year between 1990 and 2012 and that of livestock by 7.69 per cent, whereas, in contrast, the growth rate of traditional crop was negative in the same period (Table 2.7). The growth rate in the value of high-value crops was modest at 1.21 per cent per year in the same period. In brief, the potential for productivity growth in agriculture lies in high-value crops, livestock, and poultry, which are labor-intensive sectors with strong forward and backward linkages in the nonfarm sector.

D. The model

To assess the impact of population pressure, urbanization, infrastructure, and human capital on income growth and poverty reduction, we used a provincial model that relates provincial average income by source to various indicators of these factors. Specifically, we modeled Equation 1.1 for each province j at time period t,

$$Y_{jt} = \alpha + \boldsymbol{X\beta} + \epsilon_{jt} \qquad \text{(Equation 1.1)}$$

where Y is the average income by source, to wit, agricultural wages, enterprise income in agriculture, nonfarm wage income, nonfarm enterprise income, and remittances (abroad and domestic)[14]; **X** is a vector of explanatory variables and ϵ is the error term. The provinces were reclassified to form a balanced panel from years 1991 to 2012. To address possible issues of reverse causality, lagged values of the policy-related variables (specifically infrastructure development) were used in the model as opposed to contemporaneous values.

A test for autocorrelation in panel data was conducted (see Appendix 2) and shows that the dependent variables exhibit autocorrelation problems. To address this issue, Wooldridge (2010) mentions that the "Fixed effects estimator is consistent and asymptotitcally normal (Wooldridge 2010; p. 310)" but suggests using robust standard errors to address problems of autocorrelation or heteroscedasticity, to wit, "the robust variance matrix estimator is valid in the presence of any heteroscedasticity or serial correlation, provided that T is small relative to N. (p. 311)" For the provincial model, T=7 which is considerably smaller relative to N=73.

A household model analogous to Equation 1.1 was also estimated where i refers to individual households. Unlike in Equation 1 where the provinces form a balanced panel for all the FIES years from 1991 to 2012, households do not form a panel between different rounds of FIES, so the household model was estimated using a pooled dataset.

$$Y_{it} = \alpha + \boldsymbol{X\beta} + \epsilon_{it} \qquad \text{(Equation 1.2)}$$

Equation 1.2 was estimated to control for endogeneity of policies that might affect income. The assumption would be that, individually, households would be too

[14] Other sources of income were removed from total income as these are non-labor sources of income for the household and would usually have high variation across time.

small to affect policies on population pressure, urbanization, infrastructure development, and human capital services. Under this assumption, we believe that there would be no reverse causality between household income and the indicators of these policy variables.

To further investigate the correlation of these policy variables to agricultural activities, we estimated equation 1.3.

$$Y_{jt} = \alpha + \boldsymbol{X\beta} + \epsilon_{jt} \qquad \text{(Equation 1.3)}$$

For equation 1.3, the dependent variable would be the indicators of agricultural activity, i.e., total revenue from traditional crops, nontraditional crops, livestock, and poultry.

For all the equations, the values for the vector of coefficients, $\boldsymbol{\beta}$, were estimated using ordinary least squares with robust standard errors to correct for heteroscedasticity and serial correlation. Time-fixed effects were also included as explanatory variables.

2.6 Regression results

This section identifies the direction by which the four catalysts of transformation (population pressure, urbanization, infrastructure, and human capital) have induced households to adopt and combine various pathways out of poverty. We explore the impacts of the four catalysts on different sources of household income as income sources represent the pathways households have tracked to move out of poverty.

Briefly, we have the following findings. First, population pressure (or scarcity of farmland) induces households to engage more in nonfarm work and to migrate overseas and in local towns and cities and to spend less time in crop and livestock production. Second, urbanization induces households to join the nonfarm sector labor market and to establish nonfarm self-employment businesses whereas it discourages both overseas and domestic migration. Third, electricity and roads are significant

factors affecting household decision to engage in nonfarm self-employment activities and to engage in overseas and domestic migration. Fourth, irrigation by increasing cropping intensity significantly increases agricultural wage income and decreases income from domestic migration and self-employment income indicating that irrigation creates jobs in the agricultural sector. Fifth, a rise in the number of working age members tend to encourage households to get involved in a wide variety of economic activities, most importantly, in nonfarm wage work. Sixth, households with a larger proportion of more educated members (i.e., those with secondary and tertiary schooling) are associated with a larger allocation of its labor resources to such activities as nonfarm work, nonfarm self-employment, and domestic and overseas migration. The correlation between higher education and income is highest in nonfarm wage work. Seventh, the females and the younger cohort of rural Filipinos are more positively correlated to engage in nonfarm wage work and migration after controlling for education. Eighth, and lastly, households in more remote areas further from Metro Manila tend to choose farm wage work as a source of livelihood. Overall, the regression results support 3 hypotheses: H1 on the role catalysts of change, H3 on the importance of nonfarm sector on income growth, and H5 on the role of human capital on the growth of nonfarm income.

The major question is where the poor are and the kinds of activities they pursue. Inasmuch as the poor are the less educated segment of the rural population, the regression results show that the poor remain in agriculture particularly in livestock, and poultry. These sectors are the most promising sector in agriculture with high rates of growth (Table 2.7).

A. Population pressure

Population pressure as captured by the percentage of area planted to labor force in the province is expected to have a positive association with agricultural wage and agricultural activity. As total labor force increases and land becomes more scarce relative to labor force, we expect the income from agricultural activity and agricultural wage to decrease. Also, improvements in total harvested area per labor force would also drive labor away from nonfarm activities towards agricultural activities so we expect that this would have a negative correlation with nonfarm wage income

<Tables 2.8, 2.9, 2.10, 2.11, 2.12, 2.13 and 2.14 about here>

The provincial level regression results show that average income from agriculture (i.e. agricultural wage and crop farming and other agricultural activities) is positively associated with area harvested per unit of labor force (Table 2.8). An increase in the area planted per unit of labor force by one unit is associated with an increase in income from agricultural sources with a larger absolute value increase ($190.4 PPP 2005) for entrepreneurial activity as compared with that for ($86.05 PPP 2005) agricultural wages (Table 2.8, columns 1 and 2). On the other hand, a one unit increase in area planted relative to labor force is negatively associated with other income components.

Consistent with the provincial regression results about harvested area per labor force we see from household regression results that it is positively associated with agricultural wages, and crop farming, livestock and poultry production (Table 2.9). At the household-level, particularly in Luzon and Mindanao I, agricultural wage income of the household is positively associated with the ratio of the harvested area to labor force in the province. At the household-level, the results of the regression indicate that a 1

unit increase in the provincial harvested area per labor force is associated with $191.3 PPP 2005 increase in agricultural wage for Luzon (Table 2.10) and $ 104.1 PPP 2005 for Mindanao I (Table 2.12). While the coefficient is positive for the Visayas Island group (Table 2.11), it is not statistically different from zero at reasonable levels of significance.

More puzzling would be the coefficient for Mindanao II which is negative and significantly different from zero in agricultural wage income at the household-level (Table 2.13). This implies that as the harvested area per labor force in the provinces in Mindanao II increases, the agricultural wage income decreases for households within these provinces in Mindanao II. As land expands, households in Mindanao II shift away from agricultural wages towards other agriculture income, most likely crop, livestock, and poultry production which could be produced at the backyard.

Overall, it is clear that scarcity of farmland pushes households to pursue more on labor-based activities in the nonfarm sector.

B. Urbanization

Urbanization, the percentage of households in the province living in the urban area as an indicator, is expected to have a negative impact on agricultural wage but could increase income from crop farming and production of livestock and poultry. However, with urbanization comes the possibility of finding nonfarm work so we expect that this variable would have a positive relationship with nonfarm income particularly self-employment and nonfarm wage work.

Provinces that have higher percentage of households living in urban areas tend to have lower income from crop farming, livestock and poultry raising, forestry or even

fisheries (Table 2.8). The discussion on land conversion in the Philippines provides support to this result. As much agricultural land is converted to nonfarm uses, the province increases its urbanized areas but reduces the income opportunities that would come from agriculture. Also, in the more urbanized provinces, there would be more opportunities to engage in nonfarm activities.

Correlation between nonfarm wages and urbanization in the provinces is positive and significant indicating a one percentage point increase in the percentage of households living in an urban area is associated with $5.562 PPP 2005 increase in nonfarm wages (Table 2.8). This correlation is greater than the correlation between non-agricultural self-employment and urbanization which stands close to $4.8 PPP 2005.

With urbanization comes a large number of opportunities for nonfarm wage work or self-employment especially since urbanization is related to the presence of industries or establishments and different kinds of public infrastructure which can support the establishment of businesses. Urbanization is negatively correlated to remittances from abroad and not statistically significantly correlated with domestic remittances (Table 2.8) which may mean that urbanization creates forces that discourages international migration.

At the household-level, urbanization is positively correlated with nonfarm sources of income, but negatively correlated with crop farming, livestock and poultry raising and fishing (Table 2.9). Also, in Luzon (Table 2.10) and Visayas island groups (Table 2.11), urbanization of the province is negatively correlated to remittance income (domestic and abroad). The case for Mindanao (Table 2.12 and Table 2.13) may need to be studied further as the urbanization may be capturing other factors like the weak industrial base in the region due to security and peace and order issues.

Table 2.14 provides additional insight on the relationship of urbanization and agricultural income from crop farming, livestock and poultry raising, forestry, and fisheries. While the relationship is negative for traditional crop farming, it is positive for livestock and poultry. This supports the theory that urbanization promotes diversity of diet which leads to a greater demand for high value products.

Households in the provinces experiencing rapid urbanization would choose to have their family members engaging in nonfarm wage work or self-employment rather than see them move out of the households. This is especially true for Luzon and Visayas were urbanization has a negative coefficient. On the other hand for Mindanao II, the case is different. Possibly because of weak industrial base, the household members who would have limited choices for nonfarm wage work, would more likely fall back into agricultural wage work. Thus, the members are encouraged to migrate out of the household to work abroad or work in other cities or provinces. In brief, urbanization in general encourages nonfarm work and discourages migration.

C. Human Capital

Human capital indicators include the following: (1) the percentage of the household members who are female, (2) percentage of the household members who are between 15 and 25 years old (control group), between 26 and 35 years old, between 36 and 45 years old, and between 46 and 60 years old and (2) percentage of household members who have 0-6 years of schooling (primary school) (control group), those have 6-10 years of schooling (secondary schooling), and those who have more than 10 years of schooling (tertiary schooling). We expect that as the ratio of female members in the household increases, income from nonfarm activities (wages and self-employment), and

remittances (domestic and abroad) would also increase. We also expect the same relationship for secondary and tertiary educational attainment.

In general, younger members of the households between 15 and 25 years old (control) are associated more with engaging in nonfarm work while the older ones (between 46 and 60 years old) are associated less with engaging in any economic activity; retirement age in the country is 60 years old. At the provincial-level of analysis, we find that provinces with a greater proportion of working members with tertiary education tend to have a positive and significant correlation with income from nonfarm wages and self-employment and overseas remittances (Table 2.8).

This also holds true at the household-level of disaggregation (Table 2.10 to Table 2.13). Female members of the household appear to be much less associated with engaging in crop farming, livestock and poultry production and fishing because farmland is traditionally bequeathed by parents to their sons. At the household –level of disaggregation, the income from nonfarm work and non-farm self-employment activities as well as domestic and foreign remittances also tends to increase while income from agricultural wage work tends to decrease as the proportion of female members increases (Table 2.9) giving support to the common observation that Filipino females are largely engaged in nonfarm work and migration while the Filipino males tend to stay in rural villages engaged in farming activities.

For both the provincial- and household-level estimations, agricultural wage income tends to decrease with the rise in the proportion of household members with tertiary education indicating that the most educated members tend to engage more in activities outside farming (Table 2.8 and Table 2.10). Yet surprisingly, the coefficient of tertiary schooling is positive in crop production and livestock and poultry production

indicating that the most educated are associated with agricultural activities presumably in high-value products which need judgment in timing of post-production activities (e.g., packaging, refrigeration, and shipping) requiring higher education and specific skills.

Overall, it is clear that while the quantity of labor resource (number of working members) tend to be positively associated to incomes from many sources the quality of labor resources has differential correlations on various income sources with the females and secondary and tertiary education having greater positive correlations on nonfarm wages and remittances. This may mean that households with more female workers and more educated working members will tend to choose to allocate labor resources to nonfarm work and to migration. There is clear indication that the less educated (who comprise the larger segment of the poor in rural communities) remain engaged in agriculture in agricultural wage work. Regression of provincial agricultural revenues (Table 2.14) shows that higher education does not seem to be associated with provincial revenues from traditional crops, livestock, and poultry (including fishing) indicating that the less educated are associated with these activities.

D. Infrastructure

Indicators of infrastructure development include access to electricity, road density, and access to irrigation. We expect that these indicators would have a positive impact on nonfarm incomes but would have a negative impact on agricultural income as the presence of these infrastructures would drive labor away from agricultural activities towards non-agricultural activities. For remittance incomes, we expect that electricity would be positively correlated with foreign and domestic remittances while road density would be more associated with domestic remittances than with foreign remittances.

Irrigation positively affects agricultural income. Because we used lagged values of these infrastructure variables, we can claim some form of causation exists, that is, the last period's infrastructure status impacts the current level of income.

We also find a negative impact of electricity access on agriculture income. This is understandable given that as the percentage of rural households with electricity access in the province increase, the income opportunities in other sources also increase thereby resulting into a shifting of household labor resources away from entrepreneurial activities in agriculture (Table 2.8). Household regressions also support the observation on the impact of gaining access to electricity for rural households is negatively correlated to agricultural wage work and income from crop farming, poultry and livestock production, and fishing all the country as a whole (Table 2.9) and for almost all island groups (Table 2.10 to Table 2.13). Also consistent would be the pattern in the magnitude of the impact of electrification across income source. The largest impact would be on nonfarm wage work, followed by nonfarm self-employment, and finally by remittance income from abroad and domestic.

Similarly, we find a positive relationship between road density and domestic remittance. As road density in the province increases by one unit, average provincial income from nonfarm wage work and domestic remittances increases by $3317.6 and $19.00 PPP 2005, respectively (Table 2.8). On the other hand, the relationship is reversed for agricultural wages which means that as the road density in the province increases, the average income from agricultural wage in the province decreases.

Consistent with the provincial level regressions on Table 2.8, road density was also seen as a negatively correlated to agricultural income sources in the entire country at the household-level of disaggregation. Similar observations can also be made for the

Luzon (Table 2.10), Visayas (Table 2.11) and Mindanao island groups (Table 2.12 and Table 2.13) where the coefficient is negative for agriculture and crop production, poultry and livestock production, and fishery. Similarly, we see positive correlation between roads and nonfarm wages, and domestic remittance for the entire country as a whole at the household-level of disaggregation (Table 2.9) and Luzon Island as a group (Table 2.10).

The impact for the case of the Visayas group is different as road density is negatively associated with entrepreneurial activities in non-agricultural sector but it is also positively correlated to both kinds of remittance income. It is understandable why road density would be more positively associated to migration-related income in the Visayas as the provinces are mostly island groups that are connected not just through roads (particularly national highways) but also ships (Table 2.11).

For Mindanao I, roads promote migration but negatively correlated with wage income (Table 2.12). For Mindanao II, because of the large agricultural market for fruits and vegetables in Davao, national roads promote agricultural enterprise and shifts households away from nonfarm wage work (Table 2.13).

Agriculture related infrastructure as captured by irrigated area is positively associated with agriculture wage work. Interestingly, the coefficient of nonfarm wage work is negative indicating a negative correlation between improvements in agricultural irrigation and nonfarm wage work. Irrigation tends to increase labor productivity and thus increases wages.

The role of irrigation in supporting agriculture income is also manifested in the regressions where we can clearly see that agricultural wages is positively associated with irrigation (Table 2.8) and this is consistent across all island groups (Table 2.10 for

Luzon, Table 2.11 for Visayas, Table 2.12 for Mindanao I and Table 2.13 for Mindanao II). and this is consistent with the results of the provincial regression. However, for the other income sources, the impact of irrigation varies depending on the island groups.

E. Role of Distance

Provinces which are further from the main urban center (Metro Manila) are expected to have lower nonfarm income. At the provincial-level, there is no significant correlation between agricultural wage work and crop farming, poultry and livestock production, and fishing and distance to Metro Manila indicating that these activities are on-going even in the suburbs of Manila. Yet, we also see clearly that distance from Metro Manila is negatively associated with nonfarm income sources (Table 2.8).

Looking at the country as a whole at the household-level (Table 2.9), distance from Metro Manila is positively associated with agricultural wage work (i.e., households in remote villages are engaged in agricultural wage work) and negatively associated with crop farming and other agricultural activities. We speculate that this is because high-value products are perishable and refrigeration services and road network is not well developed in the country, households nearby Manila are engaged in small-scale production of high-value products. In brief, high-value production and nonfarm wage work are lucrative activities nearby Metro Manila.

For the Visayas (Table 2.11), we see that households in provinces far from Cebu City have more income coming from agriculture and crop farming, livestock and poultry production, and fishing. Interestingly, there is a positive and significant correlation between self-employment in nonfarm activities and distance from Metro Cebu indicating some form of start-up industries in far off provinces presumably

because of sub-contracting activities between industries located in Metro Cebu and those in the suburbs.

The case between Mindanao I and Mindanano II are different in terms of the impact of distance from major urban areas. For Mindanao I (Table 2.12), agriculture income is higher the farther the province is away from Cagayan de Oro City (CDO) but for Mindanao II (Table 2.13), the agricultural wage income is lower for provinces farther away from Metro Davao. This is understandable as provinces far off from CDO are known for the production of high-value crops.

Overall, we see the pattern that provinces far off from the urban centers have lower income from nonfarm sources relative to those nearby urban centers. For far off provinces, the choice of economic activity may depend on the level of agricultural development.

2.7 Conclusions and policy implications

This chapter aims to identify pathways out of poverty in the rural Philippines by looking at the different sources of household income. We found that the most important sources of income growth are nonfarm wage work, foreign remittances, and domestic remittances indicating that nonfarm work and migration are important pathways out of poverty. Yet in remote areas, where poverty tend to proliferate, income from agricultural wage work and from production of high-value products such as crops, poultry, livestock and fishery remain important for income growth.

Through a survey of literature on pathways out of poverty, 6 hypotheses were developed, and tested. Hypothesis 1 “Catalysts of change” focuses on role of population pressure, urbanization and infrastructure development as factors influencing

the rural households' decision to engage in nonfarm activities. Hypothesis 2 "Role of distance" explains the discrepancy in nonfarm income participation of households depending on their proximity to major urban centers. Hypothesis 3 emphasizes the role of nonfarm wage income in rural development and rural poverty reduction. Hypothesis 4 "Catching up" continues to look at the difference between provinces near and far off from major urban centers and how income is growing faster in the far off provinces. Hypothesis 5 "Role of human capital" emphasizes the connection of higher education and nonfarm activities. Finally, Hypothesis 6 "Role of high-value products" focuses on the contribution of agriculture production of high-value products to rural poverty in faroff areas.

Regarding Hypothesis 1 on the catalysts of change, we find through tabular analysis that population pressure, urbanization and infrastructure development have had significant impact on different sources of income indicating that household decisions are not static but are changing favorably to different catalysts of change and income growth. This is verified by tabular and regression analysis which gave fairly consistent results.

Hypothesis 2 on the role of distance is also supported by regression analysis. The regression results support also theoretical explanation of Haggblade, Hazell and Reardon (2007) on the development of rural towns that induce domestic migration thereby increasing domestic remittances.

The role of nonfarm wage incomes presented as Hypothesis 3 on the importance of nonfarm income is supported in tabular and regression analysis while tabular analysis supports Hypothesis 4 on the catch up of remote villages with those villages nearby urban areas.

Hypothesis 5 on the role of human capital was investigated and supported by using tabular analysis and regression analysis. Higher education induces household member to engage in nonfarm wages and to migration. For certain island groups in the Philippines, we found the significant impact of higher education in agricultural development, as it is closely related to agricultural entrepreneurial activities in the production of high-value products which need careful handling in post-production activities.

Our findings generate several policy implications. First, inasmuch as nonfarm wage income is the main source of income growth, rural development policies should focus, not only in agricultural modernization, but also in improving the industrial base of the country. This may mean expanding the stock infrastructure such as, but not limited to, electricity and concrete road as these infrastructures induces the evolution of industrial and service sectors. The Infrastructure development has differential impacts on different income sources of rural household. Given this finding, we suggest infrastructure development policy should consider focusing on infrastructure that creates jobs employing unskilled labor which is the main asset of the poor. Needless to say, good quality of infrastructure has a longer lasting impact on creating jobs thus there should be a focus on the quality of service delivery of physical infrastructure. Second, since migration is an important pathway, there should be focus on improving the human capital base of the country. The promulgation of the Enhanced Basic Education Act that increases basic education from 10 to more than 12 years (K-12: kindergarten to 12 years of schooling), the National Health Insurance Act, and the Responsible Parenthood and Reproductive Health Act are strategies in the right direction. Finally, the

government should, conditional on sound evidence of benefit-cost analysis and positive rates of return, continue to invest in agricultural development particularly on irrigation and modern rice technology as the Philippines is a major importer of rice and thus the poor are susceptible to swings of high rice prices. In addition, the rural poor remains in agriculture. The high-value revolution which can offer a new wave of employment and productivity growth appears to be on-going in areas nearby major cities because of good infrastructure such as electricity and good roads that facilitates handling and timely delivery of perishables. Expansion of infrastructure to remote areas may set a stage in transferring the high-value revolution even to further places.

CHAPTER 3 REMITTANCES AND CHILDREN'S SCHOOLING IN RURAL PHILIPPINES

3.1 Introduction

Chapter 2 has shown that overseas and domestic remittances have been a major source of income growth for Philippine rural households, thus migration has become an important strategy in fighting poverty.

By increasing income and savings through migration, households have the opportunity to invest in education in so far as education is a normal good. The education of children is also viewed as an important investment (Behrman and Knowles 1999; Acharaya and Gonzalez 2013) for some households that do not have access to financial investments.

This chapter therefore inquires how migration can be a pathway for rural households to move out of poverty through investment in child schooling. Remittances have the dynamic impact of increasing investments in children's schooling because remittances often serve as schooling funds. Higher levels of schooling encourage the younger generation to explore lucrative jobs in the nonfarm sector, even overseas, enable them to send remittances, and eventually move their households out of poverty.

The remaining parts of this chapter are as follows: Section 3.2 presents the literature review and testable hypotheses on the determinants of child schooling. Section 3.3 looks at the Philippine experience of migration followed by Section 3.4 which explains the data used for the analysis. Section 3.5 presents the results of the two

models and discusses the results. Finally, Section 3.6 concludes and provides policy recommendations.

3.2 Determinants of Child Schooling[15] and Testable Hypotheses

Studies have identified three major factors affecting child schooling, namely, child, household, and village characteristics. Each of these will be explained in the succeeding sub-sections.

A. Child characteristics

A child's characteristics have a direct impact on the decision of the parents to send him to school or on the child's performance in school (Moock and Leslie 1986, Acharaya and Gonzalez 2014. We shall therefore explore the impact of age, gender, nutrition, and birth order in school participation. A child's age is a significant determinant in school participation as the opportunity cost of going to school may be significantly higher for older children. In the Terai region in Central Nepal, Acharaya and Gonzalez (2014) found that the ratio of children enrolled in school is an increasing function of age. Similar results were observed for rural Ethiopia where Mani, Hoddinot and Strauss (2013) found that a 13-year old has a higher probability of being enrolled than an 11-year old. By interacting age with income, Behrman and Knowles (1999) found that for older children aged 12–17 years old in Viet Nam, there is a larger income elasticity of exam scores and last grade completed compared with children of primary school age.

[15] Indicators of child schooling are varied. Behrman and Knowles (1999) identified and analyzed four common indicators of child schooling: (1) Age when children start school; (2) Grades passed per year of school; (3) Last completed grade of schooling; and (4) Test scores.

This is an expected result as primary school is almost universal in Viet Nam and the cost of schooling borne by parents are much less so that school performance and schooling years are less responsive to income.

King and Bellew (1991) in their analysis of the determinants of gender gap in school enrollment and school attainment in Peru found that the discrepancy on education spending between gender may be explained by the preference of parents over one gender (i.e. boys over girls) and that this discrepancy may be explained by the difference in the way the labor markets reward the education of boys and girls. The authors also do not deny the possibility that parents' preferences and labor market rewards may interact and influence parents' decisions to send children to school.

Behrman and Knowles (1999) found in Viet Nam that the association between enrollment and parental income is smaller for boys than for girls indicating that education for girls is more responsive to change in income. Similarly, girls are significantly less likely to be enrolled in school compared to boys in the Terai region of Central Nepal (Moock and Leslie 1986). Still in Nepal, Acharaya and Gonzalez (2013) was able to show that boys in households receiving more remittances are more likely to be in school than girls because parents expect higher returns from the education of their sons than their daughters. There are some cases, however, that the authors find no relationship between gender and schooling outcomes. For instance, Dorantes and Pozo (2010) did not find gender difference to be statistically significant in the Dominican Republic. On the other hand, some countries have preference for daughters' education

over sons' education such as the recent phenomenon in Bangladesh[16]. Chernichovsky (1985) also found that girls are more likely to be in school than boys in rural Botswana.

There are a number of indicators that can be used to measure the nutritional status of a child. Moock and Leslie (1986) used a child's hemoglobin level as a proxy for nutritional status and found that, from their sample of households in Bara and Rutahan in the Terai Region of Central Nepal, nutritional status is not related to school enrollment. However, other indicators such as height-for-age and weight-for-height were estimated to have a positive relationship with the child being enrolled in school.

The more recent review of the relationship of health and schooling outcomes by Glewwe and Miguel (2008) emphasized the importance of addressing the sources of bias when estimating the causal impact of nutrition on schooling outcomes. Glewwe and Jacoby (1995) investigated the impact of child health as indicated by a child's weight and height on delayed enrollment and grade attainment in Ghana. To address the possibility of getting biased estimates using cross-section data, Glewwe and Jacoby (1995) used family fixed effects and found a strong negative relationship between child health and delayed enrollment but no significant relationship between child health and school attainment.

A more recent study by Dorantes and Pozo (2010) in the Dominican Republic on the impact of migration of household members to the United States (US) found that first-born children are more likely to attend school than their younger siblings. Acharaya and Gonzalez (2014) found similar results in the case of Nepal. This is consistent with the practice of older children helping their parents in sending younger

[16] According to UNICEF, primary school age enrolment rates in Bangladesh covers 89 percent for boys and 94 percent for girls. http://www.unicef.org/bangladesh/children_4862.htm

siblings to school. In contrast, Arif and Chaudhury (2015) found that in Punjab, Pakistan, migration has a positive impact on the probability of school enrollment of younger children but not on older children.

B. Household Characteristics

A number of studies have considered family size and composition (including parental schooling), total family income or expenditure, access to remittances as well as access to land, farm assets, and electricity as important factors that affect child schooling.

In the case of the Dominican Republic, Dorantes and Pozo (2010) found that children who belong to households with preschool-age children have a lower probability of being in school. Chernichovsky (1985) found similar results for rural Botswana. Arif and Chaudhury (2015) have looked at the impact of external migration in Punjab, India and found that migration has a significant impact on the enrollment of children 5–11 years of age but the impact is no longer significant for children 12–17 years of age. The authors obtained these results using an endogeneity-corrected model[17] that relates the decision to enroll a child in school with the presence of migrants in the family.

Using the 1975–1976 Malaysian Family Life Survey, King and Lillard (1987) found that there is a positive correlation between education of parents and child schooling even after controlling for income. The positive relationship captures the ability of the more educated parent to provide a home environment that is conducive to the education of the child. In the case of Nepal, the father's schooling is positively

[17] Arif and Chaudhury (2015) identified market condition as a potential omitted variable that can simultaneously determine the decision to migrate and the decision to enroll a child in school. Because this variable is absorbed by the error term in the model, the authors instead used the historic migration rate of each village in India and interacted this with the number of males in the household in order to resolve the endogeneity problem.

associated with the probability of a child being enrolled in school. This relationship remains true even after controlling for the nutritional status of the child, farm size, and membership in lower castes (Moock and Leslie 1986).

In Bangladesh, Hossain (1989) used household surveys administered in four different thanas (villages) of Bangladesh to assess the impact of public programs on a number of child outcomes. They find that the education of both the father and the mother has a positive impact on child schooling, with the mother's education being more significant in terms of augmenting child education and reducing family size.

Balderson et al. (1981) found that mothers in Guatemala who are more educated have children who are more likely to be in school. On the other hand, Dorantes and Pozo (2010) found different results in the Dominican Republic. Households wherein the female spouses (of the household heads) have a high level of education also have children with a higher level of education. Their findings also suggest that the educational attainment of the male household heads is not associated with the education of children in the household. In the case of Peru, King and Bellew (1991) found that the educational levels of both parents have a positive correlation on the school enrollment of their child. Moreover, in terms of relative importance, they find the occurrence of "same gender preference" wherein the father's educational attainment has a bigger impact on the boy's enrollment relative to the girl's enrollment while the mother's educational attainment has a bigger impact on the girl's enrollment relative to the boy's.

Tansel (1997) looks at the determinants of the demand for education for the cases of Ghana and Côte d'Ivoire. Estimating a probit model of primary school attendance for each country, the author finds that a father's education is positively associated with the

education of boys and girls alike and the same can be said for the mother's education. However, the impact of the father's education is greater than that of the mother's.

There are more recent studies that have tried to address the omitted variable bias in OLS estimates of the impact of parental schooling on child schooling. Behrman and Rosenzweig (2002) used data on twins from Minnesota, US to address the omitted variable bias associated with the mother's endowments and assortative mating. Their results show that when the mother's endowments are controlled, the impact of maternal schooling on child schooling is marginally negative or at least not positive. In contrast, parental schooling impact for the father is positive and robust in all specifications and controls. Plug (2004) used data from the Wisconsin Longitudinal Survey that was able to identify adopted children. Using the identification strategy that adopted children share their adoptive parents' environment but not their genetic ability allows the authors to control for inherited skills and abilities. Plug finds that when the husband's level of education is controlled, the mother's level of education has no impact on the adopted children's schooling.

While the Minnesota and Wisconsin studies find a negative or insignificant causal relationship between maternal education and child schooling, the study in Norway by Black et al. (2005) provides evidence for the mother's level of education using a different identification strategy to present a causal link between parents' schooling and children's schooling. Using the policy change implemented in different municipalities in Norway sometime from 1960–1972 that increased years of education by two years (from 7 grades to 9 grades) as an instrument for parental education, the study found that the father's level of education does not affect children's education.

Meanwhile, the mother's number of years of education has a causal relationship with the son's number of years of education but not with the daughter's.

In rural Philippines, Quisumbing, Estudillo and Otsuka (2004) found that the "same gender principle" applies in older generation: fathers prefer sons in schooling investment. This principle appears to have disappeared in the younger generation where parents are gender neutral in their preferences on their children's schooling.

Income is a proxy for unobserved determinants of child schooling such as innate ability, preferences and family connections, and price variation in school inputs (Behrman and Knowles 1999).[18] A number of studies have revealed various ways through which income affects educational outcomes. Increased household income improves enrollment probability (Dostie and Jayaraman 2006). Higher level of income reduces the probability of being delayed in school enrollment (Glewwe and Jacoby 1995) and increases the likelihood of schooling completion (King and Lillard 1987). It likewise reduces the likelihood of leaving school (Glick and Sahn 2000). Higher income also improves test scores (Brown and Park 2002). Some of the studies that have looked at the association between income and children's schooling have found that the impact of income on child schooling depends on the child's level of schooling. Behrman and Knowles (1999) found that in Viet Nam, the impact of income is low for children in primary school mainly because primary school is universal. The impact becomes more pronounced for older children (12–17 years old).

Dorantes and Pozo (2010) found that remittances increase school attendance of children in secondary school in the Dominican Republic but not for children in primary

[18] See Behrman and Knowles (1999) for a detailed survey of country cases that calculated the income elasticity of school indicators.

school. The authors used past migration networks in the US and past unemployment rates in 1999–2000 as instruments for remittances to address the possible source of simultaneity and bias.[19] Interacting remittances with other variables, the authors were able to find that the impact of remittances vary on certain demographics of the population. For instance, they found that remittances benefit higher order birth children but not the firstborns.

Similarly, Arif and Chaudhry (2015) in their study on the impact of remittances and external migration on school participation in Punjab, India found that remittances have statistically significant and positive impact on schooling attainment especially for younger children. The study controlled the endogeneity of remittances through historic migration rate of each village interacted with the number of males in the household to solve the issue of the lack of variability of the instrument.

Household characteristics that are related to increasing the opportunity cost of being in school are expected to have a negative impact on child enrollment. For instance, Moock and Leslie (1986) found a negative relationship between farm size and child enrollment for Central Nepal. Similar results have been found for rural Botswana (Chernichovsky 1985) and Bicol region in the Philippines (Paqueo 1981).

Access to electricity reduced the value of a child's time in performing household chores such as collecting firewood or fetching water. As such, parents would choose to send the child to school as the child's time spent at home becomes less valuable. This has been observed by Paqueo (1981) in the Bicol region in the Philippines.

[19] Dorantez and Pozo (2010) illustrate the source of bias by considering the possibility of someone, say an aunt, remitting to the household because of, for example, a favorite nephew's school attendance. In this case, the direction of causality would be reversed, that is, school attendance determines migration remittance.

C. Village Characteristics

Glewwe and Jacoby (1994) showed that improvement in school quality is associated with higher enrollment. In evaluating public programs for Bangladesh, Hossain (1989) found that government inputs into primary and secondary schools increase child enrollment. King and Bellew (1991) analyzed the Peruvian case and found that the impact of providing textbooks and increasing the number of teachers are important in inducing households to send their daughters to school. The authors provide a possible explanation for this result: that the parent's demand for a daughter's education is more price elastic than their demand for boys' education.

In terms of facilities, Behrman and Knowles (1999) found that congestion in the village is significant and negatively associated with exam scores in the last grade completed.

D. Testable Hypotheses

Based on the aforementioned review of literature, we have come up with the following hypotheses:

Hypothesis 3.1: Remittances and child schooling: A child from a household that receives more remittances is more likely to be in school and is more likely to progress in school.

Hypothesis 3.2: Household income and child schooling: A child in a household with higher income is more likely to continue in school beyond primary level.

Hypothesis 3.3: Remittances and expenditure pattern: Households receiving remittances tend to allocate a higher share of household budget on children's health and schooling.

3.3 Migration and Remittances in the Philippines

A. History of International Migration

Before World War II, the main destination of International Filipino migrants was the US, particularly Hawaii, as plantation workers in pineapple and sugar farms, and in Washington State as apple pickers (IOM 2013; Asis 2006). During this period, the Philippines was a US colony and Filipinos had easy access to the US. According to Asis (2006), the earliest Filipino workers who arrived in Hawaii in 1906 were employed in sugarcane and pineapple plantations. From Hawaii, the workers were able to move to the mainland US and obtained work in other sectors.

Two major factors that have resulted in the shift of the destination of Filipino migrants away from the US are the passage of the Tydings-McDuffie Law in 1934 (Asis 2006) and the outbreak of World War II (IOM 2013). The Tydings-McDuffie Law declared the independence of the Philippines in 10 years' time and subjected the Philippines to 50 visas per year as immigration quota. While the outbreak of World War II negatively impacted the free movement of Filipinos to the US, the country continued to send Filipinos to Hawaii to serve as military personnel, laborers or even war brides (Asis 2006).

The political situation of the country in the 1970s has contributed to the emigration of a number of Filipinos. The imposition of Martial law pushed political opponents and some of the business owners to migrate out of the country. It was also in

the 1970s when the regime of President Ferdinand Marcos encouraged the migration of workers as a response to the increasing domestic demand for jobs in the Philippines (IOM 2013).

Aside from domestic factors, external factors have also contributed to the migration of Filipinos in the 1970s. The major surge of laborers going to the Middle East started in the 1970s because of the high oil prices that provided surplus to oil-exporting countries leading to an infrastructure boom in the Middle East. Infrastructure development increased the demand for foreign labor which they sought from East Asian countries including the Philippines (Asis 2006; Ball 1997; IOM 2013). When the construction boom in the Middle East was completed in the early 1980s, there was a reduction in the demand for construction workers (IOM 2013) but jobs in the service sectors were subsequently created. Ball (1997) reported that the significant reduction in the demand for construction workers in the Middle East in the early part of the 1980s was replaced by a rise in demand for professional and service workers.

Since the 1990s, East Asia and Southeast Asia particularly Japan, South Korea, Hong Kong, Singapore and Taiwan became a major labor-importing region (Ball 1997). Ball further notes that the increase in the demand for service workers in Asia increased dramatically than the increase in the Middle East indicating another shift of the destination of Filipino workers away from the Middle East to East Asia and Southeast Asia.

This trend continues up to the present with the Middle East and East Asia being major destinations of Filipino workers. Data from the Philippine Overseas Employment Agency (POEA) in 2012 showed that Saudi Arabia, United Arab Emirates, Singapore, Hong Kong, Qatar and Kuwait are the major destinations of 75 per cent of deployed

Filipino workers. From 2006–2012, the common jobs for overseas Filipino workers (OFWs) are household workers, nurses and other professionals, waiters and bartenders, caregivers, wiremen, plumbers, welders, cleaners, and cooks. This indicates that majority of OFWs are employed in the service sector.

B. Who migrates? Where do workers go? What jobs?

Just as the destinations of the OFWs have changed over time, so did the image of the typical Filipino migrant as a reflection of the change in the markets for Filipino workers. In the 1900s to around 1940s, the typical migrant is characterized as an unmarried male employed as an agricultural worker in the United States (IOM 2013).

This image of the Filipino migrant changed when the US imposed policies limiting the migration of Filipinos in the 1960s. Thus, in the late 1970s, the persona of a typical Filipino migrant would be a 30–40 year-old male who is involved in the construction industry in the Middle East (Asis, Huang and Yeoh 2004). In the 1990s, Ball (1997) characterizes the typical Filipino migrant as female and working in the services sector particularly in entertainment and housework. They are usually employed as unskilled or semiskilled workers in foreign countries even though they possess professional qualifications like teaching or accountancy back home. Ball (1997) also notes that the women are generally employed in highly vulnerable occupations such as domestic servants and entertainers. However, citing the work of Battistella (1994), Ball (1997) noted that the expansion of the economy in East Asia (particularly South Korea, Taiwan, and Japan) had allowed for the diversification of labor and increased the participation of women and men in other sectors.

Figure 3.1 illustrates the flow of remittances and OFW deployment from 1975–2012. The trend has been increasing for both remittances and deployment since 1975 during the oil boom in the Middle East. Accordingly, remittances have increased over time with a sharp rise in 1997 because of the Asian financial crisis and the major drought which took place at about the same time. Needless to say, remittances tend to increase with the occurrence of disasters (both manmade and natural). There was also a sharp rise in remittances beginning in 2005 along with the sharp increase in the number of OFWs. It is important to mention that remittances are highly correlated with the wages of OFWs. Since the OFWs are increasingly engaged in semi-skilled and skilled jobs, their earnings must be higher compared to construction workers, thus their remittances to the Philippines must be higher.

C. Internal Migration

In the Philippines, rural-to-rural migration is the most common type of migration followed by rural-to-urban migration (which includes migration to major cities or metropolitan areas). In the 1960s–1970s, long distance migration was common but the destinations and social composition of migrants changed as the metropolitan pull and predominance of women became evident (Gultiano and Xenos 2006).

Herrin (1981) as cited by Gultiano and Xenos (2006) summarized the findings of literature on internal migration. In terms of age, the proportion of the population aged 20–29 at the place of origin was positively related to interregional long-distance migrations. The educational attainment of the migrants is also related to the probability of internal migration. The level of education increases the probability of migration for both males and females, but more prominently for males in rural-to-urban areas; it

decreases the probability of urban-to- rural migration for both sexes and from rural to rural for females. The most important factor related to migration is expected income. Once the economic criterion was met, family-related factors played a key role in the choice of destination. Finally, the older and more educated migrants were less likely to return to their places of origin.

Gender also impacts the kinds of job into which the migrants can enter. Local women at the destination tend to work in relatively better occupations while migrant women are more likely to be relegated in the service and domestic sectors. For the educated male migrants, white collar and craftsmen positions would be easily attainable while for their female counterparts, it is in the service sector where they would find employment.

Recent trends in internal migration were reported in the results of the 2005 Census and the 2010 Census. According to the Philippine Statistics Authority (PSA), out of the 82 million Filipinos who are five years and above, only 3.5 per cent moved to another city or municipality in 2010. The 2010 Census also notes that among the 2.9 million people who changed municipalities in 2010, about 1.4 million moved out of the municipality and moved to another province.[20] Of these long-distance movers, 60 per cent reside in Luzon island with 27.7 per cent coming from Region IVA (CALABARZON area), 19.7 from the National Capital Region (NCR) and 13 per cent coming from Region III (Central Luzon). This indicates that regions close by Metro Manila are common destinations.

[20] Those people who moved to another province in 2010 relative to 2005 are called "long-istance movers."

D. Uses of Remittances

In a survey of earlier studies on internal and international migration in the Philippines in the late 1980s, many have found that internal migration has affected the poor while international migration has mainly benefitted the relatively better-off members of the community (Ball, 1997) indicating that only the relatively wealthy are able to migrate outside the country while the poor are engaged in internal migration only. Results suggest that the poor are unable to finance the fixed cost of international migration.

3.4 Datasets and Description of Households and Children

A. Merging of Data

In this chapter, I used the 2006 and 2009 survey rounds of the Family Income and Expenditure Survey (FIES) and the corresponding January survey round of 2007 and 2010 round of the Labor Force Survey (LFS) to form panel data from merged LFS2007-FIES 2006 and merged LFS2010-FIES 2009. Albert, Ramos and Del Prado (2013) explained that the respondents in the fourth replicate of the July 2003 round of the LFS were interviewed not only for the July 2003 LFS and 2003 FIES and January 2004 LFS but also for the 2006 FIES and 2009 FIES. As the FIES is a rider survey to the LFS, FIES can be merged with the LFS to obtain information on all individual members of the households living in the household including children of school age.

For each of the 2006 and 2009 survey years, household members were identified in the dataset using a household member number assigned by the order of relationship to the household head (spouse first, children next, then parents, other relatives, and finally non-relatives) and by age (older members first). The enumeration method ensured that

the panel of households was preserved but not the panel of individuals. The identifier of individual household members is thus not the same for both 2006 and 2009.

To resolve this issue, we apply a matching procedure based on the assumption that having tracked the same household in 2006 and 2009, an individual member in 2009 must be three years older than their age in 2006 and their gender should not have changed. The matching procedure was similar to the one applied by Yang (2008). This procedure creates a panel of individuals in a given household in 2006 and 2009 based on their gender and age difference between 2009 and 2006.

Because the elapsed time between two FIES surveys is three years, changes in the household composition might have occurred. Thus, while it is valid for Yang (2008) to limit the matching procedure to children of the household head (as the household head is not likely to change in a span of three years, it might not be valid to match two FIES years as the household head might have changed. A perfect[21] matching of the age difference and gender of the individuals living in the same household in 2006 and 2009 was conducted such that the age of an individual included in the survey in 2009 would be three years older than they were in 2006. To further ensure that the dataset is valid, we removed observations that report unreasonable changes to educational attainment.

Table 3.1 presents the number of households from rural areas in the Philippines included in the 2006 and 2009 FIES surveys. Out of the 21,216 households in rural areas surveyed in 2006 (column 1), 4,478 households (column 2) were tracked in 2009

[21]An initial version of this paper followed the procedure of Yang (2008) that conducted the matching in two stages. After eliminating the observations that were perfectly matched, an imperfect matching was conducted. Imperfect matches were conducted to allow for the possibility that the individuals have not or have already celebrated their birthdays during the conduct of the survey. Thus, imperfect matches allowed for the age difference between 2009 and 2006 to be 2 or 4. Of the remaining observations that were not matched perfectly, 7,484 were matched. Altogether, the perfect and imperfect matching resulted to about 68 per cent of the individuals being matched from the 2009 and 2006 FIES-LFS.

(21% of the 2006 sample). From this panel of households, 3,611 children were perfectly matched using the aforementioned procedure.

<Table 3.1 about here>

Finally, two caveats of the matching procedure have to be mentioned: (1) household members with similar gender and age in the same household for any given year could not be distinguished from each other so these observations were automatically dropped; and (2) the possibility of mismatching might occur for household members when one household member with the same gender and correct age difference is present in 2006 but absent in 2009 while another member (with the same characteristics) is absent in 2006 but is present in 2009. To illustrate an example: consider the case of one identical twin living with the household in 2006 while the other identical twin is living elsewhere. If their situations are reversed in 2009, then the matching procedure would only observe one of the twins for 2006 or 2009. The procedure would then match one with the other. Such an issue could not be resolved without consulting the names of the individuals which is not released in any of the official surveys of the Philippines because of confidentiality rules.

B. Description of Households and Children

The characteristics of the panel households with school age children are presented in Table 3.2. On the average, per capita income in 2006 is $734 PPP 2005 (column 1) and this increased in 2009 to $982 PPP 2005 (column 2) or a 25 per cent increase. Average remittances per capita from abroad and domestic remittances also increased from $81 PPP 2005 and $29 PPP 2005, respectively, in 2006 to $104 PPP 2005 and $48 PPP 2005 in 2009. The major sources of income are nonfarm income (48%) and farm income

(35%) which jointly accounts for 83 per cent of total income in 2006. Remittances consist of about 16 per cent of total household income in both years.

` In terms of household members' distribution by age group, school age children (6–21 years old) account for about 45 per cent of the total members in 2006. The working age members (between 22 and 64 years old) have the next largest percentage at 40 per cent in 2006 (column 1). The proportions of all age groups have remained fairly the same in 2009.

<Table 3.2 about here>

In 2006, only 57 per cent of the household heads have at most primary education (column 1). This figure even decreased slightly to 56 per cent in 2009. Household heads with secondary schooling consist of less than 13 per cent while household heads with tertiary education is just a little more than 13 per cent in 2009 (column 2).

For rural households, food expenditure comprises almost half of the total expenditure; this is followed closely by housing expenditures (Table 3.2). Food expenditures include food prepared and consumed at home as well as food purchased outside the home. Housing expenditures include housekeeping materials, electronics, and appliances. Education expenditures comprise only five per cent of total expenditure in 2006 (column 1) and 2009 (column 2). Education expenditures include purchase of books, uniform, and school supplies as well as related transportation expenditures. The proportions in 2009 are almost the same as that for 2006. The average per capita expenditure in 2006 is about PPP $820 ($68 per month) which slightly increased to PPP $940 (PPP $78) in 2009.

<Table 3.3 about here >

Table 3.3 shows the classification of children in school age between 6 and 21 years old in 2006 grouped into four categories based on their school enrollment in 2006 and 2009: (1) not in school (not enrolled in both 2006 and 2009); (2) previously in school (enrolled in 2006, not enrolled in 2009); (3) returnee (not enrolled in 2006 but enrolled in 2009); and (4) always in school (enrolled in both 2006 and 2009).

Looking at children belonging to the elementary school age (6–11 years old), we find that for almost all ages, except nine years old, the proportion of girls (column 4) who were always in school is greater than those of boys (column 9). Fewer girls (column 2) were also classified as previously in school compared to boys (column 7). The proportion of boys leaving school tends to increase with age because farm work needs more male labor. For example, while only 2.37 per cent of the boys at age eight were classified as previously in school (column 7), this figure increases to 9.56 per cent at age 10 (column 7) and 16.13 per cent at age 11 (column 7). This pattern is not observed, however, for girls (column 2).

High school-aged (12–15 years old) girls (column 4) are more likely to be classified as always in school than boys (column 9). Similarly, the likelihood of boys age 12–15 to be never in school (column 6) is greater than for girls for all age groups (column 1). The proportion of being previously in school is greater for girls (column 2 vs. column 7) only at age 15 while the proportion of returning to school is slightly higher for boys (column 8 vs. column 3) in all age groups.

Among tertiary school-age children between 16 and 21 years old in 2006, we can observe 16-year old girls (column 4) more likely to be always in school (40%) while the proportion is only 27 per cent for 16-year old boys (column 9).

Being previously in school is more likely among girls (column 2) than boys (column 7) in tertiary school age. Around 19 per cent of 18-year- old boys (column 7) were not in school in 2009 despite being in school in 2006. For girls (column 2), the proportion is much higher at 31 per cent. Table 3 also shows that by age 20, a larger proportion of girls are no longer in school perhaps because of marriage.

Overall, there is a clear pattern that rural Filipino parents tend to prefer investing in girls in secondary and tertiary school. Farmland is preferentially bequeathed to sons while daughters are preferentially sent to school to equalize inheritances among children (Quisumbing, Estudillo and Otsuka 2004).

3.5 Determinants of Investments in Child Schooling and Progress of Children in School

A. Expenditure analysis

To analyze the impact of remittances on a household's education-related expenditures, this paper uses the Working-Leser Model, which a number of papers have used in demand analysis (Himaz 2010; Rivera and Gonzalez 2009; Azam and Kingdon 2012). The Working-Leser Model relates the share of the household budget devoted to a certain good or service with total income[22], household size, and a set of socioeconomic variables.

Specifically, the functional form is given by Equation 2.1.

$$\omega_{it} = \alpha + \beta \ln\left(\frac{x_{it}}{n_{it}}\right) + \eta \ln n_{it} + \gamma \frac{n_{jt}}{n_{it}} + \tau \tilde{z}_{it} + u_{it} \qquad \text{(Equation 2.1)}$$

[22] For the purpose of our analysis, we have used total expenditure as a proxy for total income. Total expenditure was used as this is a broader measure of household welfare. It also incorporates consumption smoothing behavior of households (ADB 2009).

Where ω_{it} is the share of the household budget devoted to different expenditure items including education; x_{it} is total expenditure per household; n_{it} household size; $\frac{n_{jt}}{n_{it}}$ is age-sex classification of members; $\tilde{z}_{it}$ is a vector of socioeconomic variables: educational attainment of household head, age of the household head, sex of the household head, time and provincial dummies, i denotes households, and t denotes year (2009).

We estimate an instrument variable Tobit regression using the number of working-age members in the household in the previous time period (i.e. 2006) as instrumental variables. The number of working age members in the previous year is considered as an exogenous variable considering that previous period (i.e. 2006) is three years past the present period (2009). And that may no longer have a direct impact on the current expenditure pattern. As a robustness check, a seemingly unrelated regression (SUR) was estimated (Appendix 3). It is important to note however that the results of the SUR may simply refer to correlations, not causality. A panel with fixed effect estimation was also conducted for further robustness check of the findings. The panel estimation controls for time-invariant omitted variables (Appendix 4).

B. Controlling for Endogeneity of Per Capita Expenditure

Per capita expenditure at the current time period might be correlated to omitted variables which are captured by the error term. For instance, per capita expenditure of the household might be correlated to the household's current attitude towards risk (Behrman and Knowles 1999; Estudillo, Quisumbing and Otsuka 2001), which is also

correlated to the ratio of certain expenditure groups.[23] As such, Ordinary Least Squares (OLS) or Tobit would yield inconsistent results. To solve this, a valid instrumental variable for per capita expenditure may be used to achieve consistent results. The total number of working-age members in the household in the previous period (2006) was used as an instrumental variable. We believe that the household head's current attitude toward risk would not be correlated to the previous period's total number of working-age members in the household as it would have already been exogenously determined. Also, total number of working-age members in the household in 2006 would not directly affect the expenditure pattern of households in 2009.

Following the model used by Estudillo, Quisumbing and Otsuka (2001), we estimated using OLS in the first-stage regression of the log of per capita expenditure at time t on the instrument and all the characteristics of the household head such as sex, age, and education in 2009. The instrumental variable in the first stage of the IV-Tobit model (i.e. determinants of per capita expenditure in 2009, Table 3.4) is the number of working age members in 2006 (i.e. lagged variable three years earlier than 2009). The second stage of the IV-Tobit model is the determinants of various expenditure shares with the predicted per capita expenditure (PCE) as one of the LHS variables. Since the IV (number of working-age members in 2006) is three years earlier than the per capita expenditure in 2009, we believe that this IV is largely deprived of endogeneity. This is because in three years, the household's resource allocation decisions have changed considerably that it is unlikely that the current budget allocation in 2009 remains directly affected by household composition in 2006. Noting the concern that the

[23] If the household head is risk-averse, the household may choose to reduce expenditure per capita in order to have higher level of savings.

instrument might be weak, we checked if the F-statistic of the first stage regression is greater than 10 which is the rule of thumb defined by Staiger and Stock (1997) in the case of 1 endogenous variable, i.e. F-statistic less than 10 would indicate a weak instrument.. The F-test in the first stage regression (Table 3.4) is 16.77 which is greater than the rule of thumb of 10, rejecting the null hypothesis of weak instrument.

The results are presented in Table 3.4. From the first-stage regression, we obtained the predicted values of per capita expenditure, which we inserted as part of the right-hand side variables of the second-stage regression.

<Table 3.4 about here >

The results of the first-stage regression show that household size is negatively associated with per capita income expenditure. A one per cent increase in household size is associated with 0.720 per cent decrease in per capita expenditure (roughly $7.18 PPP 2005). Male-headed households have (although not significant) higher per capita expenditure than female-headed households. The level of educational attainment of the household head is also positively associated with per capita expenditure of the household as evidenced by the magnitude of the coefficient of the dummy variables for secondary schooling (7–10 years) and tertiary schooling (greater than 10 years). The increasing magnitudes are indicative of households with heads who have higher levels of education and significantly higher levels of per capita expenditure. On the average, household heads with secondary education belong to households that have per capita expenditure that has roughly $2.33 PPP 2005 more relative to households with heads having only primary education. The difference is $6.70 PPP 2005 for households with heads having tertiary education. While the proportion of total income coming from domestic remittances is negatively correlated to per capita expenditure of the household,

the proportion of foreign remittance and nonfarm income positively and significantly increases household per capita expenditure, which indicates that foreign remittances and nonfarm income are important sources of funds for household expenditures.

The second-stage estimation is calculated using Tobit specification for each of the expenditure categories. The left-hand side (LHS) variable is the share of each expenditure group on household total expenditure while the right-hand side (RHS) variables include exogenous variables such as the characteristics of the household head, sources of income, disaggregation of the household members by age and gender, and the predicted value of per capita expenditure in logarithm from the first stage. If the RHS variable is in percentages (e.g., proportion of members in different age groups), the coefficients of the LHS variables are elasticities for variables that are continuous (e.g., predicted per capita expenditure).

<Table 3.5 about here>

Table 3.5 shows that per capita expenditure is negatively although insignificantly associated with the budget share of food expenditures (column 1). The results of the SUR (Appendix 3) and panel fixed effects regression (Appendix 4) also find a negative correlation between per capita expenditure and food expenditure following Engel's law. The negative per capita income elasticity of food expenditure supports Engel's law, which states that as income increases, the share of expenditure accruing to food decreases.

The main variables of interest, domestic remittances, and foreign remittances are negatively associated with the budget share of food and other expenditures but are positively associated with the budget share of housing, education, health, and clothing. These observations are supported by the results of the SUR (Appendix 3) and panel

fixed effects estimation (Appendix 4). This reveals that remittances diversify the expenditure pattern of households away from food expenditures.

Comparing the marginal effects of foreign remittances and domestic remittances on education and health, it is clear that foreign remittance is more correlated with the budget share of education expenditures while domestic remittance is more correlated with the budget share of health expenditures. These findings are robust across the all the models estimated. All the models supports *Hypothesis 3.3* stating that households receiving more remittances are more likely to allocate more of their budget on children's health and schooling. Domestic remittances are more likely correlated with health expenditures because domestic migration has relatively less barriers than international migration. Thus, as household members become sick, it is easier for other members to migrate and send remittances domestically than internationally. On the other hand, international remittances are more associated with education because international migrants tend to be more familiar with the schedule of school fees. Usually, remittances tend to balloon during enrolment months (May and June). Thus, they are able to plan their remittances to meet the educational needs of the family members.

Nonfarm income significantly increases the expenditure share on housing, and education. Nonfarm income is negatively associated with food share of the budget. A possible explanation for this result would be the highly irregular and unexpected nature of health spending. As such, it is more likely that those living in rural areas would rely more on remittances for large health expenditures and on nonfarm income for day-to-day expenditures.

The relationship between the composition of the household and expenditure share also reveals an interesting direction. As the number of males or females between 0

and 5 years old increases, the expenditure share of education decreases. The reason is that children below five years old are not yet in school. As the proportion of children aged 17–21 increases, expenditure share for education increases while expenditure share for health decreases. This is the age cohort that is in tertiary schools (parents have to finance this expenditure) and is less likely to get sick. These findings are also robust across all the models.

To sum up, the two most important findings in the expenditure share analysis are the following: (1) For rural households, receiving higher remittances (both domestic and foreign) increases the expenditure share of nonfood expenditures and decreases the share accruing to food expenditures; and (2) While domestic and foreign remittances do increase expenditure shares on education and health, domestic remittances are associated more with health expenditures while foreign remittances are associated more with education. These two observations are also supported by the the SUR (Appendix 3) and panel fixed effects estimation (Appendix 4).

C. Progress in Schooling of Children

Model

We used a modified version of the model used by Bansak and Chezum (2015) that relates school progress to a set of variables indicating the child's characteristics, household and parents' characteristics, and village/geographic characteristics. The Bansak and Chezum model relates a binary dependent variable (whether a child is in school or not in school) but for our specification, there would be four options for a child. Equation 2 represents the model used for the analysis.

$$S_{ghi} = \beta_0 + \beta_1 C_{ghi} + \beta_2 X_{hi} + +\beta_3 Y_{hi} + \beta_4 B_{ghi} + \mu_{ghi} \qquad \text{(Equation 3.2)}$$

S_{ghi} is the measure of the child's schooling and equal to 1 if child g in household h and barangay i is not enrolled in school in 2006 and in 2009 (Never in school), 2 if the child is enrolled in school in 2006 but not in 2009 (Previously in school), 3 if the child is not enrolled in 2006 but in school in 2009 (Returnee), and 4 if the child is enrolled in school in 2006 and 2009 (Always in school); C_{ghi} is a vector of child's characteristics; X_{hi} is a vector of households characteristics; Y_{hi} is a vector of income variables; and B_{ghi} is a vector of geographic characteristics.

The following variables were included in the vector of child characteristics: age,[24] gender,[25] birth order, and sibling rivalry. The household characteristics are the household income;[26] level of education of the household head; access to electricity; and proportion of household members below five years old. Income by source (foreign remittance, domestic remittance, farm and nonfarm) expressed in natural logarithms[27] were included in the model to capture the impact of remittances on school progress. Barangay (or village) characteristics are dummy variables indicating the presence of elementary schools and high schools in the barangay. To minimize issues on reverse causality,[28] all explanatory variables are only for the initial year of 2006. This is because

[24] Age determines whether a child is eligible to go to school or not.
[25] Gender of a child plays a role in the decision to educate a child as parents may prefer to send their sons to school because of cultural beliefs, because of biases against girls or because of economic reasons because sons are more likely to stay with the parents after marriage and care for them as they grow older.
[26] Household income increases the probability of sending a child to school because of greater financial resources.
[27] To obtain the natural logarithm of the income variables, we replaced observations with zero or negative income with the minimum value of income. Then we included in the explanatory variables a dummy variable for those observations with zero income.
[28] If the decision to stay in school determines the amount of remittances the household may receive, then there is an issue of reverse causality.

while the decision to enroll in school or not in 2009 might affect remittances in 2009, it is unlikely that it affected the remittances in 2006. Endogeneity concerns are addressed by using lagged variables.

The model was estimated using multinomial logistic regression using the {mlogit} command of Stata® with the base category being 'never in school.' The multinomial logit model calculates separate logit models for each option of the dependent variable relative to the base category (Cameron and Trivedi 2009). Under the assumption of independence of irrelevant alternatives, the multinomial logit model estimates are consistent. To test this assumption, the hausman test was used. (Appendix 5). The result of the hausman test show that the assumption is not violated at one percent level of significance. It is violated for the case of 12-15 year olds if we allow for 5 percent degree of significance. To further check the robustness of the results, we also compared the results of the multinomial logit to the results using a bivariate probit model (Appendix 6) and multinomial probit model (Appendix 7). The multinomial probit model does not require the independence of irrelevant alternatives assumption (Cameron and Trivedi 2009).

To simplify the interpretation of the coefficients of the multinomial logit estimation, the option for reporting odds ratios are used. The odds ratio of choosing alternative *j* rather than the base alternative (never in school) is given by Equation 3.

$$\frac{\Pr(y_i=j)}{\Pr(y_i=1)} = e^{(\boldsymbol{x_i}\boldsymbol{\beta_j})} \qquad \text{(Equation 3.3)}$$

Thus, $e^{\widehat{\beta}_j}$ gives the proportionate change in the relative risk ratio of choosing alternative j rather than the base alternative of 'never being in school' when the

explanatory variable changes by one unit. A value less than one for $e^{\hat{\beta}_j}$ is associated with an estimated $\hat{\beta}_j$ that is negative while the converse is true for values greater than one.

Regression results

Three models were estimated, one for each group of children: 6–11 years of old, 12–15 years, and 16–21 years old. The age groups pertain to the common age groups in elementary, high school and tertiary school, respectively. The relative risk ratios or relative odds are presented as Table 3.6.

<Table 3.6 about here>

Elementary-school age girls have better odds at being always in school (relative to never being in school), which is 2.492 times that of elementary school age boys (column 3). In terms of probability, girls ages 6 to 11 are, on the average, 86 per cent likely to always in school while for boys this is only 81 per cent. The relative odds of being always in school are also higher for high school girls (column 6) than for high school boys. This translates to average probability of being always in school of 64 per cent for high school girls. For highschool boys, the average probability is only 50 per cent. The results of the bivariatel probit and multinomial probit verify these observations as both estimate average marginal effects to be around 4.4 percent for elementary school age children while 14 percent for high school age children.

Across all models, the coefficient for the sex of the child is not statistically significant for tertiary school age children (column 9) indicating that after controlling for other child characteristics and household and village characteristics, gender does not matter significantly in enrolling children in tertiary school.

Compared to 6-year old children, the relative odds of being previously in school are higher for any child whose age is between 8 and 11 years (column 1). The probability of being previously in school (i.e. dropped out) has an increasing trend relative to age. It increases from 0 per cent in age 6 to nearly 12 per cent by age 12. Relatedly, compared to 6-year old children, the relative odds for returning to school is lower for any child whose age is from 9–11 years (column 2). A slightly increasing trend is also observed in the bivariate probit model and the multinomial probit model. In contrast to the case of elementary school-age children, the results indicate that for high school-age children, age is not a significant determinant of the relative odds of being previously in school (column 4) or returning to school (column 5). Perhaps this is because secondary schools are mandated free by law in the Philippines since 1988, thus a large majority of children in early high school years are in school. However, across all models, we find that age is negatively associated with the relative odds of being always in school (column 6). Compared to 12-year old children, the relative odds of being always in school is lower for any child whose age is 14 or 15 years old. In terms of probability, a 12-year old child's probability of being always in school is, on the average, 74 per cent. For 14 year-old children, the probability decreases to 47 per cent while for 15 year old children, the probability decreases further to 35 per cent. Age 14-15 is the age when rural Filipino children could choose to join the labor market.

For tertiary school-age children, the multinomial probit and multinomial logit models show that the relative odds of being previously in school (column 7), returnees (column 8) or always in school (column 9) is significantly negatively associated with age as reflected by relative risk ratio being less than one for almost all age levels. This means that enrollment in tertiary schools is significantly lower for older children who

are eligible to join the labor force instead of being enrolled in school. To illustrate, a 16-year old child is 32 per cent likely to always be in school. As the child becomes older, the probability decreases to 22 per cent by age 17, 14 per cent by age 18 and so on until only 1 per cent by age 21.

While being the eldest child is not statistically significant for the models of elementary school-age children (columns 1–3) and high school-age children (columns 4–6), being the eldest child is associated with higher relative odds of leaving school (column 7) for tertiary school-age children. This is because of the long standing Filipino tradition that the eldest child has to drop out of school to join the labor market or help in household tasks while the parents work to be able to finance the education of younger siblings. On the average, the probability that children 16 to 21 years of age will drop out of school if they are an elder sibling is 31 per cent which is about 6 per cent higher than other siblings. Being the youngest child is associated with lower relative odds of being always in school (column 3) and being a returnee (column 2). High school-age youngest children and tertiary school-age youngest children also have lower relative odds of returning to school than the middle children or single child.

For tertiary school-age children, younger children have relative odds of being previously in school that are 11.45 times higher than that of a middle child or an only child (column 7). The results for birth order of tertiary school age children give evidence to the belief that elder children, having already received investment on basic education, are expected to get as much returns from education by continuing on to tertiary education (even for just two years) in order to support younger siblings while the younger siblings are the ones prone to being kept out of school or taken out of school.

Among the household characteristics, we find the educational attainment of the household head to be positive and significant determinants of the relative odds of high school-age children and tertiary school-age children for being classified as always in school. The results of the bivariate probit and the multinomial probit also support this observation. This is because the more educated heads tend to have higher earnings and have the greater propensity to send children to higher levels of schooling because they know the relative market returns to higher education.

Elementary school and high school-age children who belong to households with access to electricity are associated with relative odds of being in school that are 2.258 (column 3) and 1.761 (column 6) times than the relative odds of children who belong to households with no electricity. This reveals that the quality of housing affects the progress of a child in school. An elementary–school aged child living in a house with no electricity has, on average, only 72 per cent of being always in school, 17 per cent lower than a child living in a house with electricity. For high school-aged children, the difference is about 3 per cent. The bivariate probit (Appendix 6) model estimates the marginal effects of having access to electricity to be around 8 and 9 percent, respectively while the multinomial probit (Appendix 7) model estimates the marginal effects to be at 9 percent and 11 percent respectively. All models show positive and significant relationships.

Having school-age siblings is not a significant determinant of progress in school for elementary and secondary school-age children but it is a negative and significant determinant of the relative odds of being always in school and being previously in school for tertiary school-age children because parents have to pay the full price of tertiary schooling

The variables indicating the sources of income of household have very interesting results related to *Hypotheses 3.1 and 3.2*. First, none of the income variables are significantly associated with the progress of elementary school-age children (columns 1–3). This is as expected as the policy emphasis on providing universal primary school education by the government has reduced the cost of primary school education being paid for by parents. The results from the bivariate probit and multinomial probit models show that this observation is true for remittances from abroad and nonfarm income but domestic remittances have an impact on the progress of elementary school children. Second, for high school-age children, remittances from abroad are negatively associated with the relative odds of children being previously in school (column 4). Domestic remittances are positively associated with the relative odds of children to be always in school (column 6) indicating that income from domestic migration is allocated to finance high school education. A one per cent increase in domestic remittance (around $1.76 PPP 2005) is associated with a 2 percentage point increase in the probability of high school age children to be always in school (around 4 percent for the birvariate probit and multinomial probit models). Farm income is only marginally significant in increasing the relative odds of children to be returnees (column 5). Third, in the case of tertiary school-age children being always in school, we find that there is a positive and significant relationship between the relative odds and all sources of income (although the relationship is only significant at 10% level for foreign remittances). The coefficient for the remittance variables indicates that a one per cent increase in foreign remittance (about $6.74 PPP 2005) is associated with the relative odds of being always in school that is 1.287 times more than before the increase (column 9) or about 2.25 per cent increase in the probability of being always in school

(2.97 for the multinomial probit model). Similarly, a one per cent increase in domestic remittance (about $1.76 PPP 2005) is associated with the relative odds of being always in school that is 1.446 times more than before the increase (significant at 5% level) equivalent to about 3.10 per cent increase in probability of being always in school (2.88 percent for the bivariate probit model; 4.31 percent for the multinomial probit model) . Importantly, nonfarm income significantly increases the odds of a child in tertiary school-age to be in school (i.e., previously being in school, returnee, and always in school) relative to not being in school at all. These observations support Hypothesis 3.2, which highlights the importance of household income (nonfarm income in particular) in explaining progress in school beyond the primary level.[29] The importance of nonfarm income in financing children's schooling is consistent with the findings of Estudillo, Sawada and Otsuka (2009).

Having an elementary school in the village increases the relative odds that elementary school-age children would be classified as always in school but it is not significantly related to the progress of children in other age groups. Similarly, having a secondary school in a village increases the relative odds of high school-age children to be returnees (column 5) and to be always in school (column 6). Interestingly, having a secondary school in the village also increases the relative odds of tertiary school-age children to be always in school (column 9). In brief, the presence of a school in the village increases the likelihood that a child will be in school and continue to be in school even at higher levels. An elementary school-aged child living in a village with an elementary school has an 84 per cent probability of being always in school, about 0.6

[29] Maligalig and Albert (2008), using data for 2002 and 2004, found that the most important reason for not attending school for both primary and secondary school-age students is lack of personal interest in school, which encompasses a number of issues, including lack of parental support, low quality of schools available, demands of community life, and the need to contribute to family income

per cent higher than a child in a village with no elementary school while a high-school child living in a village with a high school has a 15 per cent probability of being always in school; 7 per cent higher than a child living in a village with no high school. These results are also observed in the multinomial probit and bivariate probit.

Overall, we have two important findings on the relationship between remittances and children progress in school: (1) Remittances from abroad are not significant determinants of school progress for elementary school-age children but are significant determinants of school progress for tertiary school-age children; and (2) Domestic remittances are associated with keeping high school-age children in school while all income sources are important in keeping children in school, especially for tertiary school-age children.

3.6 Summary and Conclusion

In the earlier chapter, we have found a rising share of remittances in total income of households in rural Philippines in areas near the cities and far from major cities. This indicates the importance of migration as a pathway out of poverty for rural Filipino households. This chapter explores the relationship between migration and human capital investment in school-age children by examining the impact of remittances on household expenditure—specifically on the share of education and health— and on children's progress in school.

One of the main findings is that while remittances do increase the expenditure share for human capital, domestic remittances is associated more with health expenditures while foreign remittances are associated more with education. This finding

fully supports and qualifies Hypothesis 3.3 by providing more insight on the relationship of sources of remittances and the type of expenditure.

Recent data from the Family Income and Expenditure Surveys have revealed a consistent share of remittances to total income. By employing a Working-Leser model for demand analysis, we were able to verify that Engel's law is in effect in rural households in the Philippines. The results also show that remittances allow households to diversify their expenditures away from food expenditures such as housing, education, health and clothing expenditures.

By using matched data from Labor Force Surveys, we were able to verify the hypothesis on the relationship of total income and being always in school (Hypothesis 3.2). We find that, for tertiary school-age children, higher income—regardless of source—is positively associated with being always in school. Likewise important is nonfarm income, which is significantly associated with a child being in school. This implies that nonfarm income is a source of schooling funds and that the development of nonfarm sector induces households to invest in children's schooling. This is because the development of a nonfarm sector creates jobs that lead to a rise in children returning to schools.

Our results have failed to fully support Hypothesis 3.1 that attempts to relate remittances and child schooling as our results have shown that for elementary school-age children (as the findings are not robust across all models), income variables (including remittances) are not significant determinants of school progress. For high school-age children, domestic remittances are significant determinants of being always in school. However, Hypothesis 3.1 holds true for tertiary school-age children, such that,

households that receive more remittances are more likely to be in school and progress in school.

It is also important to note that having a school in the village and access to electricity are significant determinants of being always in school. It appears that the policy environment has a significant impact on the schooling of Filipino children. Primary school has been free since the American colonial period in 1900–1950 during which primary schools were built in a large number of villages. Secondary school was mandated free by law in 1988 and since then, average schooling attainment of the labor force has risen. On the other hand, access to electricity enables young girls to stay in school and enables children to study their lessons at home even during night time.

The results of our study echoes the findings of Albert *et al.* (2012) on the importance of increasing household income in order to improve the participation of children in school. Rural households resort to migration in order to have resources that keep children in school. Improvements in domestic employment particularly in rural areas would provide options for rural households for migration.

The results also highlight the importance of supply side factors and support the government policy of school building, conditional on sound benefit-cost analysis, especially secondary schools. Secondary schools not only keep children of secondary school age in school but also have spillover effects for older children. Hence, it is important to focus not only on improving access to elementary schools in rural villages but also secondary schools. However, it is not only the quantity of schools but the quality of schooling that matters as labor productivity relies highly on cognitive skills, which are created in an excellent school environment. The Philippine government is thus in the right direction when it passed the Education Reform Act, which increased

the years of basic education from 10 to 12 years with the expectation that the additional two years will enhance the skills of young Filipinos.

CHAPTER 4 SOCIO-ECONOMIC HISTORY OF A VILLAGE IN CENTRAL LUZON, 1977-2013

4.1 Introduction

This chapter gives a microscopic picture of the dynamic impacts of four modernizing factors—population pressure, urbanization, infrastructure development and human capital (See Chapter 2)—on rural households, by exploring socio-economic changes that took place in a study village in Central Luzon in a span of 36 years. This village (henceforth referred to as the CLV) was randomly selected from an extensive survey of 50 villages, representing irrigated and rainfed lowland rice production environments in northern, central, and southern Luzon, as well as Panay Island (David and Otsuka, 1994:52). This village is a representative of favorably rainfed villages, common in the Central Luzon area.

Although it has undergone changes brought about by different modernizing factors, the CLV remained as an agricultural village through the years. In the subsequent sections, the evolution of these factors and how they have impacted on the land and labor markets, livelihood opportunities in the village and poverty will be discussed in detail. The major finding of this chapter is that the four modernizing forces are the same forces that promote income growth and poverty reduction in the CLV.

The rest of this chapter proceeds as follows: Section II provides the history of the CLV by describing the early settlement of the people and the development of infrastructure. This includes a discussion on rice technology, and the implementation of land reform in the area. Section III presents the modernizing forces in the context of the

CLV. Section IV looks at how the economic activities of the CLV have changed in relation to the modernizing forces. Finally, Section V summarizes the findings and provides conclusions.

4.2 History of the village

The Central Luzon region of the Philippines is known as the "rice bowl" of the country. This research looks at the evolution of a Central Luzon village located in the province of Nueva Ecija. The village is one of the barangays (local name for villages) under the jurisdiction of the Science City of Muñoz. The CLV is a small village known for its vast farmlands, traditionally planted with rice in the wet season, and fruits and vegetables during the dry season. The CLV is the largest producer of shallots (a type of onion commonly used in northern dishes) during the dry season. The farmers of the CLV have access to the most modern rice technology, largely due to the fact that it is part of a science city where the Philippine Rice Research Institute (PHILRICE) and the Central Luzon State University are located.

< Figure 4.1 about here >

The CLV was selected because of the dramatic socio-economic changes that occurred within a span of almost 4 decades. A number of studies have used earlier sets of data in the analysis of a number of issues. These include: adoption of modern rice technology and agrarian arrangements (Dozina 1978), credit and land contracts (Nagarajan, Quisumbing and Otsuka 1991; Hayami and Otsuka 1993, Fukui 1995), land inheritance and schooling investments (Estudillo, Quisumbing and Otsuka 2001). The most recent data was gathered by Prof. Estudillo, together with this dissertation author, in 2013. This was through the generous funding from the GRIPS Emerging State Project

JSPS KAKENHI Grant Number 25101002. The research process was as follows: the fieldwork was conducted from November to mid- December 2013, while the data verification, encoding and processing were done in December 2013 to January 2014.

A. Early settlement

The CLV is a relatively old settlement. It was originally a forested area that the government opened up as a homestead and attracted early settlers (History of Gabaldon, undated). These early settlers in the CLV have been documented to be there even before the 1940s. In the survey conducted by Dozina (1978), it was revealed that even prior to 1939, 13 of the 118 respondents already resided in the core area of the village. As the CLV developed, it attracted the immigration of landless workers to the village, offering their labor services to the land owners. The survey also showed that landless workers were already present in the area even before 1939. In 1977, about 26 per cent of the household heads in this village were landless workers (Dozina 1978).

By 1977, most of the households settled around 4 districts (*purok*s). Because of its strategic location at the southern part of the village, *Purok Maligaya* served as the gateway to the village and was also considered as the center of trading activity. *Purok Bayanihan* was the center of religious activities, as well as the seat of government of the village. *Purok Pukok* is the educational center because the elementary school is located in this district. *Purok Gadi,* on the other hand, is just a small settlement located on the northernmost part of the village (Dozina 1978).

The author's visit to the CLV in 2013 however revealed that a reclassification of the districts in the village had been undertaken, and the *puroks* were renamed as follows: *Acacia, Camachile, Ipil-ipil, Manggahan, Molawin*, *Narra* and *Yakal*. *Purok*

Molawin is the district nearest the city proper. It is the first district along the main village road. The center of government is *Purok Yakal. Purok Narra* is the center of educational activity as the elementary school is located here. *Purok Manggahan* and *Purok Ipil-Ipil* are farthest from the center of the village. Most of the facilities are located along the main village road, near the entrance of the village that connects it to the *poblacion* (city center). Among these facilities are: a basketball court, solar dryer, rice trading houses, a hardware store and eateries.

During the early stages of CLV's development, most of the households were formed through inter-marriage among the local inhabitants. Dozina (1978) found that only 30 per cent of the households enumerated were formed through migration. The rest were formed through inter-marriages of the local people. However, in more recent surveys conducted by the author (Table 4.1), the total number of households who are immigrants to the CLV have increased through time, and that a substantial number of immigrant households were landless workers.

<Table 4.1 about here>

The number of migrant farmers have decreased slightly in 2004, but increased again in 2013. Meanwhile, the number of migrant landless workers has been increasing consistently, adding up to the burgeoning number of resident landless households in the village. Landless workers' major reason for migrating is to look for economic opportunities. Among them: working for a better or bigger farm and being near farms where they can obtain work. Farmers' major reasons for migrating into the CLV is related to ownership of land (through inheritance or purchase) or related to marriage.

B. History of infrastructure

This section discusses the development of infrastructure such as roads, public schools, private businesses, and use of modern agriculture technology. In the late 1970s, reaching the CLV could only be done by crossing a river by foot, or thorugh the use of a small boat. This is because of a small river that separates the village from the *poblacion*. In the early 2000s, the construction of the Don Felix D. Enrile Bridge facilitated the movement of people in and out of the village. This also made the travel time faster. Coming from the *poblacion* of the Science City of Muñoz, it now only takes around15 minutes to reach the village by car or tricycle.

Means of transport around the CLV has also changed through the years. In the 1970s, moving around the village was done through *tricycles* (motorcylces with a side attachment for passengers) which were common around the area (Dozina, 1978). The *tricycles* also plied the routes between the *poblacion* and the villages, and passed through the river during the dry season. Recent data reported by the Science City of Munoz, particularly the one from 2014, showed that the most common means of transport in the village at present are motorcycles (42 per cent), *tricycles* (25 per cent), hand tractors (21 per cent) and others (12 per cent).

The CLV is not directly connected to the Pan-Philippine highway. Most of the roads are composed of unpaved feeder roads in the 1970s which could be very muddy during the monsoon season. One of the exceptions is the paved Muñoz-Talugtog Road (with road length of about 1.8 kilometers) which passes through the center of the village. Recently, partial paving of the roads have been conducted. Two other partially paved major roads passing through the village are: Catalanacan-Gabaldon Road (with road

length of about1.3 kilometers) and the Gabaldon-Calabalabaan Road (with road length of about 3 kilometers).

There is an elementary school located at the center of the CLV. The earliest elementary school in CLV was constructed in 1939 and was made of light materials. In 1953, a sturdier school building made of galvanized iron and concrete was constructed (History of Gabaldon, undated). For secondary education, children would have to go to the city center or other villages. For tertiary education, the nearest college is the Central Luzon State University (CLSU), but children would still opt to go to cities such as Manila, Cabanatuan, Baguio and nearby provinces that house universities. Examples of these are: Bulacan, Tarlac, Pampanga, and Pangasinan.

In the 1970s, there were seven *sari-sari* (small-scale retail) stores scattered throughout the CLV (Dozina 1978). By 2014, there are now around 48 *sari-sari* stores which reflect around a seven-fold increase in the number of small-scale stores in the village.[30] In the 1970s, there were no reported wholesale stores in the CLV, but in the 1990s, data from the Census of Population and Housing indicated the presence of 2 wholesale stores in the CLV: one for construction supplies and the other for soft drink beverages. The 2014 barangay profile further reported the presence of the following establishments in the CLV: poultry farms, paddy *(palay)* buying, a motorcycle dealership, 2 photocopying centers, 3 welding shops and 1 tailoring shop. Aside from the elementary school, other public facilities were constructed around the 1990s, including the Multi-purpose stage, a solar dryer and a basketball court.

[30] Data from the website barangay profile reported by the Science City of Muñoz. Available at: http://www.sciencecityofmunoz.ph/barangayprofile.html

The increase in the number of establishments in the CLV is an indication of the increasing demand for goods and services that is brought about by the population increase in the CLVs. The road quality improvement in the CLV also contributed to the increase in the number of establishments.

While the number of economic establishments in the CLV has expanded, there seems to be no improvement in the availability of financial institutions providing credit in the area. In the 1970s, agricultural credit sources were the Muñoz Rural Bank, and the Philippine National Bank (Dozina, 1978). However, these banks have no branches in the CLV, and the nearest branches are located in the city proper of the Science City of Munoz. The case continued to be true in 2013 when the author visited the CLV. But the author noted the presence of small, informal money lenders in the village. These remain as an important source of credit.

Because of its proximity to the Science City of Munoz, the CLV has access to several rice varieties. The very first modern rice variety – IR 8 – was introduced in Central Luzon in the late 1960s. IR5, which was more suitable for rain-fed environment, became more popular among farmers in the favorably rain-fed ecosystem in the Central Luzon. Dozina (1978) describes the agricultural environment of the CLV in the 1970s as 283 hectares of agricultural land which mostly depended on rain for irrigation. A few farms (around 10 per cent) were pump-irrigated during the dry season. The most common tenure arrangement is leasehold. During the wet season, the whole of the CLV, except the residential areas, were used to plant rice (Dozina 1978).

<Table 4.2 about here>

As early 1970s, the adoption of high yielding varieties (HYV) was relatively high in the CLV (Table 4.2). Since 1977, the proportion of farmers planting HYVs was consistently above 90 per cent. In 2013, the proportion of farmers who adopted (HYVs) remained above 90 per cent, even reaching close to 100 per cent, implying the continued use of modern varieties for many years.

Apart from the adoption of the HYV, the farmers in the CLV use modern farming technology like chemical herbicides/insecticides, fertilizers, tractors and threshing machines. The farmers in the CLV have also been using threshing machines and tractors even as early as the 1970s indicating the substitution of machine for labor because of the rising wages. The use of rotovators (a common attachment for tractors) is necessary in the CLV, especially during late rainfall as this reduces the time for land preparation. One possible reason for the increasing use fertilizers would the relatively lower cost per hectare of the said inputs. On the average, farmers have spent around $100 PPP 2005/ha in the dry season of 1977, and the amount has increased sharply to $171 PPP 2005/ha in 1992. Recent surveys have shown that the cost of fertilizer is only at $157 PPP 2005 in 2013 which is significantly lower than that of 1992. This might be due to the government fertilizer subsidy.

The proportion of herbicides/chemical users has remained roughly the same across the years, except for 1992 when there was a sharp increase in the use of herbicides. Hossain (2015) relates the increasing use of herbicides in the Philippines to the increasing cost of labor, making farmers switch from manual weeding to herbicide application. The use of herbicides also increased because of the shift from transplanting to direct seeding which is commonly associated with severe weed problems.

While mechanized threshing has been more common even during the dry season of the 1970s, it has expanded even more with almost all farms using mechanical threshers both during the wet and the dry seasons in 2013. Again, this is attributable to the rising agricultural wages.

C. Implementation of land reform

One of the policies that affected the land market in the CLV is the Agricultural land reform code of 1963 under President Diosdado Macapagal. This aimed to, among others, establish family-sized farms as the basis of Philippine agriculture, increase farm incomes through the creation of social and economic environment fostering agriculture growth, and systematically distribute land (Republic Act 3844). Two programs under RA3844 governed the land distribution: Operation Land Transfer (OLT) and Operation leasehold (OLH). OLH converts share tenancy to leasehold with the fixed rent at 25 per cent of the average harvest in the three normal years before the program implementation. Meanwhile, the OLT program provides the government the right to expropriate lands planted with rice or corn in excess of the retention limit of 75 hectares. The government compensates the value of the expropriated land in cash and Land Bank bonds, and then distributes the land among tenants for annual amortization payments within twenty five years (Fuwa, 2000). Republic Act 6389 in 1971, or the Code of Agrarian Reform, reduced the retention limit to 24 hectares.

Further modifications to the land reform program were made upon the declaration of Martial Law in 1972. Presidential Decree 27 by President Ferdinand Marcos further reduced the retention limit to 7 hectares. Thus, under OLT, landlords were allowed to retain a maximum of 7 hectares, while the land in excess of the

retention limit was redistributed to the existing tenant beneficiaries through the issuance of certificates of land transfer (CLT). The CLTs are converted to Emancipation Patent (EP), which indicates full ownership of the transferred land, upon full payment of the land for 15 years at 6 per cent annual interest. The value of the land is equivalent to 2.5 times the average of the value of production during three normal crop years preceding the promulgation of the law (Presidential Decree 27). Landlords with land holdings less than 7 hectares fall under the OLH, which awards the current tenants of the land perpetual usufruct rights managed by the Department of Agrarian Reform. In 1988, the Comprehensive Agrarian Reform Program (CARL: Republic Act 6657) of President Corazon Aquino, extended the Marcos land reform program to lands planted with plantation crops, lands used for commercial livestock, and lands under the public domain. By the passage of the CARL, most of the lands in the CLV underwent land redistribution. Ballesteros and Dela Cruz (2006) assessed the status of the implementation of land reform in Nueva Ecija in general, and found that in the northern district of Nueva Ecija (in which the CLV is included), the land redistribution accomplishment was more than 100 per cent of the target.

In comparing the land tenure of households from 1967 and 1977, Dozina (1978) found that there was a sharp decrease in the number of share tenants in CLV. From as many as 29 farmers in 1967, it went down to only 2 farmers in 1977. This was a possible indication of the impact of the land reform implementation in 1972.

In a Southern Laguna village, Hayami and Kikuchi (2000) attributed to OLH the improvement of income of tenants through an income transfer from the landlords as mandated by the Land Reform law. The income of leasehold tenants would increase significantly, resulting to a narrowing of the disparity between the income of

farmers/landlords and tenants. However, Hayami and Kikuchi (2000) noted that the OLH may have resulted to a widening of the disparity between farmer and agricultural wage workers (those who do not receive any claim on land income).

D. History of land tenure

Dozina (1977) initially classified the land tenure arrangements in the CLV into six major categories: (1) owner-operator, in which the farmer is the owner and operator of the land, (2) part-owner, in which the owner owns part of the land while the rest of the land is under leaseholder or sharetenants, (3) leaseholder, where the leaseholder is giving a fixed land rent to the owner, (4) share tenants who pay rent on a 50-50 or 70-30 sharing basis, (5) those who hold some land as share tenants and other as lessees and (6) other arrangements which include special arrangements, like a landless worker who becomes a farmer only for one season as payment for labor during the preceding season. It also includes sub-lessees and sub-lessors.

Sub-leasing is a type of land contract wherein the land that is leased to the lessee is once more rented out to another person. Dozina (1978) specifically associates subleasing to pump-irrigated lands that tend to have high production surplus during the dry season because of intensified use of fertilizer and chemical inputs. Under subleasing arrangement, the leaseholder acts as a sub-lessor and receives a fixed rent from the sub-lessee (i.e. sub-leaseholder) without having to pay the landowner any additional rent[31] while the sub-lessee receives the residual production.

Moya et al. (2015), using a different survey, observed the emergence of different forms of land cultivation arrangements in Central Luzon during the mid-1980s.

[31] Rent is predetermined and fixed by the Department of Agrarian Reform and would usually be satisfied from the sales of the production from the wet season.

Mortgaging-out was defined as the instance when the farmer borrowed a certain amount of money in exchange for the right to cultivate the land which will expire when the borrowed money is completely repaid. Borrowed land is the case when some farmers lend their field for a certain period to landless relatives in exchange for a certain seasonal payment (which may often be negligible). Mortgage-in occurs when some well-off farmers give or lend money to co-farmers for a certain period in exchange for the right to cultivate the land.

Nagarajan, Quisumbing and Otsuka (1991) in a nearby irrigated village also observed a different labor contract called *kasugpong* or *porcientuhan. Kasugpong* is never found in the CLV when it was under rainfed conditions. Under this contract, a laborer received either a fixed sum of paddy or 10 per cent of gross output at the end of a crop season as payment for his labor service throughout the season. This differs from a share tenancy, which is a land contract oftentimes having a 50-50 share arrangement, because the low output sharing rate considers *kasugpong* as a labor contract. Otsuka, Hayami and Marciano (1989) attribute the emergence of *porcientuhan* labor contract as a substitute for tenancy or sub-tenancy because of the land reform regulations, particularly, the legal prohibition of share tenancy and sub-tenancy arrangements.

<Table 4.3 about here>

Table 4.3 presents the distribution of the land by type of tenure. In 1992, most of the farms were owned, accounting for about 44 per cent of the total number of parcels. This was relatively unchanged through the years since 1992. While the share of owned parcels remained relatively unchanged, the total area shrunk drastically in 2013. From about 93 hectares being owned, it was reduced to only 54 hectares.

For the leased lands, there was a sharp decline in the number of parcels from 79 (about 42 per cent) in 1992 to only 29 (13 per cent) in 2013 (Table 4.3). The incidence of mortgaged land has remained almost the same from 1992 to 2013, at around 8 per cent. It is also interesting to note that the incidences of share tenancy have not been observed since 1992 (because of the prohibition of the land reform law). About 33 per cent of the land in 2004 and 2013 was under *porcientuhan* despite not being observed in 1992. It seems that the land market in the CLV has undergone changes due to land reform regulations[32]: (1) share tenancy has been completely eliminated, (2) mortgaging (or land pawning) has emerged while *kasugpong* or *porcientuhan* plots have dominated. In addition, sub-leasing is no longer observed as it seems to have been replaced by the *porcientuhan* contract.

E. Evolution of land transactions

Aside from the traditional land contracts, like leasehold contract and share tenancy, which has been addressed by the land reform policies, new land transactions have sprouted in the CLV. These include borrowing of land, pawning and selling of land.

<Table 4.4 about here>

It has been observed that since the 1970s, the selling of land is not common in the CLV. Dozina (1978) observed that in 1977, there were no land sales done in CLV. In 2004, documented cases of land sales only involved 7 parcels. The land owners who sold their land did so for medical reasons and for debt payments. In 2013, there was an increase in the number of parcels being sold. However, the size of land sold decreased from an average of 4 hectares in 2004 to only 0.65 hectares in 2013 (Table 4.4). In

[32] Ishikawa (1981) has observed early on that the changes in agrarian structure in Southeast Asia would not only be caused by technological advancements but also other developments particularly land and tenancy reforms.

2013, the most common reason for selling land was to use the proceeds from the sale of land for consumption spending. Distress sale of productive assets (farmland in this case) could lead to poverty. Others include combination of reasons like education and consumption or education and production. It is interesting to note that sales of land have been undertaken to finance education in two instances in 2013. This may mean that, as a form of asset, farmlands have been substituted for education.

F. The rise of *porcientuhan* workers

As early as the 1990s, Hayami and Otsuka (1993) observed the emergence of a type of labor contract (*kasugpong* or *porcientuhan*) in the Central Luzon region of the Philippines. Hayami and Otsuka likened the contract to the *al-varum* contract in Tamil Nadu in Nepal where the worker supplies labor for the share of output at only 27.5 per cent, while the landlord takes care of all the costs including the wages of casual labor employed in peak seasons.[33] In the case of the CLV, the share of output that is given to worker is only about 10 per cent. Hayami and Otsuka (1993) attributed the emergence of these contracts to the implementation of the land reform law that has a provision that explicitly prohibits share-cropping. Yet, *kasugpong* is common only in irrigated areas in the central plain.

<Table 4.5 about here>

Table 4.5 provides some characteristics of the *porcientuhan* households. It is interesting to note that despite the increase in the number of *porcientuhan* households from 57 households in 2004 to 77 households in 2013, very little has changed in terms of the

[33] Ishikawa (1981) has noted the importance of hired labor similar to that of porcientuhan workers by the end of the Tokugawa era in Japan. The practice of hiring 2 or 3 agricultural laborers on each *tezukuri-jinushi* farm allowed the village of Saga to adopt Meiji Technology at that time.

socioeconomic characteristics. The average size of a *porcientuhan* household is around 5 persons in a household in 2004, and this has remained unchanged in 2013. The proportion that have electricity slightly increased from 76 per cent in 2004 to 79 per cent in 2013, while households that have access to sanitary toilet facilities remained unchanged between 2004 and 2013 at 86 per cent.

Heads of *porcientuhan* households have, on the average, 7 years of education in 2004 and in 2013. A cursory check of the data for 2013 indicates that *porcientuhan* workers have relatively the same level of education as agricultural landless workers (about 7 years). Farmers, on the other hand, have relatively higher level of education (9 years), while nonagricultural workers have 8 years, on the average. In terms of age, the heads of *porcientuhan* households have become considerably younger. In 2004, the average age of *porcientuhan* households was 50 years old, while in 2013, it was 42 years old. It seems that those who are engaged in *porcientuhan* work are the young and less educated people who have little opportunities outside rice farming.

In terms of the relationship to the landlord, most of the *porcientuhan* household heads (63 per cent in 2004; 62 per cent in 2013) are not related to their landlord. In 2004, those who are directly related to the household head comprise only 7 per cent of *porcientuhan* workers, while the proportion of those who are distantly related to the household head is at 30 per cent. No significant change in the proportions was observed in 2013.

The following observations may lead to the hypothesis that the presence of irrigation in 2008 has not affected the socioeconomic situation of *porcientuhan* workers. However, the bottom panel of Table 5 indicates that there has been a drastic improvement in the total farm income obtained by the *porcientuhan* households. From

around $187 PPP 2005 in 2004, average annual farm income in 2013 has increased by tenfold to about $1873 PPP 2005. This is largely because of the emergence of double cropping in the CLV due to CASECNAN, and the rise in rice prices since the Asian food crises in 2006-2008. Nonfarm income has also increased from 2004 to 2013, albeit only slightly, while remittances have slightly declined. Overall, technical change in terms of irrigation and rise in rice prices has improved the income status of *porcientuhan* households.

The increase in the incidence of *porcientuhan* may also be partially explained by the increase in the productivity of the agricultural land brought about by the access to irrigation through the completion of the CASECNAN National Irrigation System in 2008. The discussion on semi-attached permanent workers[34] by Hayami and Otsuka (1993) also provided additional explanation on the proliferation of *porcientuhan* households. Hayami and Otsuka attributed the proliferation of *porcientuhan* to the implementation of land reform, the development of new rice technology, and the transfer of land-cultivation to urban residents. The *porcientuhan* arrangement was seen as an innovation that caters to the demand of land-reform beneficiaries in the CLV who want to withdraw from working on the farms. The *porcientuhan* contract "plays a role similar to a tenancy contract, while it can be claimed as a labor-employment contract" (Hayami and Otsuka 1993: 156). Yet the *porcientuhan* contract is inefficient as the worker has less incentive to work. In fact, there has been frequent hiring and firing of *porcientuhan* workers and their contract last for only about 3-4 cropping seasons (about 2 years).

[34] Hayami and Otsuka (1993) characterized the semi-attached permanent workers as a labourer who lives within the vicinity of the employer's residence with the obligation to perform pre-assigned tasks both related to the household as well as agricultural. The payment may be in the form of a fixed amount of paddy (10 to 30 cavans) or a fixed share of output (10 per cent).

Urbanization may have also resulted to the proliferation of *porcientuhan*. Table 4.5 also shows the location of the residence of the landlords for whom the *porcientuhan* households work. Around 42 per cent of the landlords lived in CLV in 2004, but this has declined to 34 per cent in 2013. Meanwhile, the proportion of landlords who live in the urban areas of Munoz increased by 10 percentage points from 44 per cent in 2004 to 54 per cent in 2013. Hayami and Otsuka (1993) observed that these urban dwellers have a relatively high cost of monitoring farm workers so they resort to the *porcientuhan* arrangement because other share tenancy arrangements are prohibited by law. Some of the urban dwellers who hired *porcientuhan* workers are recipients of pawned out farmlands who could not cultivate the land by themselves, thus resorting to a *porcientuhan* contract.

4.3 Modernizing forces

In this section we present the history of the CLV by exploring the evolution of the modernizing factors. By utilizing past studies, we are able to form a dataset that can illustrate the evolution of the CLV across 4 decades. As the baseline, the data presented by Dozina in 1978 was utilized. Dozina conducted a complete enumeration of households in the CLV in the months of August and November 1977, covering the crop year 1976 wet season and the 1977 dry season.

This study also used the data collected by the International Rice Research Institute for its study entitled “Technology, Income Distribution and Poverty in the

Philippines" which was conducted in 4 villages in the Philippines one of which is the CLV. The study is based on village complete enumeration field surveys.[35]

The dataset collected by Estudillo, Sawada and Otsuka (2008) was used for 2004, while this author visited the CLV in 2013 to conduct a complete enumeration survey. The total number of households enumerated for each survey is presented in Table 4.6. In 1977, only 118 households lived in the CLV. This number has increased to 230 in 1992, 381 in 2004 and 509 in 2013.

<Table 4.6 about here>

Table 4.6 shows the gradual movement of households away from farming as the proportion of farmers decreased across time. In 1977, about 74 per cent of households in the CLV are farmers. Farmers still comprise a majority (58 per cent) of households in 1992. However, in 2004, farmers only comprise 34 per cent, and the proportion further decreased to 28 per cent in 2013. The reverse trend can be observed for landless households in the CLV.

The 2004 and 2013 datasets allowed for further disaggregation of landless workers. The data show that the proportion of agricultural landless workers slightly decreased from 2004 to 2013. In contrast, the number of non-agricultural landless households has almost doubled from 102 households in 2004 (about 27 per cent) to 203 households in 2013 (about 40 per cent).

Using the data from the aforementioned research endeavors, it will be illustrated how a village facing the evolution of the modernizing factors has changed in terms of land ownership, labor activities, sources of income, poverty and income distribution.

[35] The International Rice Research Institute provides access to a number of its datasets at its website: http://ricestat.irri.org/fhsd/php/panel.php?page=4

A. Population pressure

Population pressure is one of the major modernizing factors emphasized in Chapter 2. The rapid increase in population, coupled with the decreasing availability of land for agriculture activity, has resulted in scarcity of farmland.

Population pressure in the CLV is presented in Table 4.7. Land area is the physical area of the village as identified in 1977. As the borders of the villages have already been defined, total land area of the village would have remained constant across time. The CLV covers about a total land area of 301 hectares.

Total population in 1977, as surveyed by Dozina (1978), is around 649 people. This has increased to 1110 in 1992, (representing a 71 per cent increase in a period of 15 years). The population more than doubled after 12 years to 2292 people. In 2013, the population growth in the CLV has slowed down, increasing only to 2925 people (which is about 28 per cent increase in a period of 9 years) (Table 4.7).

<Table 4.7 about here>

Three different indicators of population pressure were used: total land per family, total land per farmer and total land per person. Regardless of the indicator used, it can be clearly seen that the amount of land available relative to the total number of people in the village has declined over time, indicating the increasing scarcity of farmland. This could lead to poverty if there are no alternative sources of household income.

Total land per family is about 2.6 hectares in 1977, but this has rapidly declined to 0.6 hectares per family in 2013. Land per farmer at the baseline period is at 3.4 hectares per farmer, but this has sharply decreased to 2.2 hectares per farmer in 1992. Since 1992, the average land per farmer has remained almost constant. This observation

points to an increasing number of landless families in the CLV resulting to a rapidly declining land per family.

Population growth may have a significant effect on the size of the farm cultivated over time. Rapid population growth fragments the land into smaller ones. In the CLV, it has been observed that fragmentation occurs due to the partible inheritance system, in order to accommodate the landed farmer's children who are separated from their parents, usually upon marriage, and have to cultivate a piece of land.

B. Urbanization

Urbanization is another modernizing factor that influences the decision of households regarding their choice of pathway out of poverty (cf. Chapter 2). Urbanization, for the case of the CLV, means the rise of small cities and expansion of big cities near the CLV. It was also shown in Chapter 2 that households near major cities tend to engage in nonfarm activities (Hypothesis 2). In this section, it is illustrated how people living in the CLV have been affected by rapid urbanization that is occurring within its vicinity.

<Figure 4.2 about here>

It was observed that rapid urbanization is occurring within the vicinity of the CLV. This trend was observed in the population of the neighboring cities surrounding CLV, particularly, Cabanatuan, San Jose and the Science City of Muñoz. The rapidly increasing population growth and development of the urban cities near the CLV may be drawing the people living in the CLV to engage in nonfarm work in the nearby cities.

The distribution of households in CLV by district was also looked at. This is in order to characterize the households in the CLV by distance to urban areas[36]. Households who reside in the districts of Mulawin, Acacia and Yakal are defined as households who live near an urban area, while the households who reside in the districts of Camachile, Mangahan, Ipil-ipil are those far from an urban area. The district of Narra is the central district and cannot be distinguished as far or near, so it is classified as the central district. The characteristics of the households in these areas are shown as Table 4.8.

<Table 4.8 about here>

Table 4.8 supports the observation that the households who rely on agriculture income (i.e. farmers) tend to live in the districts far from the urban area. Around 45 per cent of the farmers live far from the urban areas in 2004, and this has increased slightly to 47 per cent in 2013. The case for non-agricultural workers is the opposite. In 2004, around 43 per cent of the non-agricultural (landless) workers live near the urban areas, while only 27 per cent live far from the urban areas. In 2013, the proportion of non-agricultural workers has increased further to 50 per cent.

It is also worth noting the location of the agricultural wage workers and the *porcientuhan* workers on Table 4.8. The main occupation of daily wage workers would be related to providing labor for rice planting activities, while *porcientuhan* workers worked on the land for one cropping season in return for 10 per cent of the harvest. Around 25 per cent of agricultural wage workers and 28 per cent of *porcientuhan* workers live far from urban areas in 2004, slightly increasing in 2013 to 31 per cent and 33 per cent, respectively.

[36] Appendix 8 shows a visual representation of the distribution of households by district. The first three districts from the right are classified as districts near an urban area while the last three districts from the left are districts far from an urban area. The remaining district is the central district.

It is clear in this section that the CLV is experiencing the pull of urbanization. A more thorough analysis of the composition of income of households would also reveal how urbanization has affected the livelihood of the households in the CLV.

C. Human capital

In this section, investment in human capital pertains to investment in schooling and migration. As the population of the CLV and its surrounding cities continue to increase, the quality of the human capital resources also improved (Table 4.9) as reflected by distribution of the population by educational attainment. The share of the population with higher levels of education has increased since 1977.

<Table 4.9 about here>

The share of the population with no education has decreased from 6.6 per cent in 1977 to only 2.5 per cent in 2013 (Table 4.9). Similarly, the proportion of the population with limited education (primary and elementary) has decreased from a combined total of about 53.8 per cent in 1977 to just about 30.8 per cent in 2013. This is because of the upgrade of the primary school in the village, which went from a school that only reached grade 4 to grade 6 (the full primary school). Despite the CLV not having a high school within the village, the proportion of the high school educated population (unfinished and graduate combined) has more than doubled from 19.7 per cent to 39.0 per cent in 2013. The number of people in the CLV with college education in 1977 was only 24 people (about 3.7 per cent), but this has sharply increased to 74 people in 1992 (around 6.7 per cent). Then, it further increased to 325 people in 2004 (around 14.2 per cent), but rate of increase has slowed down resulting to only 473 people in 2013 (16.1 per cent).

The improvement in human capital is also supported by Table 4.6 which shows the distribution of the sample households by occupation of the household head. It can be inferred from Table 4.6 that there is an increasing number of the households that are able to engage in the nonfarm sector.

The rapidly increasing population of the CLV has also changed the distribution of the population by age groups. In 1977 and 1992, the population of the CLV can be described as very young (Appendix 9). For both males and females, more than 50 per cent of the population falls in the age categories of 0 to 19 in 1977.

Compared to the relatively classical pyramid shape of the population in 1992, the population distribution for 2004 and 2013 is quite different because of the relatively similar distributions of the population for age groups 20-29 and 30-39. Also observed was a smaller share of the bottom age groups (0-19) in 2004 (around 36 per cent for both males and females) and 2013 (around 37 per cent for males and 34 per cent for females).

In 2013, there were more people who belong to the working age group in the CLV. A possible reason for this change in the distribution of the population by age group would be the influx of migrants to the CLV. Some of the migrants are people who decided to settle in there because they were able to purchase agricultural land, or they were able to obtain work in the nearby cities or within the village. As such, these migrants tend to belong at the prime working age groups and have relatively older children.

D. Infrastructure

Infrastructure development pertaining to the elementary school, all-weather roads, transportation, irrigation and the establishment of private enterprises were discussed in earlier section. What is notable in the earlier discussion is that the construction of the bridges and roads and the increase in modes of transportation have facilitated the mobility of people in and out of the CLV. There is also a considerable increase in the number of businesses in the CLV despite limited means of credit.

Other indicators of infrastructure development – particularly in the household's access to electricity, flush toilets and piped water – have shown improvement. The study by Dozina, as well as the earlier surveys of IRRI, was not designed to collect information on the access of households to basic infrastructure. This led to the limited information regarding these indicators being reported. However, the more recent surveys have included some information and are presented in Table 4.10.

<Table 4.10 about here>

The proportion of households with access to electricity by households in the CLV is at 83 per cent in 2004 and this figure increased slightly to 86 per cent in 2013 (Table 4.10). In 1992, about 66 per cent of households have access to flush toilets. This has increased significantly in more recent years with the most recent figure being at 87 per cent.

Because the CLV is an agriculture-based village, the availability of irrigation is also a crucial indicator of infrastructure development in the area. In the late 1970s, most of the farmlands in the CLV were irrigated by rain water, i.e. rain-fed farms, while a few farms were able to use ground water pumps to irrigate their landholdings during the dry season (Dozina 1978).

Estudillo, Quisumbing and Otsuka (2001) and Hossain, Gascon and Marciano (2000) were able to observe how some farmers in the CLV extended the use of their land beyond the wet season by using pumps (Hossain, Gascon and Marciano 2000), or by planting cash crops in areas which remain rain-fed (Estudillo, Quisumbing and Otsuka 2001).

In the late 2000s, the irrigation component of the Casecnan Multi-purpose Irrigation and Power Project (CMIPP) allowed most of the farms to be irrigated through the Casecnan National Irrigation System. The CMIPP is a Build-Operate-Transfer project that was entered in 1995 by the Philippine government through the National Irrigation Administration and the Casecnan Water and Energy Company, Inc. The power component of the CMIPP was completed in 2001, while the irrigation component was completed in 2008. The Irrigation component was able to provide irrigation to 16,800 hectares of new areas, part of which is the CLV.

Table 4.10 clearly illustrates how the construction of the CMIPP has shifted the source of irrigation for most of the farms. Up until 2004, most of the farms relied on rainwater (37 per cent of total irrigated area) or on pumps (63 per cent of total irrigated area) for irrigation. However, with the CMIPP, 88 per cent of the farms reported having irrigation coming from the National Irrigation System. Only 1 per cent of the total irrigated area relied on pumps, while the rain-fed areas accounted for 11 per cent of total irrigated area in the CLV.

In the next section, there will be a discussion on how the improvement in the access to irrigation affected the distribution of land in and the overall welfare of households in the CLV.

4.4 Changes in household welfare

The preceding sections have presented the modernizing forces that greatly affected the economic and social fabric of the CLV. In terms of population pressure, it was found that the amount of land relative to the number of people in the village has declined over time. Urbanization has also pulled people from the CLV and found them living in areas nearer to the urban areas. The human capital of households in the CLV sharply improved, giving them access to nonfarm work. Infrastructure access also improved, particularly the irrigation system for farms. This paper then proceeds to analyze the process by which these factors have affected the level and distribution of income of the CLV across the three decades.

A. Changes in Household income structure

A snapshot of the average income of farmers and landless workers in the CLV from 1997 to 2013 is presented in Table 4.11. The data classifies income into three major classifications: farm income, non-farm income and remittances.

Farm income includes wages earned from working on the farm and net income from rice, other crops and livestock and poultry. Wage earnings include income earned by being hired as farm laborers for farm tasks such as preparation of the rice land, transplanting of seeds, weeding, application of chemicals (herbicides and insecticides), fertilizer application and in the harvesting and threshing operations. Households are also able to earn income from non-farm enterprises which include net income from *sari-sari* stores, tricycle driving and ownership of other businesses. Non-farm wage earnings are being derived from working as employees of the government and from other non-agricultural enterprises. Remittances are income (both in cash and in kind) that was sent

to the household by someone who is away from the household. The value of remittances in kind were imputed by the respondent and added to the total income of the household.

For both the farmer and landless groups, the share of farm income has been steadily declining over time, while the share of nonfarm income has sharply risen sometime after the conduct of the 1992 survey (Table 4.11). Because the farmer groups are the ones who have access to land resources, they are the ones who are able to plant rice. Some landless workers are able to engage in non-rice agriculture by using small tracts of land around their residence ("bakod") for fruits and vegetables. It is also possible for some landless workers to engage in livestock or poultry production despite limited size of land.

<Table 4.11 about here>

Across time, the share of non-rice income has also declined because of the availability of irrigation. The JICA report evaluating the accomplishment of the CMIPP mentions the negative spillover effect of the construction of the CMIPP to the non-rice agricultural activity in the CLV. The relatively good environment brought about by the improvements in irrigation, which is more suitable for rice agriculture, seems to be an incentive for farmers to continue rice production rather than to tap into new cash crops (Awano undated). As the share of farm income decreases across time for both farmers and landless workers, the share of nonfarm income increases. Landless workers in 2013 have more than three quarters of their total income coming from nonfarm income indicating that nonfarm work is more lucrative. For farmers, the proportion is about two thirds.

For the landless workers, the share of remittances to total income has sharply increased from 0 per cent in 1977 to 25 per cent in 1992. Part of the increase may be attributed to the fact that in the1980s, Filipinos started to explore job opportunities overseas such as the Middle East and East Asia. However, sometime after 1992, there was a reduction of the share of remittances to total income for the landless households. In 2004, the share of remittances to total income was only 13 per cent for landless households which slightly increased in 2013 to 15 per cent. Some economic factors that may have affected the international migration decision of households between1992 to 2004 include the Gulf war in the early 90s, the Asian Financial Crisis in 1998, and the September 11 attack in 2001.

Remittances have also become a major source of income for farming households. In 1992 and 2004, the share of remittances to total income for farmers is around 9 per cent, but this has increased slightly to 11 per cent in 2013 (Table 4.11). Because farmers are able to earn from agricultural production (e.g. rice), the decision to migrate outside of the CLV is a less important option for the landless workers.

By comparing the CLV with another village benefiting from irrigation at that time, Dozina (1978) posits that the presence of irrigation accounts for the difference in the income sources between the two villages. The lack of irrigation in the CLV in 1978 limits the farm work opportunities during the dry season. Yet this may no longer be the case when various work opportunities have emerged out of agriculture including overseas work.

B. Pathways out of poverty

The preceding section discussed the evolution of the sources of income in CLV. In this section the pathways out of poverty will be analyzed by looking at the poverty indicators and decomposing these according to subgroups of the population. Foster-Greer-Thorbecke [FGT(a)] indicators are calculated for the CLV using the PPP $1.25/day poverty[37]. For the years 2004 and 2013, where a more detailed group of households was available, the FGT(a) indicators were also decomposed according to type of household in order to identify the contributions of the household types to total poverty in the CLV.

The Stata® command devised by Jenkins (2006) additively decomposes each FGT(a) index using Equation 4.1:

$$FGT(a) = \sum_k v_k FGT_k(a) \qquad \text{(Equation 4.1),}$$

where v_k=$\frac{N_k}{N}$ is the number of households in subgroup k divided by the weighted total number of persons (i.e. subgroup population share), and $FGT_k(a)$ is the FGT(a) indicator for subgroup k. Subgroup decomposition shares (S_k), for each k, are also calculated using the following formula:

$$S_k = v_k \left[\frac{FGT_k(a)}{FGT(a)}\right] \qquad \text{(Equation 4.2)}$$

The poverty indices and their corresponding decompositions are presented in Table 4.12. In 1992, overall poverty headcount was at 55 per cent and this decreased to 50 per cent in 2004, only to increase slightly to 52 per cent in 2013 (Table 4.12). In general, a negative trend can be observed despite the slight increase in 2013.

[37] Using PPP conversion factor in 2005 and the Philippine CPI, the following poverty lines were calculated for the CLV: PhP 5175 for 1992, PhP 10321 for 2004 and PhP 15,539 for 2013. Depending on the value of a, FGT(a) indices are defined as: headcount ratio (a=0), poverty gap (a=1), and squared poverty gap (a=2).

The values of the poverty gap index and the squared poverty gap index decreased from 1992 to 2004, but increased again from 2004 to 2013, eroding the gains from 1992 to 2004. These indicators imply that while there have been improvements in reducing the number of poor people in the CLV, the income needed to move the poorest of the poor out of poverty may have increased over time.

Table 4.12 also shows the FGT(a) for each type of household. The headcount for farmers have steadily decreased from 48 per cent in 1992 to 44 per cent in 2004 to 38 per cent in 2013. Similarly, the contribution of farmers to overall poverty has been steadily decreasing. In 1992, the farmers' contribution to overall poverty headcount was at 53 per cent, but this decreased to 30 per cent in 2004, and further declined to 20 per cent in 2013.

Another interesting finding is the change in the relative contribution of non-agricultural households to total poverty headcount. In 2004, 29 per cent of total non-agricultural workers are poor, contributing 16 per cent to total poverty headcount. In 2013, the contribution of non-agricultural workers to poverty headcount drastically increased to 35 per cent. The rapid increase is explained not just by the increase in poverty headcount for non-agricultural workers (46 per cent in 2013) but also by the sharp increase in the proportion of households engaged in non-agricultural activities from 27 per cent to 40 per cent (see Table 4.6).

<Table 4.12 about here>

As for the contribution of daily wage workers to total poverty, we find that the poverty headcount ratio increased from 66 per cent to 74 per cent, but the share to overall headcount ratio has decreased from 32 per cent to 24 per cent. This is because of the decrease of the share of daily wage workers in the population. The case of the

porcientuhan households is different in terms of contribution to total poverty, only slightly decreasing despite no change in FGT(0). All in all, these observations highlight the importance of nonfarm wage work as it absorbs the households who do not want to engage in farming or in agricultural labor. These observations also resonate with the observations made in the earlier section regarding the pull of urbanization being felt in the village.

<Figure 4.3 about here>

Because the data gathered for the CLV involved a complete enumeration of the households, it is possible to create a panel of households from 1992 to 2004 and from 2004 to 2013. Out of the 230 households surveyed in CLV in 1992, 166 were tracked in 2004 while out of the 381 households that were surveyed in 2004, 324 were tracked in 2013. [38] Figure 3 illustrates the dynamics of poverty in the CLV for two adjacent survey periods. In 1992, 52 per cent of the 166 panel households were considered poor. Of these households, 35 per cent remained poor in 2004. These households are considered chronically poor (Reyes et al. 2011). For the period 2004 to 2013, the chronically poor is close to 35 per cent.

In contrast, of those who were non-poor in 1992 (48 per cent), 27 per cent remained non-poor while the remaining 21 per cent fell into poverty. The proportion that fell into poverty in 2004-2013 is 18 per cent, which is smaller than the proportion in 1992-2004.

<Table 4.13 about here>

[38] Poverty dynamics was also calculated for a three period panel of households (See Appendix 10) but the limited panel of households prevented a thorough analysis. In this situation, chronically poor households are those that are classified as poor in all three periods. Households who have experienced being poor at least once are classified as transient poor while the rest are classified as never poor.

To further support the initial observations from the poverty decomposition, the dynamics of poverty was disaggregated by type of household (Table 4.13). From Table 4.13, we can see that among those who were never poor, farmers and the non-agricultural workers have the two largest shares. All together, they comprise 84 per cent of all those who were never poor in 92-04 and 91 per cent in 04-13. Similarly, those who moved out of poverty (transient poor) are more likely to be engaged in non-agricultural and farming activities. This indicates that non-farm activities and irrigation promote movement out of poverty.

An interesting observation would be the composition of those who are chronically poor and those who fell into poverty. In 2004, farmers comprise the largest share among those who are chronically poor (41 per cent) and those who fell into poverty (44 per cent). However, this changed significantly from 2004-2013 wherein only 22 per cent are chronically poor and 28 per cent of those who fell into poverty were farmers. This observation may be capturing the effect of the opening of the Casecnan National Irrigation System in 2008, which reduced the need of farmers to rely on rainfall. Again, this is evidence that irrigation is a pathway out of poverty.

It is also important to mention that non-agricultural activities in the CLV are very heterogenous. Thus, while they comprise a majority of the never poor, they also comprise a majority of those who fell into poverty and chronically poor in 2004-2013. A hypothesis for this would be that non-farm enterprises which rests on the economic condition of the CLV tend to be less stable than non-farm wage work which provides reliable stable income. The former explains the proportion for those who fall into poverty, while the latter explains those who were never poor.

C. Land and Income Inequality in the CLV

The distribution of income across households in the CLV is also of great concern for this study. As chapter 2 has shown, there is a possibility of households catching up to those who are nearer urban areas because they are able to engage in more stable income sources through nonfarm wage work. Analysis of the distribution of income and land holdings in the CLV may also provide insight on which households benefit from the improvements of infrastructure and urbanization that has been influencing the CLV in the past decades.

Figure 4.4 illustrates the Lorenz curve for income and land. For both land and income, we see that the distribution of land and income in the CLV has always been skewed and has worsened over time. Both Lorenz curves have moved away from the 45-degree line, indicating an increasing trend in inequality from 1992 to 2013. This observation is confirmed by the corresponding Gini coefficients for each Lorenz curve that were calculated and presented in Table 4.14.

In 1992, the distribution of income has been relatively unequal with a Gini coefficient equal to 0.4842. This has deteriorated to 0.5689 in 2004, and worsened slightly to 0.6074 in 2013.[39] Confidence intervals reveal that the point estimates for 2013 and 1992 are statistically different (Table 4.14 in brackets).

<Figure 4.4 about here>

Compared to income Gini coefficient, the land Gini coefficient for 1992 is at 0.7129 representing a high concentration of land. The concentration of land has continued

[39] Weaknesses in the data collection may admittedly result to an overestimation of the inequality. Hayami and Kikuchi (2000) acknowledge that poor households tend to have a number of sporadic income sources of marginal amounts (examples include tips, minor subsistence products, small grants) which are difficult to capture through questionnaires. These Gini coefficients are then indicative of the general trend of inequality in the CLV.

further in 2004, resulting to an increase in the Gini coefficient to 0.7688. The concentration of the land has slightly increased in 2013, relative to 2004. The confidence intervals also indicate that the point estimates are different. Two reasons can possibly explain the drastic change in land distribution: (1) scarcity and inequality of land ownership and (2) the rapid influx of landless workers. Increased inequality of land ownership occurs when some individuals in the CLV have the opportunity to acquire additional parcels of land. Initially starting as a pawned/mortgaged transaction, the original land owners would resort to selling their land/giving up their land rights to the pawnee when owner experienced difficulties in repayment. In 2004, the top ten households with largest land holdings comprise 28 per cent of the total land holdings in that area. In 2013, this proportion further increased to 34 per cent. This indicates that fewer households are gaining larger parcels of land.

Migration also has an important impact in the distribution of land. As can be seen in the Lorenz curves for land (Figure 4.4, panel B) the proportion of landless members in the CLV has increased sharply. Of the households that were migrants in 2013, 45 per cent are immigrants to the CLV and are engaged in non-farm work, while 22 per cent are immigrants to the CLV and are engaged in daily agricultural wage work. These groups of migrants represent the landless workers (excluding the *porcientuhan)* that have resulted in a more skewed distribution of land in the CLV.

<Table 4.14 about here>

Relatedly, the influx of migrants to the CLV plays an important role in explaining how non-farm income prevented a drastic deterioration of income distribution in the CLV despite the highly unequal distribution of land. The rapid urbanization occurring within the vicinity of the CLV, as well as the improvements of human capital, have increased

the non-farm income-earning opportunities available for landless workers. This weakened the reliance on land as a source of livelihood for most of these households, explaining the slower pace of increase of income distribution compared to land distribution.

A decomposition of the Gini coefficient by sources of income (Table 4.15) was conducted to quantify the relative importance of various income components in accounting for overall income inequality. Following the procedure used by Otsuka, Cordova and David (1992) and Feldman (2006), the total income Gini for each year was decomposed into its income components using the following formula:

$G = \sum_i S_i \, R(y, x_i) G(x_i)$ (Equation 4.3)

Where G is the Gini coefficient of total income; $G(x_i)$ is the Gini coefficient for the income from the ith source; S_i is the share of ith source; $R(y, x_i)$ is the rank correlation. Intuitively, Equation 4.3 explains that the total income inequality, G, is influenced by the relative importance of the income source to the total income S_i, the distribution of income of source $G(x_i)$ and the relationship between the two, $R(y, x_i)$. To apply equation 1 to our data, the stata command descogini was utilized (Table 4.15). The command not only provides the share of the income source to total inequality but also provides the percentage change in inequality induced by a small change in the income source.

<Table 4.15 about here>

The results for 1992, 2004 and 2013 are presented in Table 4.15. We find that consistently, across the years, rice income, nonfarm income (nonfarm wage and nonfarm enterprise) and remittances have the largest shares contributing to total income

inequality. Over time, there is a shift in the sources of income that reduce inequality. In 1992, all of the income sources that reduce inequality are related to agriculture (i.e. wage, agriculture and livestock). For 2004, we find that the nonfarm income as a whole reduce inequality. For 2013, the data shows that farm wages and non-rice production are inequality-reducing sources of farm income, while nonfarm wages are inequality-reducing sources of nonfarm income. Across the years, the percentage change in the Gini coefficient of total income from a small change in remittances has been increasing which implies that remittances have consistently been inequality increasing. These observations support our initial observations on the role of nonfarm income (particularly wages) in reducing poverty. It also supports the importance of wages (both farm and nonfarm) as inequality reducing sources of income.

4.5 Summary and conclusions

This chapter is a case study of a village in Central Luzon (the CLV) where the forces of modernization (population pressure, urbanization, human capital, and infrastructure) have infringed on the lives and livelihood of rural Filipino households in a typical village in the rice-growing central plain of the country. Using historical data spanning almost four decades, this chapter was able to illustrate the evolution of the CLV through the lens of modernizing forces.

Historical household-level and village-level data have shown that the CLV has been receiving migrants. These are mostly landless workers, because of its proximity to urban centers and the development of infrastructure that creates jobs within the village and nearby places. The increasing population on closed land frontier has resulted into an increasing scarcity of agricultural land. The CLV has benefited from improvements in

infrastructure like roads, access to irrigation, improved modes of transportation, and a more active business environment. The human capital in the CLV has also improved in terms of working age population and the quality of education, owing to the expansion of primary school and development of infrastructure (e.g., bridge and concrete roads) that complement the schooling infrastructure. Data has shown that urbanization also pulled landless workers closer to urban areas to benefit from access to nonfarm work.

These catalysts of change have affected the sources of income of households in the CLV. Rice income – which has been traditionally a major source of income for farmers – has been replaced by nonfarm income. For landless workers, the share of agricultural wage work has been declining, while those of the remittances and nonfarm wage income have become more important. Both farming households and the landless households (the poorest in the village) have experienced remarkable improvement in income. This is due to the development of irrigation that allowed double cropping of rice.

Because of these increases in income, head count index has declined over time. These forces affect households differently, depending on the sources of income. The access to irrigation has prevented farmers from falling into poverty. The reduction on the reliance on rain water has made rice farming income higher and more stable, making farming a pathway out of poverty. Urbanization has improved the access to nonfarm work, which was also shown to absorb the households who do not want to engage in farming or in agricultural labor.

The modernizing forces also redefined the sources of income that reduce inequality. Household incomes that promote equality are agricultural wage and high-value products (or high-value revolution), whereas the sources that promote inequality

are nonfarm enterprises and remittances. Migration to the CLV has increased inequality of land distribution but the availability of employment opportunities in farm and nonfarm wage work brought about by urbanization and improvement of infrastructure and better human capital prevented a drastic deterioration of income distribution. In brief, land distribution no longer dictates the distribution of income in the village.

CHAPTER 5 CONCLUSION

5.1 Research objective and main findings

The main objective of this dissertation is to investigate the impacts of four modernizing forces namely population pressure, urbanization, human capital, and infrastructure on income growth and poverty reduction of rural Filipino households. Poverty reduction can be achieved through a combination of strategies while the underlying modernizing factors may accelerate or impede the reduction of poverty.

Chapter 2 explores the impacts of the four catalysts on different sources of household income representing pathways households have tracked to move out of poverty. Chapter 3 focuses on migration as it has been an important strategy in fighting poverty. Because of the dynamic impacts of migration and remittances on poverty reduction, this author investigates the channels through which remittances can reduce poverty. Chapter 4 provides the case of CLV as a microscopic picture of the dynamic impacts of four modernizing factors on rural households through their impacts on land and labor markets, livelihood opportunities, and distribution of land and income in the village. The overall findings, as supported by all three chapters, are presented in the succeeding paragraphs.

Population pressure

In Chapter 2, I have found that population pressure (or scarcity of farmland) induces households to engage more in nonfarm work, to migrate either overseas or to local towns and cities, and to spend less time in crop and livestock production. Chapter 4 verifies this observation in the case of the CLV. Over time, as supply of farmland

decreases because of population growth, the livelihoods of the households have shifted away from agriculture to nonfarm work.

Urbanization

Chapter 2 reveals that urbanization of the province induces households to join the nonfarm sector labor market and to establish nonfarm self-employment businesses whereas it discourages both overseas and domestic migration. In Chapter 4, as urbanization occurs faster outside the CLV, it has encouraged household members living in the CLV to migrate domestically to nearby cities to find work. Urbanization in areas near the CLV has also improved the access to nonfarm work, which was also shown to absorb the households who do not want to engage in farming or in agricultural labor. Chapter 3 supplements these findings by showing how migrants can improve the welfare of the households left behind in rural areas through remittances. For rural households, remittances are invested on human capital development.

Infrastructure

Chapter 2 emphasizes that electricity and roads are significant factors affecting household decision to engage in nonfarm self-employment activities and to engage in overseas and domestic migration. These infrastructures are also important in improving the human capital resources of rural households as these increases the likelihood of children to be always in school (Chapter 3). Chapter 4 highlights the value of roads in facilitating the increase in the number of establishments in CLV. It also improved the access to nearby cities allowing households to find work outside of the farm and the landless workers to migrate to the CLV.

Chapter 2 also shows that irrigation, by increasing cropping intensity significantly, increases agricultural wage income and decreases income from domestic migration and self-employment income indicating that irrigation creates jobs in the agricultural sector. This observation is substantiated by the experience of the CLV. Both farming households and the landless households (the poorest in the village) have experienced remarkable improvement in income due to the development of irrigation that allowed double cropping of rice.

Human Capital

It is revealed in Chapter 2 that households with a larger proportion of more educated members (i.e., those with secondary and tertiary schooling) allocate more of its labor resources to nonfarm work, nonfarm self-employment, and domestic and overseas migration. The impact of higher education on increasing income is highest in nonfarm wage work. Chapter 3 further supports this observation by providing the means through which households in rural areas have increased the number of educated members: through remittances invested in children's health and schooling. For the poor households in the CLV, migration may not be a viable option because it is an expensive endeavor which they could not afford.

The females and the younger cohort of rural Filipinos are more engaged in nonfarm wage work and migration after controlling for education (Chapter 2). The preference for females is also seen in schooling where females are more likely to be always in school (Chapter 3). Regarding the kinds of activities in which the poor engages themselves, Chapter 2 finds that the poor remain in agriculture particularly in

livestock, poultry and fishery sectors. Chapter 4 highlights these sectors as the areas which reduces inequality in the CLV.

To conclude, this dissertation has found that the modernizing factors, though feared to lead to rural impoverishment, are also the same factors that lead to the growth of income and reduction of poverty.

5.2 Policy recommendations

This dissertation has four important policy implications for poverty reduction: (1) inasmuch as nonfarm wage income is the main source of income growth, rural development policies should focus not only in agricultural modernization bust also in improving the industrial base of the country; (2) as migration is an important pathway for income growth and poverty reduction, there should be focus on improving the human capital base of the country; (3) foster agriculture development through infrastructure investments as the rural poor remains in agriculture; and. finally, (4) ensure ease of access to elementary and secondary schools as this increases the likelihood of children to stay in school.

5.3 Prospects for future research

As Chapter 2 highlights the importance of high-value revolution, to date there is hardly any detailed dataset that gives a disaggregated composition of agricultural income focusing on different types of high-value commodities (e.g. crops, livestock, and fishery). Results of this research shows there are benefits in allowing access to household surveys with disaggregated data on various agricultural income sources.

Limitations on the available data on school quality have limited the scope of Chapter 3 in providing quantifiable evidence on the impact of school quality on the children's progress in school and children's innate ability. In fact, the Philippine public schools are criticized as "factory" of graduates of secondary schools with little marketable skills. Thus, it is necessary to look carefully on how the schooling system has produced graduates with sufficient and appropriate skills for the job market. In Chapter 4, the findings from the CLV case illustrate the initial impact of irrigation access on an agricultural village primarily reliant on rain and shallow pumps for irrigation. Further research on the shift livelihoods activities of the CLV households over time could provide additional insights on the long term impacts of irrigation access to a rural village. This may mean a resurvey of the same village in a few years.

Appendix

Appendix 1. Sources of income, by island group and by distance, 1991 and 2012

	Luzon		Visayas		Mindanao I		Mindanao II	
	Near Metro Manila	Far from Metro Manila	Near Cebu City	Far from Cebu City	Near CDO City	Far from CDO City	Near Davao City	Far from Davao City
1991								
Agricultural income	186	338	220	409	419	308	438	488
	(5)	(20)	(12)	(26)	(23)	(24)	(25)	(35)
Wages	113	162	130	279	314	79	268	249
	(3)	(10)	(7)	(18)	(17)	(6)	(15)	(18)
Crop and others	74	176	89	130	105	229	170	239
	(2)	(10)	(5)	(8)	(6)	(18)	(10)	(17)
Nonfarm income	3,909	1,353	1,551	1,154	1,391	969	1,305	907
	(95)	(80)	(88)	(74)	(77)	(76)	(75)	(65)
Wages	2,903	933	1,172	803	1,226	775	996	741
	(71)	(55)	(66)	(51)	(68)	(61)	(57)	(53)
Self-employment	186	70	74	64	58	65	93	58
	(5)	(4)	(4)	(4)	(3)	(5)	(5)	(4)
Remittance from abroad	694	266	203	185	67	95	171	66
	(17)	(16)	(11)	(12)	(4)	(7)	(10)	(5)
Domestic remittance	125	84	102	102	40	34	46	41
	(3)	(5)	(6)	(7)	(2)	(3)	(3)	(3)
Total income	4,095	1,691	1,771	1,563	1,811	1,277	1,743	1,395
	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)

Appendix 1. Sources of income, by island group and by distance, 1991 and 2012 (Continued)

	Luzon		Visayas		Mindanao I		Mindanao II	
	Near Metro Manila	Far from Metro Manila	Near Cebu City	Far from Cebu City	Near CDO City	Far from CDO City	Near Davao City	Far from Davao City
2012								
Agricultural income	187	529	215	473	520	547	794	655
	(2)	(13)	(4)	(11)	(12)	(18)	(19)	(19)
Wages	132	315	127	347	382	287	642	448
	(2)	(8)	(3)	(8)	(9)	(9)	(15)	(13)
Crop and others	55	214	88	126	138	261	152	206
	(1)	(5)	(2)	(3)	(3)	(8)	(4)	(6)
Nonfarm income	7,435	3,555	4,668	3,725	3,802	2,562	3,451	2,728
	(98)	(87)	(96)	(89)	(88)	(82)	(81)	(81)
Wages	5,553	2,282	3,240	2,314	2,863	1,820	2,551	1,852
	(73)	(56)	(66)	(55)	(66)	(59)	(60)	(55)
Self-employment	217	122	123	126	122	113	144	108
	(3)	(3)	(3)	(3)	(3)	(4)	(3)	(3)
Remittance from abroad	1,319	734	970	866	496	295	497	463
	(17)	(18)	(20)	(21)	(11)	(9)	(12)	(14)
Domestic remittance	347	417	336	419	321	334	259	306
	(5)	(10)	(7)	(10)	(7)	(11)	(6)	(9)
Total income	7,622	4,083	4,884	4,197	4,322	3,110	4,245	3,382
	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)

*Numbers in parantheses are percentages to total income.

Source: Author's calculations from FIES 1991 and 2012.

Appendix 2. Serial correlation tests for dependent variables in the provincial regression

Wooldridge test for autocorrelation in panel data
H_0: No first order autocorrelation

Variable	F-statistic	P-value	Conclusion
Agricultural wage income	23.841	0.0000	Reject null hypothesis
Crop farming and others	47.496	0.0000	Reject null hypothesis
Nonfarm wage income	23.913	0.0000	Reject null hypothesis
Nonfarm self-employment	11.061	0.0014	Reject null hypothesis
Abroad remittance	0.602	0.4403	Cannot reject null hypothesis
Domestic remittance	4.649	0.0344	Reject null hypothesis

Appendix 3. Seemingly unrelated regression results

Variables	(1) Food (% of Total Expenditure)	(2) Housing (% of Total Expenditure)	(3) Education (% of Total Expenditure)	(4) Health (% of Total Expenditure)	(5) Clothing (% of Total Expenditure)	(6) Others (% of Total Expenditure)
Log Per Capita Expenditure (predicted)	-15.40***	6.818***	3.263***	2.165***	0.00716	3.123***
	(0.269)	(0.263)	(0.174)	(0.138)	(0.0829)	(0.186)
Household size (log)	-5.439***	-0.285	2.125***	1.175***	-0.0363	2.431***
	(0.608)	(0.593)	(0.392)	(0.310)	(0.186)	(0.446)
Age of Head	-0.0234*	0.0194	-0.00222	0.00701	-0.0205***	0.0202**
	(0.0125)	(0.0122)	(0.00804)	(0.00635)	(0.00382)	(0.00910)
Sex of Head (1=male)	0.131	-0.560	0.936***	-0.184	-0.214*	-0.101
	(0.386)	(0.376)	(0.249)	(0.196)	(0.118)	(0.285)
Head has HS educ. (1=yes)	-0.860***	0.417	0.565***	-0.0851	0.369***	-0.393**
	(0.265)	(0.259)	(0.171)	(0.135)	(0.0812)	(0.192)
Head has college educ. (1=yes)	-2.251***	0.732*	1.666***	-0.643***	0.462***	0.0578
	(0.401)	(0.391)	(0.258)	(0.204)	(0.123)	(0.291)
Domestic remittance (% of income)	-0.0548***	0.0307***	0.0133**	0.0333***	0.00851***	-0.0313***
	(0.00999)	(0.00975)	(0.00645)	(0.00510)	(0.00306)	(0.00715)
Foreign remittance (% of income)	-0.0493***	0.0524***	0.0319***	0.00337	0.0115***	-0.0500***
	(0.00748)	(0.00730)	(0.00483)	(0.00381)	(0.00229)	(0.00538)
Nonfarm income (% of income)	-0.0214***	0.0322***	-0.00669***	-0.00730***	0.00334***	-0.000223
	(0.00373)	(0.00364)	(0.00241)	(0.00190)	(0.00114)	(0.00261)
Proportion of household members:						
Males aged:						

Appendix 3. Seemingly unrelated regression results (Continued)

Variables	(1) Food (% of Total Expenditure)	(2) Housing (% of Total Expenditure)	(3) Education (% of Total Expenditure)	(4) Health (% of Total Expenditure)	(5) Clothing (% of Total Expenditure)	(6) Others (% of Total Expenditure)
0-5	-0.0606	0.211	-0.229**	0.203***	-0.0906*	-0.0308
	(0.153)	(0.149)	(0.0985)	(0.0778)	(0.0468)	(0.112)
6-11	0.403***	-0.0916	0.00991	0.0178	-0.0826**	-0.256***
	(0.135)	(0.131)	(0.0867)	(0.0685)	(0.0412)	(0.0992)
12-16	0.432***	-0.178	0.140	0.0403	-0.0315	-0.401***
	(0.134)	(0.130)	(0.0862)	(0.0681)	(0.0409)	(0.0984)
17-21	0.269*	-0.394***	0.654***	-0.0757	-0.0174	-0.435***
	(0.143)	(0.139)	(0.0918)	(0.0725)	(0.0436)	(0.105)
65 and above	-0.169	0.576**	-0.272	0.275**	-0.0541	-0.360*
	(0.264)	(0.257)	(0.170)	(0.134)	(0.0807)	(0.194)
Females aged:						
0-5	0.0693	0.119	-0.188***	0.126**	-0.111***	-0.0134
	(0.110)	(0.107)	(0.0707)	(0.0558)	(0.0336)	(0.0806)
6-11	0.330***	0.0314	-0.139**	0.0307	-0.0885***	-0.163**
	(0.0885)	(0.0863)	(0.0571)	(0.0451)	(0.0271)	(0.0648)
12-16	0.130	-0.121	0.202***	0.0194	0.000619	-0.229***
	(0.0894)	(0.0872)	(0.0576)	(0.0455)	(0.0274)	(0.0657)
17-21	-0.379***	-0.195*	0.882***	-0.0843	0.0611*	-0.283***
	(0.114)	(0.111)	(0.0735)	(0.0581)	(0.0349)	(0.0844)
22-64	0.00627	0.0375	-0.0649	-0.0881	0.127***	-0.0165
	(0.107)	(0.105)	(0.0691)	(0.0546)	(0.0328)	(0.0789)

Appendix 3. Seemingly unrelated regression results (Continued)

Variables	(1) Food (% of Total Expenditure)	(2) Housing (% of Total Expenditure)	(3) Education (% of Total Expenditure)	(4) Health (% of Total expenditure)	(5) Clothing (% of Total Expenditure)	(6) Others (% of Total Expenditure)
65 and above	-0.526***	0.564***	-0.0891	0.311***	-0.0290	-0.229
	(0.200)	(0.195)	(0.129)	(0.102)	(0.0612)	(0.147)
Constant	167.0***	-20.72***	-23.47***	-15.84***	5.665***	-13.44***
	(4.173)	(4.103)	(2.759)	(2.196)	(0.975)	(1.406)
Provincial dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,128	8,128	8,128	8,128	8,128	8,128

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations

Appendix 4. Panel estimation with fixed effects

Variables	(1) Food (% of Total Expenditure)	(2) Housing (% of Total Expenditure)	(3) Education (% of Total Expenditure)	(4) Health (% of Total Expenditure)	(5) Clothing (% of Total Expenditure)	(6) Others (% of Total Expenditure)
Log Per Capita Expenditure	-11.62***	4.196***	1.834***	3.030***	-0.708***	3.267***
	(0.552)	(0.520)	(0.318)	(0.293)	(0.167)	(0.377)
Household size (log)	-5.267***	-0.657	1.649**	1.299*	-0.116	3.091***
	(1.266)	(1.193)	(0.730)	(0.671)	(0.384)	(0.864)
Age of Head	0.147***	-0.0689*	-0.0107	-0.0224	-0.0163	-0.0293
	(0.0375)	(0.0353)	(0.0216)	(0.0199)	(0.0114)	(0.0256)
Sex of Head (1=male)	-1.424	-0.269	1.711***	0.528	-0.506*	-0.0405
	(0.940)	(0.886)	(0.543)	(0.499)	(0.285)	(0.642)
Head has HS educ. (1=yes)	1.745**	-1.033	-0.147	-0.640	0.101	-0.0254
	(0.736)	(0.694)	(0.425)	(0.391)	(0.223)	(0.503)
Head has college educ. (1=yes)	3.630***	0.422	-1.082	-2.664***	0.0462	-0.352
	(1.151)	(1.085)	(0.664)	(0.610)	(0.349)	(0.786)
Domestic remittance (% of income)	-0.0378**	-0.0121	0.0169	0.0250**	0.00651	0.00146
	(0.0186)	(0.0175)	(0.0107)	(0.00984)	(0.00563)	(0.0127)
Foreign remittance (% of income)	-0.0366**	0.00353	0.0336***	0.00271	0.0100*	-0.0133
	(0.0178)	(0.0167)	(0.0102)	(0.00941)	(0.00539)	(0.0121)
Nonfarm income (% of income)	-0.00780	0.00359	-0.00375	-0.0106*	0.00730**	0.0112
	(0.0102)	(0.00961)	(0.00588)	(0.00541)	(0.00309)	(0.00696)
Proportion of household members:						
Males aged:						

Appendix 4. Panel estimation with fixed effects (Continued)

Variables	(1) Food (% of Total Expenditure)	(2) Housing (% of Total Expenditure)	(3) Education (% of Total Expenditure)	(4) Health (% of Total Expenditure)	(5) Clothing (% of Total Expenditure)	(6) Others (% of Total Expenditure)
0-5	-0.261	0.185	-0.287*	0.441***	-0.191**	0.113
	(0.301)	(0.283)	(0.173)	(0.159)	(0.0912)	(0.205)
6-11	0.0551	0.0194	0.0790	0.195	-0.175**	-0.174
	(0.282)	(0.266)	(0.163)	(0.149)	(0.0855)	(0.192)
12-16	0.398	-0.220	0.0945	0.253*	-0.0981	-0.427**
	(0.264)	(0.249)	(0.152)	(0.140)	(0.0801)	(0.180)
17-21	0.232	-0.372	0.614***	0.128	-0.0918	-0.511***
	(0.250)	(0.235)	(0.144)	(0.132)	(0.0757)	(0.170)
65 and above	-0.539	1.076**	-0.488	0.291	-0.0226	-0.318
	(0.560)	(0.528)	(0.323)	(0.297)	(0.170)	(0.382)
Females aged:						
0-5	0.216	0.199	-0.189	0.158	-0.137**	-0.246*
	(0.211)	(0.199)	(0.122)	(0.112)	(0.0640)	(0.144)
6-11	-0.0422	0.185	-0.0824	0.201**	-0.0359	-0.225*
	(0.191)	(0.180)	(0.110)	(0.101)	(0.0579)	(0.130)
12-16	0.123	0.131	0.0302	0.0568	0.00481	-0.346***
	(0.175)	(0.165)	(0.101)	(0.0926)	(0.0530)	(0.119)
17-21	-0.239	-0.0528	0.489***	-0.0980	0.0573	-0.156
	(0.199)	(0.188)	(0.115)	(0.106)	(0.0604)	(0.136)
22-64	-0.0424	-0.0864	-0.0531	-0.00883	0.0458	0.145
	(0.198)	(0.187)	(0.114)	(0.105)	(0.0602)	(0.135)

Appendix 4. Panel estimation with fixed effects (Continued)

Variables	(1) Food (% of Total Expenditure)	(2) Housing (% of Total Expenditure)	(3) Education (% of Total Expenditure)	(4) Health (% of Total expenditure)	(5) Clothing (% of Total Expenditure)	(6) Others (% of Total Expenditure)
65 and above	-0.472	-0.945**	0.703***	0.563**	-0.0264	0.177
	(0.441)	(0.415)	(0.254)	(0.234)	(0.134)	(0.301)
Constant	134.2***	0.191	-13.38***	-19.40***	12.54***	-14.10***
	(4.578)	(4.314)	(2.641)	(2.427)	(1.389)	(3.124)
Provincial dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,222	6,222	6,222	6,222	6,222	6,222

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations

Appendix 5. Hausman tests of Independence of Irrelevant Alternatives (IIA) assumption

H_0: Odds(Outcome-J vs Outcome-K) are independent of other alternatives

	Primary school-aged children (N=1726)	
	Chi^2	$P>chi^2$
Not in school	65.413	0.071
Dropped	59.928	0.159
Returnee	18.861	1.000
Always	49.023	0.513.
	Secondary school-aged children (N=1038)	
	Chi^2	$P>chi^2$
Not in school	49.106	0.350
Dropped	69.012	0.016
Returnee	23.721	0.997
Always	23.889`	0.997
	Tertiary school-aged children (N=843)	
	Chi^2	$P>chi^2$
Not in school	0.094	0.993
Dropped	0.499	0.974
Returnee	-2.876	.
Always	2.486	0.981

Appendix 6. Results of bivariate probit expressed as marginal effects

	Marginal effects at mean								
	Primary School (Ages 6-11)			Secondary school (Age 12-15)			Tertiary school (Age 16-21)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	**Previously in school**	**Returnee**	**Always**	**Previously in school**	**Returnee**	**Always**	**Previously in school**	**Returnee**	**Always**
Child's characteristics									
Child's sex (female=1)	-0.0164**	-0.0178*	0.0444***	-0.0247	-0.0340***	0.140***	0.0427	-0.0116	0.00143
	(0.00725)	(0.00975)	(0.0137)	(0.0291)	(0.00883)	(0.0320)	(0.0325)	(0.0117)	(0.0184)
Child is 6 years old (base)	Base	Base	Base						
Child is 7 years old (yes=1)	0.0214	-0.0872***	0.0785***						
	(0.0148)	(0.0150)	(0.0231)						
Child is 8 years old (yes=1)	0.0239	-0.178***	0.187***						
	(0.0173)	(0.0202)	(0.0280)						
Child is 9 years old (yes=1)	0.0488***	-0.155***	0.124***						
	(0.0143)	(0.0190)	(0.0265)						
Child is 10 years old (yes=1)	0.0745***	-0.156***	0.0908***						
	(0.0145)	(0.0195)	(0.0255)						
Child is 11 years old (yes=1)	0.0880***	-0.139***	0.0511**						
	(0.0143)	(0.0180)	(0.0240)						
Child is 12 years old (base)				Base	Base	Base			
Child is 13 years old (yes=1)				0.106***	-0.00325	-0.139***			
				(0.0380)	(0.0110)	(0.0448)			
Child is 14 years old (yes=1)				0.291***	-0.0136	-0.367***			
				(0.0415)	(0.0117)	(0.0467)			
Child is 15 years old (yes=1)				0.357***	-0.00932	-0.473***			
				(0.0435)	(0.0121)	(0.0473)			
Child is 16 years old (yes=1)							Base	Base	Base

Appendix 6. Results of bivariate probit (Continued)

	Marginal effects at mean								
	Ages 6-11			Age 12-15			Ages 16-21		
Variables	(1) Previously in school	(2) Returnee	(3) Always	(4) Previously in school	(5) Returnee	(6) Always	(7) Previously in school	(8) Returnee	(9) Always
Child is 17 years old (yes=1)							-0.163***	0.00681	-0.096***
							(0.0489)	(0.0166)	(0.0255)
Child is 18 years old (yes=1)							-0.212***	-0.0103	-0.172***
							(0.0484)	(0.0175)	(0.0278)
Child is 19 years old (yes=1)							-0.250***	-0.0242	-0.231***
							(0.0545)	(0.0203)	(0.0325)
Child is 20 years old (yes=1)							-0.273***	-0.0445*	-0.296***
							(0.0612)	(0.0240)	(0.0356)
Child is 21 years old (yes=1)							-0.284***	-0.0831***	-0.397***
							(0.0690)	(0.0320)	(0.0478)
Eldest child (yes=1)	0.000724	-0.00701	0.0077	-0.0572	0.0204**	0.0173	0.0887**	-0.00903	0.0395**
	(0.00993)	(0.0147)	(0.020)	(0.0350)	(0.00985)	(0.0381)	(0.0354)	(0.0126)	(0.0196)
Youngest child (yes=1)	0.0476	0.0247	-0.0957	-0.0535	0.0164	0.0244	0.502**	-0.103	0.0974
	(0.0316)	(0.0602)	(0.088)	(0.119)	(0.0316)	(0.190)	(0.212)	(0.0791)	(0.113)
School age sibling (% of fsize)	0.000743	0.00907	-0.0122	0.0479**	0.00218	-0.0741***	-0.00506	-0.00421	-0.0137
	(0.00585)	(0.0080)	(0.011)	(0.0200)	(0.00567)	(0.0224)	(0.0181)	(0.00649)	(0.0115)
Household characteristics									
Head has at most sec. educ. (yes=1)	0.000947	-0.037***	0.045***	0.0325	-0.0450***	0.0934**	0.0393	0.0134	0.0595***
	(0.00866)	(0.0122)	(0.0163)	(0.0343)	(0.0107)	(0.0367)	(0.0354)	(0.0130)	(0.0210)
Head has at most col. educ. (yes=1)	-0.00791	-0.061***	0.0863***	-0.143**	-0.0323*	0.300***	0.154***	0.0346*	0.189***
	(0.0159)	(0.0217)	(0.0305)	(0.0591)	(0.0178)	(0.0661)	(0.0581)	(0.0201)	(0.0297)

Appendix 6. Results of bivariate probit (Continued)

	Marginal effects at mean								
	Ages 6-11			Age 12-15			Ages 16-21		
Variables	(1) Previously in school	(2) Returnee	(3) Always	(4) Previously in school	(5) Returnee	(6) Always	(7) Previously in school	(8) Returnee	(9) Always
Household size	-0.00032	7.47e-05	0.000344	-0.0232	4.17e-06	0.0326*	0.00300	0.00542	0.0152
	(0.00458)	(0.00618)	(0.00824)	(0.0159)	(0.00456)	(0.0180)	(0.0151)	(0.00545)	(0.0102)
Access to electricity (yes=1)	-0.02***	-0.042***	0.0813***	-0.0501	-0.00933	0.0992**	-0.0716*	0.0125	-0.0194
	(0.00820)	(0.0114)	(0.0158)	(0.0350)	(0.00927)	(0.0392)	(0.0411)	(0.0156)	(0.0251)
HH members 5 yrs old and lower (% of family size)	0.000149	0.000371	-0.000663	0.00352*	-0.000129	-0.00455**	-0.00714***	0.000365	-0.004***
	(0.00045)	(0.0006)	(0.00081)	(0.0021)	(0.00056)	(0.0023)	(0.00224)	(0.000856)	(0.00152)
Remittances from abroad (log)	-0.00636	0.00134	0.00706	-0.0631**	0.0156**	0.0405	0.0169	0.00175	0.0159
	(0.00714)	(0.00748)	(0.0110)	(0.0267)	(0.00718)	(0.0264)	(0.0266)	(0.00942)	(0.0110)
Domestic remittances (log)	-6.46e-05	-0.0150**	0.0187**	-0.00967	-0.00810*	0.0386**	0.00190	0.0114*	0.0288***
	(0.00433)	(0.00636)	(0.00873)	(0.0156)	(0.00462)	(0.0165)	(0.0194)	(0.00667)	(0.0106)
Farm income (log)	0.00266	0.000767	-0.00460	-0.0318*	0.00366	0.0334*	0.0306	0.00185	0.0256**
	(0.00441)	(0.00619)	(0.00815)	(0.0172)	(0.00472)	(0.0202)	(0.0193)	(0.00704)	(0.0107)
Non farm income (log)	-0.00586	0.000876	0.00694	-0.043***	0.00543	0.0435**	0.0388**	0.00158	0.0306***
	(0.00391)	(0.00594)	(0.00779)	(0.0161)	(0.00433)	(0.0181)	(0.0170)	(0.00627)	(0.0101)
Zero abroad remittances (yes=1)	-0.00274	0.0221	-0.0235	-0.167	0.0613*	0.0456	-0.00895	0.0138	0.0272
	(0.0314)	(0.0381)	(0.0519)	(0.116)	(0.0322)	(0.119)	(0.135)	(0.0487)	(0.0577)

Appendix 6. Results of bivariate probit (Continued)

	Relative risk ratios								
	Ages 6-11			Age 12-15			Ages 16-21		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Previously in school	Returnee	Always	Previously in school	Returnee	Always	Previously in school	Returnee	Always
Zero domestic remittances (yes=1)	0.00622	-0.0535*	0.0576	-0.0416	-0.0187	0.116	0.0618	0.0414	0.143***
	(0.0203)	(0.0293)	(0.0405)	(0.0734)	(0.0206)	(0.0769)	(0.0931)	(0.0328)	(0.0525)
Zero farm income (yes=1)	0.0237	0.0124	-0.0478	-0.266**	0.0298	0.282**	0.169	0.0132	0.149**
	(0.0309)	(0.0426)	(0.0563)	(0.117)	(0.0328)	(0.138)	(0.135)	(0.0492)	(0.0758)
Zero nonfarm income (yes=1)	-0.0388	0.0348	0.0101	-0.328***	0.0353	0.351***	0.217*	0.0199	0.198***
	(0.0267)	(0.0406)	(0.0530)	(0.114)	(0.0304)	(0.129)	(0.121)	(0.0454)	(0.0746)
Village characteristics									
Has ES in bgy (yes=1)	-0.0130	-0.0270*	0.0513***	0.0116	0.0114	-0.0516	-0.0593	0.0183	0.00321
	(0.00959)	(0.0139)	(0.0197)	(0.0422)	(0.0135)	(0.0487)	(0.0458)	(0.0162)	(0.0249)
Has HS in bgy (yes=1)	-0.00104	0.0223*	-0.0261	-0.0797**	0.00300	0.103**	0.0385	0.00382	0.0358
	(0.00942)	(0.0125)	(0.0180)	(0.0375)	(0.0110)	(0.0403)	(0.0399)	(0.0141)	(0.0229)
Observations	1,726	1,726	1,726	1,038	1,038	1,038	843	843	843

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculations

Appendix 7. Results of mulrinomial probit expressed as marginal effects

	Marginal effects at mean								
	Primary School (Ages 6-11)			Secondary school (Age 12-15)			Tertiary school (Age 16-21)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	**Previously in school**	**Returnee**	**Always**	**Previously in school**	**Returnee**	**Always**	**Previously in school**	**Returnee**	**Always**
Child's characteristics									
Child's sex (female=1)	-0.0136*	-0.0133	0.0400***	-0.0117	-0.0242**	0.129***	0.0521	-0.00943	0.0134
	(0.00758)	(0.00920)	(0.0128)	(0.0297)	(0.00978)	(0.0327)	(0.0375)	(0.0163)	(0.0274)
Child is 6 years old (base)	Base	Base	Base						
Child is 7 years old (yes=1)	0.0227	-0.0526***	0.0381						
	(0.0325)	(0.00740)	(0.0320)						
Child is 8 years old (yes=1)	0.0260	-0.0764***	0.0699**						
	(0.0323)	(0.00832)	(0.0326)						
Child is 9 years old (yes=1)	0.0536	-0.0764***	0.0315						
	(0.0394)	(0.00860)	(0.0391)						
Child is 10 years old (yes=1)	0.134**	-0.0692***	-0.0527						
	(0.0590)	(0.00825)	(0.0584)						
Child is 11 years old (yes=1)	0.176***	-0.0683***	-0.101						
	(0.0657)	(0.00839)	(0.0645)						
Child is 12 years old (base)				Base	Base	Base			
Child is 13 years old (yes=1)				0.127***	0.00623	-0.151***			
				(0.0458)	(0.0140)	(0.0460)			
Child is 14 years old (yes=1)				0.326***	0.000448	-0.385***			
				(0.0484)	(0.0130)	(0.0442)			
Child is 15 years old (yes=1)				0.382***	0.00716	-0.490***			
				(0.0483)	(0.0147)	(0.0401)			
Child is 16 years old (yes=1)							Base	Base	Base

Appendix 7. Results of multinomial probit (Continued)

	Marginal effects at mean								
	Ages 6-11			Age 12-15			Ages 16-21		
Variables	(1) Previously in school	(2) Returnee	(3) Always	(4) Previously in school	(5) Returnee	(6) Always	(7) Previously in school	(8) Returnee	(9) Always
Child is 17 years old (yes=1)							-0.163***	-0.0137	-0.101***
							(0.0424)	(0.0192)	(0.0241)
Child is 18 years old (yes=1)							-0.231***	-0.0427***	-0.142***
							(0.0364)	(0.0153)	(0.0217)
Child is 19 years old (yes=1)							-0.256***	-0.0487***	-0.163***
							(0.0347)	(0.0134)	(0.0201)
Child is 20 years old (yes=1)							-0.246***	-0.0386***	-0.217***
							(0.0335)	(0.0135)	(0.0189)
Eldest child (yes=1)	0.00153	-0.00522	0.0051	-0.0500	0.0195	0.0109	0.112***	0.0102	0.0229
	(0.0102)	(0.0134)	(0.018)	(0.0353)	(0.0136)	(0.0401)	(0.0399)	(0.0183)	(0.0282)
Youngest child (yes=1)	0.0603	-0.051**	-0.107	-0.119	-0.0313***	0.0614	0.317	-0.0582***	0.0721
	(0.0897)	(0.00666)	(0.119)	(0.132)	(0.00623)	(0.162)	(0.223)	(0.00979)	(0.201)
School age sibling (% of fsize)	0.00310	0.0109	-0.0138	0.0563***	0.00897	-0.0849***	7.12e-06	0.00832	-0.0167
	(0.00633)	(0.0078)	(0.010)	(0.0216)	(0.00754)	(0.0238)	(0.0222)	(0.00939)	(0.0171)
Household characteristics									
Head has at most sec. educ. (yes=1)	-0.00250	-0.033***	0.0397***	0.0412	-0.0233**	0.0703*	0.0497	0.0184	0.0742**
	(0.00890)	(0.0101)	(0.014)	(0.0355)	(0.00937)	(0.0379)	(0.0410)	(0.0188)	(0.0343)
Head has at most col. educ. (yes=1)	-0.0121	-0.040***	0.0588***	-0.139***	-0.0226**	0.243***	0.0518	0.0329	0.291***
	(0.0123)	(0.0094)	(0.017)	(0.0466)	(0.00906)	(0.0484)	(0.0647)	(0.0358)	(0.0666)

Appendix 7. Results of multinomial probit (Continued)

	Marginal effects at mean								
	Ages 6-11			Age 12-15			Ages 16-21		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	**Previously in school**	**Returnee**	**Always**	**Previously in school**	**Returnee**	**Always**	**Previously in school**	**Returnee**	**Always**
Household size	-0.000926	-0.00071	0.00063	-0.0323*	-0.0069	0.043**	-0.00333	-0.00370	0.0148
	(0.00496)	(0.006)	(0.008)	(0.0174)	(0.0062)	(0.0188)	(0.0188)	(0.00793)	(0.0149)
Access to electricity (yes=1)	-0.0291**	-0.051***	0.0924***	-0.0680*	-0.0226*	0.118***	-0.0586	0.0214	-0.0468
	(0.0116)	(0.0144)	(0.0190)	(0.0390)	(0.0133)	(0.0429)	(0.0496)	(0.0202)	(0.0398)
HH members 5 yrs old and lower (% of family size)	0.000523	0.000610	-0.000902	0.00417*	0.000597	-0.00547**	-0.00745***	0.000216	-0.00337
	(0.000466)	(0.00058)	(0.00077)	(0.00218)	(0.000660)	(0.00235)	(0.0027)	(0.00131)	(0.00222)
Remittances from abroad (log)	-0.00583	-0.00017	0.00563	-0.0642**	0.0153	0.0401	0.0190	-0.00132	0.0297*
	(0.00688)	(0.00693)	(0.00994)	(0.0288)	(0.00992)	(0.0289)	(0.0277)	(0.0109)	(0.0166)
Domestic remittances (log)	-0.00123	-0.014**	0.0184**	-0.0151	-0.0095**	0.0448**	0.00427	0.0112	0.0431**
	(0.00431)	(0.00611)	(0.00799)	(0.0158)	(0.00477)	(0.0182)	(0.0215)	(0.00898)	(0.0168)
Farm income (log)	0.00187	0.000351	-0.00336	-0.0266	0.00909	0.0296	0.0310	-0.00115	0.0404**
	(0.00439)	(0.00582)	(0.00767)	(0.0192)	(0.00554)	(0.0206)	(0.0217)	(0.00937)	(0.0171)
Non farm income (log)	-0.00445	0.00181	0.00540	-0.0454**	0.00434	0.0448**	0.0546***	0.0120	0.0293**
	(0.00387)	(0.00578)	(0.00725)	(0.0177)	(0.00474)	(0.0190)	(0.0198)	(0.00991)	(0.0146)
Zero abroad remittances (yes=1)	-0.00851	0.00768	-0.0143	-0.158	0.0401**	0.0664	-0.0407	-0.0318	0.0929
	(0.0346)	(0.0318)	(0.0465)	(0.135)	(0.0162)	(0.135)	(0.142)	(0.0700)	(0.0587)

Appendix 7. Results of multinomial probit (Continued)

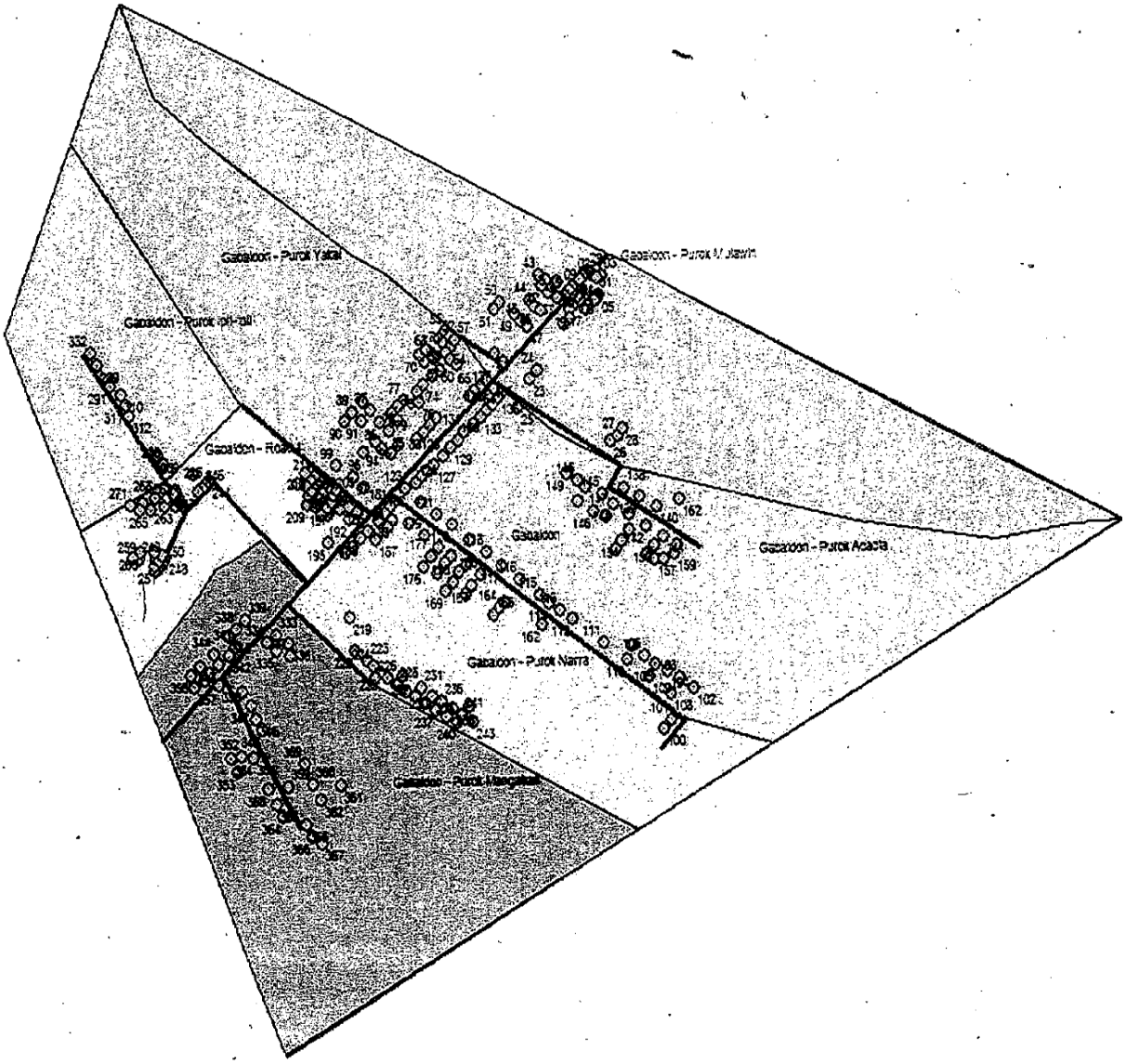
	Relative risk ratios								
	Ages 6-11			Age 12-15			Ages 16-21		
Variables	(1) Previously in school	(2) Returnee	(3) Always	(4) Previously in school	(5) Returnee	(6) Always	(7) Previously in school	(8) Returnee	(9) Always
Zero domestic remittances (yes=1)	0.00347	-0.0478	0.0583	-0.0976	-0.0519*	0.172**	0.0457	0.0225	0.219***
	(0.0201)	(0.0316)	(0.0405)	(0.0744)	(0.0272)	(0.0850)	(0.0987)	(0.0400)	(0.0732)
Zero farm income (yes=1)	0.0209	0.0116	-0.0452	-0.202**	0.129	0.162	0.0975	-0.0292	0.301
	(0.0404)	(0.0444)	(0.0638)	(0.0913)	(0.112)	(0.136)	(0.166)	(0.0445)	(0.184)
Zero nonfarm income (yes=1)	-0.0315	0.0352	0.000357	-0.287***	0.0353	0.306***	0.274*	0.0840	0.169
	(0.0198)	(0.0482)	(0.0538)	(0.0867)	(0.0466)	(0.109)	(0.158)	(0.112)	(0.136)
Village characteristics									
Has ES in bgy (yes=1)	-0.00614	-0.0211	0.050**	0.00535	0.00773	-0.0391	-0.0285	0.0200	0.00175
	(0.0119)	(0.0171)	(0.0234)	(0.0438)	(0.0141)	(0.0485)	(0.0522)	(0.0182)	(0.0359)
Has HS in bgy (yes=1)	-0.00675	0.0156	-0.0211	-0.0452	0.0224	0.0749*	-7.61e-05	-0.0133	0.080**
	(0.0094)	(0.0139)	(0.0186)	(0.0366)	(0.0163)	(0.0414)	(0.0479)	(0.0189)	(0.0392)
Observations	1,726	1,726	1,726	1,038	1,038	1,038	843	843	843

Standard errors in parentheses

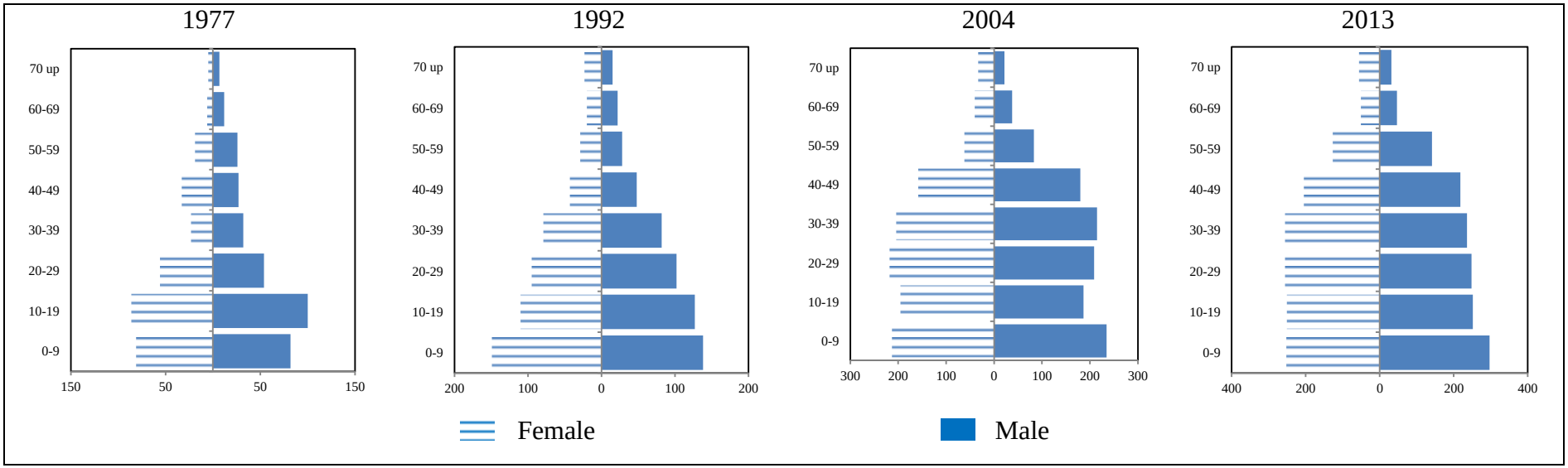
*** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculations

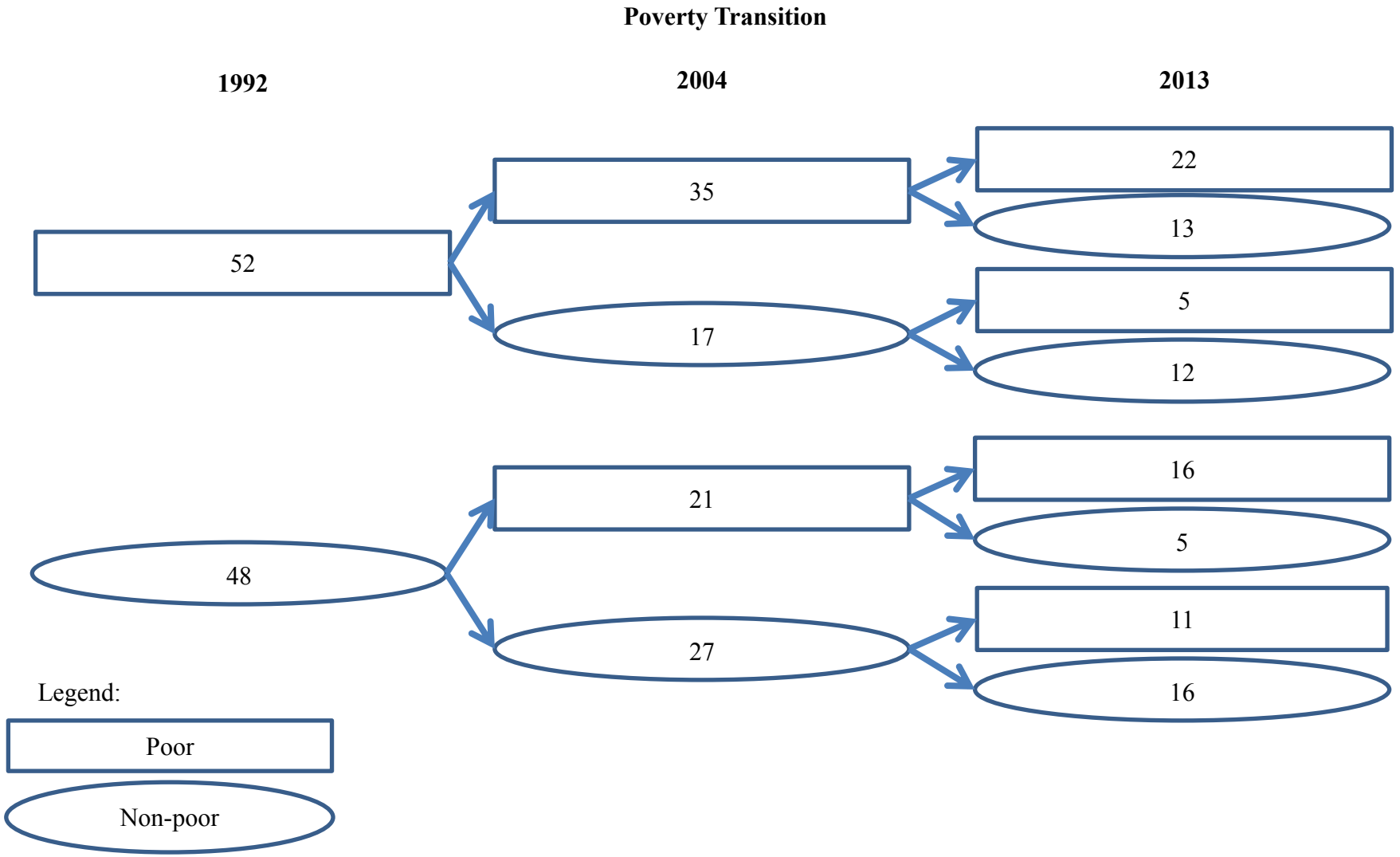
Appendix 8. Distribution of households in the CLV by districts



Appendix 9. Distribution of population of CLV, 1977-2013



Appendix 10: Transition of Poverty 1992, 2004, 2013



References

Acharaya, C., & Leon-Gonzalez, R. (2014). "How do Migration and Remittances Affect Human Capital Investment? The Effects of Relaxing Information and Liquidity Constraints." *The Journal of Development Studies* 50:3, 444-460. DOI:10/1080/00220388.2013.866224.

Acosta, P. (2006). "Labor supply, school attendance, and remittances from international migration: the case of El Salvador." Policy Research Working Paper Series 3903. The World Bank.

Adams Jr., Richard, H., & Cuecuecha, A. (2010). "Remittances, Household Expenditure and Investment in Guatemala." *World Development* 38:11, 1626-1641. DOI: 10.1016/j.worlddev.2010.03.003.

Adams, R.H.Jr., & He, J. J. (1995). *Sources of Income Inequality and Poverty in Rural Pakistan*, Washington DC. International Food Policy Research Institute, research report 102.

ADB (2009). Poverty in the Philippines Causes, Constraints and Opportunities. Asian Development Bank, Mandaluyong City, Philippines.

Albert, J., Quimba F., Ramos, A. & Almeda, J. (2012). Profile of Out-of-School Children in the Philippines. Discussion Paper Series No. 2012-01. Philippine Institute for Development Studies.

Albert, J., Ramos, A. & del Prado, F. (2013). "Poverty and Vulnerability in the Philippines Before and Amidst the Global Financial Crisis: Evidence from Cross Section and Panel Data." Paper presented at the 12th National Convention on Statistics (NCS), Mandaluyong City, Philippines, October 1–2.

Ali, I. & Pernia, E.M. (2003). Infrstructure and Poverty Reduction – What is the connection? ERD policy brief series Economics and Research Department No. 13Asian Development Bank, Mandaluyong City, Philippines.

Arif, R. & Chaudhury A. (2015). "The Effects of External Migration on Enrolments, Accumulated Schooling and Dropouts in Punjab." *Applied Economics* 47:16, 1607–1632. DOI:10.1080/00036846.2014.1000518.

Asis, M. (2006). "The Philippines' Culture of Migration." Migration Information Science. http://www.migrationpolicy.org/article/philippines-culture-migration.

Asis, M., Milagros, B., Huang, S., & Yeoh, B.S.A. (2004). "When the Light of the Home is Abroad: Unskilled Female Migration and the Filipino Family." *Singapore Journal of Tropical Geography* 25:2, 198–215.

Awano, H. undated. Ex-post evaluation of Japanese ODA Loan Central Luzon Irrigation Project.

Azam, M., & Kingdon, G. (2012). "Are Girls the Fairer Sex in India? Revisiting Intra-household Allocation of Education Expenditure?" *World Development* 42:143 –164.

Balderson et al. (1981)

Balisacan, A.M. (2003). "Poverty and Inequality" in The Philippine Economy Development, Policies and Challenges, Arsenio Balisacan and Hal Hill (eds). Ateneo de Manila University Press, Quezon City, Philippines.

Ball, R. (1997). "The Role of the State in the Globalisation of Labour Markets: the Case of the Philippines." *Environment and Planning* 29:1603–1628.

Ballesteros, M. & dela Cruz, A. (2006). Land Reform and Changes in Land Ownership Concentration: Evidence from Rice-Growing Villages in the Philippines. Discussion Paper Series No. 2006-21. Philippine Institute for Development Studies.

Bansak, C., & Chezum, B. (2015). "How do Remittances Affect Human Capital Formation of School-age Boys and Girls?" *American Economic Review: Papers and Proceedings* 99:2, 145–148.

Banerjee, A.V., & Duflo, E. (2011). Poor Economics A Radical Rethinking of the Way to Fight Global Poverty. Public Affairs, New York, USA.

Battistella, R. (1994). "The Political Economy of Labor Intensive Development: The Case of the Philippines." Paper delivered at the OECD Conference on "Development Strategies, Employment and International Migration," Paris, July 1994.

Barrett, C.B., Bezuneh, M., & Aboud, A. (2001). *Income diversification, poverty traps and policy shocks in Côte d' Ivoire and Kenya* in Food Policy (26) 367-384.

Baulch, B. (2011). *Why Poverty Persists: Poverty Dynamics in Asia and Africa*, Cheltenham: Edward Elgar Publishing.

Behrman, J., & Knowles, J.C. (1999). "Household Income and Child Schooling in Viet Nam." *The World Bank Economic Review* 13:2, 211–56.

Behrman, J. R., & Rosenzweig, M. (2002). "Does Increasing Women's Schooling Raise the Schooling of the Next Generation?" *American Economic Review* 92:1, 323–334.

Black, S., Devereux, P.J., & Salvanes, K.G. (2005). "The More the Merrier? The Effect of Family Size and Birth Order on Children's Education." *The Quarterly Journal of Economics*, 669–700.

Brown, P. H., & Park, A. (2002). "Education and Poverty in Rural China." *Economics of Education Review* 21:6, 523–541.

Cameron, A., & Trivedi, P. (2009). *Microeconometrics Using Stata*. Stata Press, Texas.

Chami, R,, Fullenkamp, C., & Jahjah, S. (2003). "Are Immigrant Remittance Flows a Source of Capital for Development?" IMF Working Paper WP/03/189. International Monetary Fund.

Chernichovsky, D. (1985). "Socioeconomic Aspects of School Enrollment and Attendance in Rural Botswana." *Economic Development and Cultural Change* 33:2, 319-332.

David, C., & Otsuka, K. (eds) (1994) *Modern Rice Technology and Income Distribution in Asia*, Boulder, CO: Lynne Rienner.

Davis, B., Winters, P., Carletto, G., Covarrubias, K., Quiñones, E.J., Zezza, A., Stamoulis, K., Azzarri, C., Digiuseppe, S. et al. (2009). *A Cross-Country Comparison of Rural Income Generating Activities* in World Development Vol. 38 No. 1 pp. 48-63.

De Janvry, A., Sadoulet, E., & Zhu, N. (2005). The role of non-farm incomes in reducing rural poverty and inequality in China. *Department of Agricultural & Resource Economics, UCB*.

De Janvry, A., Sadoulet, E., & Zhu, N. (2005). The Role of Non-farm incomes in Reducing Rural Poverty and Inequality in China. CUDARE Working Paper. Available online at http://escholarship.org/uc/item/7ts2z766.

Dorantes, C., & Pozo, S. (2010). "Accounting for Remittance and Migration Effects on Children's Schooling." *World Development* 38:12, 1747–1759.

Dozina, G. E. (1978). Agrarian Adaptation to Demographic and Technological Changes in two Central Luzon Villages, Masters Thesis. Ateneo de Manila University, Manila, Philippines.

Dostie, B., & Jayaraman, R. (2006). "Determinants of School Enrollment in Indian Villages*". Economic Development and Cultural Change* 54:2, 405-421. DOI:10.1086/497006.

Eder, J. F. (1999). *A generation later: Household strategies and economic change in the Rural Philippines*. University of Hawaii Press.

Estudillo, J.P., Fujimura, M., & Hossain, M. (1999). "New rice technology and comparative advantage in rice production in the Philippines," *Journal of Development Studies*, 35(5): 162–84.

Estudillo, J. P., & Otsuka, K. (1999) "Green revolution, human capital, and off-farm employment: changing sources of income among farm households in Central Luzon, 1966–94," *Economic Development and Cultural Change*, 47(3): 497–523.

Estudillo, J. P., & Otsuka, K. (2006) "Lessons from three decades of green revolution in the Philippines," *Developing Economies*, 44(2): 123–48.

Estudillo, J. P., & Otsuka, K. (2016). *Moving out of poverty: an inquiry into the inclusive growth in Asia.* London and New York: Routledge Taylor and Francis Group.

Estudillo, J.P., Mano, Y., & Seng-Arloun, S. (2013) "Job choice of three generations in rural Laos," *Journal of Development Studies*, 49(7): 991–1009.

Estudillo, J. P., Quisumbing, A. R., & Otsuka, K. (2001). Gender differences in land inheritance and schooling investments in the rural Philippines. Land Economics, 77(1), 130-143.

Estudillo, J., Quisumbing A., & Otsuka, K. (2001). "Gender Differences in Wealth Transfer and Expenditure Allocation: Evidence from the Rural Philippines." *The Developing Economies* 39:4, 366-94.

Estudillo, J.P., Sawada, Y., & Otsuka, K. (2008) "Poverty and income dynamics in Philippine villages, 1985–2004," *Review of Development Economics*, 12(4): 877–890.

Estudillo, J.P., Sawada, Y., & Otsuka, K. (2009). "The Changing Determinants of Schooling Investments: Evidence from the Villages in the Philippines, 1985–1989 and 2000–2004." *Journal of Development Studies* 45:3, 391–411.

Feldman, A. (2006). Decomposing inequality and obtaining marginal effects. Stata Journal, 6(1), 106-111.

Fields, G. S. (2012). *Working hard, Working Poor: a global journey*, Oxford: Oxford University Press.

Fukui, S. (1995). The role of land pawning in securing loans: the case of sangla in the Philippines. *The Developing Economies*, *33*(4), 406-409.

Funkhouser, E. (2006). The Effect of Emigration on the Labor Market Outcomes of the Sender Household: A Longitudinal Approach Using Data from Nicaragua." *Well-being and Social Policy* 2:2, 5–25.

Fuwa, N. (2000). Politics and Economics of Land Reform in the Philippines: a survey. A background paper prepared for a World Bank Study, Dynamism of Rural Sector Growth: Policy Lessons from East Asian Countries.

Gibson, J., & Olivia, S. (2009) The Effect of Infrastructure Access and Quality on Non-farm Enterprises in Rural Indonesia in World Development Vol. 38, No. 5 pp. 717-726.

Glewwe, P., & Jacoby, H. (1994). "Student Achievement and Schooling Choice in Low-income Countries: Evidence from Ghana." *Journal of Human Resources* 29:3, 843–864.

Glewwe, P., & Jacoby, H. (1995). "An Economic Analysis of Delayed Primary School Enrollment in a Low-income Country: The Role of Early Childhood Nutrition." *Review of Economic Statistics* 77:1, 156–169.

Glewwe, P., & Miguel, E. (2008). "The Impact of Child Health and Nutrition on Education in Less Developed Countries." *Handbook of Development Economics* 4. DOI: 10.1016/S1573-4471(07)04056-9.

Glick, P., & Sahn, D.E. (2000). "Schooling of girls and boys in a West African Country: the effects of parental education, income and household structure." *Economics of Education Review 19*, 63-87

Gonzales (1987). *Rice production and regional crop diversification in the Philippines: Economic issues.* Philippine Review of Economics and Business Vol. XXIV (1&2) pp. 125-148.

Gultiano, S., & Xenos, P. (2006). "Age Structure and Urban Migration of Youth in the Philippines." In *Age Structural Transitions: Challenges for Development*, edited by I. Pool, L. Wong, and E. Vilquin. Paris: Committee for International Cooperation in National Research in Demography.

Haggblade, S., Hazell P.B.R., & Dorosh. (2007). *Sectoral Growth Linkages between Agriculture and the Rural Nonfarm Economy* in Transforming the Rural Nonfarm Economy opportunities and Threats in the Developing World. International Food Policy Research Institute, Washington DC.

Haggblade, S., Hazell, P.B.R., & Reardon, T. (Eds) (2007) *Structural Transformation of the Rural Nonfarm Economy* in Transforming the Rural Nonfarm Economy Opportunities and Threats in the Developing World. The Johns Hopkins University Press, Baltimore.

Hayami, Y., & Godo, Y. (2005). *Development Economics: From Poverty to the Wealth of Nations*, Oxford: Oxford University Press.

Hayami, Y., & Kikuchi, M. (1999). *A rice village saga: Three decades of green revolution in the Philippines*. Rowman & Littlefield Publishers.

Hayami, Y., & Kikuchi, M. (2000). *A Rice Village Saga: Three Decades of Green Revolution in the Philippines*, London: Macmillan Press.

Hayami, Y., & Otsuka, K. (1993). *The Economics of Contract Choice: An Agrarian Perspective.* Oxford: Clarendon Press.

Herrin, A. (1981). "Population and Development Research in the Philippines: A Survey." National Economic and Development Authority, Manila.

Himaz, R. (2010). "Intrahousehold Allocation of Education Expenditure: The Case of Sri Lanka." *Economic Development and Cultural Change* 58:2, 231–258.

History of Gabaldon (undated),

Hossain, S. (1989). "Effect of Public Programs on Family Size, Child Education and Health." *Journal of Development Economics* 30:145–158.

Hossain, M., Gascon, F., & Marciano, E. B. (2000). Income distribution and poverty in rural Philippines: insights from repeat village study. *Economic and Political Weekly*, 4650-4656.

International Fund for Agricultural Development (Ed.). (2001). *Rural poverty report 2001: The challenge of ending rural poverty*. Oxford University Press.

IFAD. (2010). Rural poverty report 2011.

International Organization of Migration. (2013). "Country Migration Report: The Philippines." https://publications.iom.int/system/files/pdf/cmreport_philipines2013.pdf.

Iheke, O.R. and F.A. Arikaibe. "Impact of agricultural intensification on poverty alleviation among rural farm households in Imo state Nigeria." *Int. J. Dev. Sust*, 1, 1140-1149.

Ishikawa, S. (1981). Essays on technology, employment and institutions in economic development.

Jayasuriya, S.K., & Shand, R.T. (1986). "Technical change and labor absorption in Asian agriculture: some emerging trends," *World Development*, 14(3): 415–28.

JBIC (2002), Cash Crop Distribution Systems in the Philippines Issues and Measures to Address them. JBIC Research Paper No. 12.

Jenkins, S. (2008). Estimation and interpretation of measures of inequality, poverty, and social welfare using Stata, North American Stata Users' Group Meetings 2006, Stata Users Group, http://EconPapers.repec.org/RePEc:boc:asug06:16.

Kikuchi, M. (1998). "Export-oriented garment industries in the rural Philippines," in Y. Hayami (ed.) *Toward the Rural-Based Development of Commerce and Industry: Selected Experiences from East Asia*, Washington, D.C.: World Bank.

Krishna, A., Kristjanson, P., Radeny, M. & Nindo, W. (2004). Escaping Poverty and Becoming Poor in 20 Kenyan Villages, Journal of Human Development, 5:2, 211-226.

Lanjouw, J., & Lanjouw, P. (2001). "The rural non-farm sector: issues and evidence from developing countries," *Agricultural Economics*, 26(1): 1–23.

Lanjouw, P. (2007). "Does rural nonfarm economy contribute to poverty reduction?" in S. Haggblade, P. Hazell and T. Reardon (eds) *Transforming the Rural Nonfarm Economy: Opportunities and Threat in the Developing World*, Baltimore: Johns Hopkins University Press, pp. 55–79.

Lastarria-Cornhiel, S. (2006). "Feminization of agriculture: trends and driving forces," Background paper for the World Development Report 2008.

Lipton, M. and Ravallion, M. (1995) "Poverty and policy," in H. Chenery and T.N. Srinivasan (eds) *Handbook of Development Economics*, 3(B), USA: Elsevier, pp. 2551–2657.

Llanto, G. (2004). Infrastructure Development: Experience and Policy options for the future. Perspective paper series No. 7. Philippine Institute for Development Studies, Makati City, Philippines.

Llanto, G. (2011). Investing in Local Roads for Economic Growth. Discussion Paper Series No. 2011-38. Philippine Institute for Development Studies, Makati City, Philippines.

Lorenciana, C.S. (2015). Young generation, infra to sustain Phl economy. Philippine Star.com updated April 19, 2015.

Mallaque III, I., & Yokohari, M. (2007). *Urbanization process and the changing agricultural landscape pattern in the urban fringe of Metro Manila, Philippines* in Environment and Urbanization. International Institute for Environment and Development Vol. 19(1): 191-206.

Manasan, R.G., Mercado R.G., & Pineda, V.S. (2000). Urbanization in a Decentralized Framework: The Lure of the City. Development Research News March-April 2000. Vol. XVIII No. 2.

Nagarajan, G., Quisumbing, M. A., & Otsuka, K. (1991). Land pawning in the Philippines: an exploration into the consequences of land reform regulations.*The Developing Economies*, *29*(2), 125-144.Otsuka, Hayami and Marciano (1989).

Nargis & Hossain (2006). *Income dynamics and pathways out of rural poverty in Bangladesh, 1988-2004* Agricultural Economics 35. Supplement 425-435.

Navarro, Adoracion (2013) Cost Efficiency and Effectiveness of the Sitio and Household Electrification Programs, Discussion Paper Series No. 2013-12. Philippine Institute for Development Studies, Makati City, Philippines

Orbeta, A.Jr. (2003). Education, Labor Market and Development: A Review of the Trends and Issues in the Philippines for the Past 25 Years. Perspective Paper Series No. 9. Philippine Insitute for Development Studies, Makati City, Philippines.

Otsuka, K., Cordova, V., & David, C.C. (1992). "Green Revolution, Land Reform, and Household Income Distribution in the Philippines". *Economic Development and Cultural Change* 40 (4). University of Chicago Press: 719–41. http://www.jstor.org/stable/1154631.

Otsuka, K., Estudillo, J.P., & Sawada, Y. (2009). *Rural Poverty and Income Dynamics in Asia and Africa,* London and New York: Routledge Taylor and Francis Group.

Pica-Camarra, U., Tasciotti, L., Otte, J., & Zezza, A. (2011). Livestock Assets, Livestock income and Rural Households. Joint Paper of the World Bank, FAO, AU-IBAR, ILRI with the support of the Gates Foundation.

Porio, E. (2009). *Urban Transition, Poverty and Development in the Philippines a Preliminary Draft* Department of Sociology, Ateneo de Manila University, Quezon City, Philippines.

Presidential Decree 27, Decreeing the emancipation of tenants from the bondage of the soil, transferring to them the ownership of the land they till and providing the instruments and mechanism therefor. October 21, 1972.

Quisumbing, A.R., Estudillo, J.P., & Otsuka, K. (2004). *Land and Schooling: Transferring Wealth across Generations*, Baltimore: Johns Hopkins University Press.

Rahman, S. (2008). Determinants of crop choices by Bangladeshi farmers: a bivariate probit analysis. *Asian Journal of Agriculture and Development*, *5*(1), 30.

Ramos, C.G., Estudillo, J., Sawada, Y., & Otsuka, K. (2012). Transformation of the Rural Economy in the Philippines, 1988-2006. Journal of Development Studies, 48:11, 1629-1648.

Reardon, T. (1997). Using evidence of household income diversification to inform study of the rural nonfarm labor market in Africa. *World development*,*25*(5), 735-747.

Republic Act 3844, Agricultural Land Reform Code, August 8, 1963.

Republic Act 6657, Comprehensive Agrarian Reform Law of 1988, June 10, 1988.

Reyes, C., Tabuga, A., Mina, C., Asis, R., & Datu, M.B. (2011). Dynamics of Poverty in the Philippines: Distinguishing the Chronic from the Transient Poor Discussion Paper Series No.. 2011-31. Philippine Institute for Development Studies.

Ricote, E. (2006). *The Governance of Urbanization in the Philippines: Focus on Public-Private Partnerships.* Jose Rizal University, Mandaluyong City, Philippines.

Solon, O., & Floro, M.S. (1993). *The Philippines in the 1980s: A Review of National and Urban Level Economic Reforms. Working Paper* Urban Development Division Transportation, Water and Urban Development Department Environmentally sustainable development, The World Bank, Washington DC.

Sonobe, T., & Otsuka, K. (2006). *Cluster-based Industrial Development: an East Asian Model*, New York: Palgrave Macmillan.

Suzuki, Y. (2013). *Philippines: The Challenge of Sustaining High Growth – Formulation of effective medium to long-term plan is essential.* Japan Center for Economic Research, 2013 "Asia Research" report.

Takahashi, K., & Otsuka, K. (2009). "Human capital investment and poverty reduction over generations: a case from rural Philippines, 1979–2003," in K. Otsuka, J. Estudillo and Y. Sawada (eds) *Rural Poverty and Income Dynamics in Asia and Africa*, London and New York: Routledge Taylor and Francis Group.

Todaro, M. P. (1969). A model of labor migration and urban unemployment in less developed countries. *The American economic review, 59*(1), 138-148.

Turner, B. L., Hydén, G., & Kates, R. W. (1993). *Population growth and agricultural change in Africa*. Univesity of Florida Press.

United Nations. (2012). *The Millennium Development Goals Report 2012*, New York: United Nations.

United Nations. (2013). *The Millennium Development Goals Report 2013*, New York: United Nations.

Van de Walle. (2000). Are Returns to Investment Lower for the Poor? Human and Physical Capital Interactions in Rural Vietnam.

Weerdt, J.D. (2010). *Moving out of Poverty in Tanzania: Evidence from Kagera*. The Journal of Development Studies, 46:2, 331-349.

Weinberger, K. M., & Lumpkin, T. A. (2005). Horticulture for poverty alleviation-the unfunded revolution.

Winters, P., Davis, B., Carletto, G., Covarrubias, K., Quiñones, E.J., Zezza, A., Azzari, C., & Stamoulis, K. (2009). Assets, Activities and Rural Income Generation: Evidence from a Multicountry analysis in World Development Vol. 37 No. 9 pp. 1435-1452.

World Bank. (1990). *World Development Report 1990: Poverty*, Oxford: Oxford University Press.

World Bank. (2000). *World Development Report 2000/2001: Attacking Poverty*, Oxford: Oxford University Press.

World Bank.. (2007). *World Development Report 2008: Agriculture for Development*. Washington D.C.

World Bank. (2008). *World Development Report 2008: Agriculture for Development*, Washington, D.C.: World Bank.

World Bank. (2009). *World Development Report 2009: Reshaping Economic Geography*, Washington, D.C.: World Bank.

World Bank. (2012). *World Development Report 2013: Jobs*. Washington D.C.

World Bank. (2013). *World Development Report 2014: Risk and Opportunity: Managing Risk for Development*, Washington, D.C.: World Bank.

World Bank. (2014). *Global monitoring report 2014/2015: ending poverty and sharing prosperity*. Washington, D.C.: World Bank.

Yang, D. (2008). "International Migration, remittances and household investment: evidence from Philippine Migrants' Exchange Rate Sshocks." *The Economic Journal*, Vol.118 No. 528, pp. 591-630.

Zezza, A., Winters, P., Davis, B., Carletto, G., Covarrubias, K., Quinones, E., ... & Bonomitiis, G. (2008). Rural household access to assets and agrarian institutions: A cross country comparison.

Tables

Table 1.1 Proportion of people living on less than $1.25 a day, 1990-2015

	1990	**2011**	**2015**
Sub-Saharan Africa	57	47	41
Southern Asia	52	23	17
South-eastern Asia	46	12	7
Eastern Asia (China only)	61	6	4
Latin America and the Caribbean	13	5	4
Central Asia	8	4	2
Western Asia	5	2	3
Northern Africa	5	2	1
World	36	15	12

Source: UNDP, Millennium Development Goals Report 2015

Table 1.2 Proportion of poor people in the Philippines, by Region, 1990-2012

	1991	2000	2012
PHILIPPINES	30	21	17
NCR (National Capital Region)	5	6	2.6
CAR (Cordillera Autonomous Region)	37	31	18
Region I (Ilocos Region)	31	30	14
Region II (Cagayan Valley)	37	25	17
Region III (Central Luzon)	18	17	10
Region IV-A (Calabarzon)	19	15	8.3
Region IV-B (Mimaropa)	37	36	24
Region V (Bicol Region)	48	45	32
Region VI (Western Visayas)	32	37	23
Region VII (Central Visayas)	38	32	26
Region VIII (Eastern Visayas)	42	38	37
Region IX (Zamboanga Peninsula)	36	39	34
Region X (Northern Mindanao)	43	38	33
Region XI (Davao Region)	34	28	25
Region XII (Soccskargen)	47	41	37
Region XIII Caraga	49	44	32
ARMM (Autonomous Region of Muslim Mindanao)	27	54	49

Source: Philippine Statistics Authority

Table 2.1. Macroeconomic indicators in the Philippines, 1980-2012

Indicator	**1980**	**2000**	**2012**
Population (million)	47	77	95
Population of 15-60 years old (million)	25	45	58
Arable land per capita (ha)[1]	0.28	0.16	0.14
Gross domestic product per capita (PPP$ in 2005)	2,807	2,685	3,801
Composition of gross domestic product			
Agriculture (%)	26	14	12
Industry (%)	38	34	32
Services (%)	36	52	56
Composition of employment			
Agriculture (%)	52	38	33
Industry (%)	15	16	15
Services (%)	33	46	52
Rice yield (tons/ha)	2.2	3.1	3.7
	Annual growth rates (%)		
	1980-89	1990-99	2000-12
Population	2.73	2.30	1.85
Gross domestic product per capita	-0.70	0.42	2.90
Rice yield	2.01	-0.29	1.57

[1]Total arable land divided by population of 15-60 years old.

Data sources: World Bank, World Development Indicators

Table 2.2. Poverty and inequality indicators in the Philippines, 1991-2012

Poverty indicator	1991	2000	2012
Philippines			
Headcount ratio (%)	30.1	20.9	16.5
Poverty gap (%)	9.5	5.8	3.9
Severity of poverty (%)	4.2	2.3	1.4
Urban areas			
Headcount ratio (%)	19.2	10.9	6.6
Poverty gap (%)	5.6	2.7	1.4
Severity of poverty (%)	2.4	1.0	0.5
Rural areas			
Headcount ratio (%)	46.3	35.6	22.6
Poverty gap (%)	15.3	10.3	5.6
Severity of poverty (%)	6.9	4.1	2.0

Data source: Author's calculations from the Family Income and Expenditure Surveys, 1991, 2000, and 2012.

Table 2.3. Number of provinces, by proximity to major cities and by island group, in the Philippines, 1990

	Number	Province[a]
Luzon		
Near Metro Manila	11	Bataan, Batangas, Bulacan, Cavite, Laguna, Nueva Ecija, Pampanga, Quezon, Rizal Tarlac, Zambales
Far from Metro Manila	26	Abra, Albay, Aurora, Batanes, Benguet, Cagayan, Camarines Norte, Camarines Sur Catanduanes, Ifugao, Ilocos Norte, Ilocos Sur, Isabela, Kalinga, La Union, Marinduque, Masbate, Mountain Province Nueva Vizcaya, Occidental Mindoro, Oriental Mindoro, Palawan, Pangasinan Quirino, Romblon, Sorsogon
Visayas		
Near Cebu City	4	Bohol, Cebu, Negros Oriental, Siquijor
Far from Cebu City	10	Aklan, Antique, Capiz, Eastern Samar Iloilo, Leyte, Negros Occidental Northern Samar, Samar, Southern Leyte
Mindanao I		
Near Cagayan de Oro City	6	Agusan del Norte, Bukidnon, Camiguin, Lanao del Norte, Misamis Occidental Misamis Oriental
Far from Cagayan de Oro City	7	Basilan, Lanao del Sur Sulu, Surigao del Norte Taw-Tawi, Zamboanga del Norte, Zamboanga del Sur
Mindanao II		
Near Davao City	4	Agusan del Sur, Davao, Davao Oriental, Davao del Sur
Far from Davao City	5	Maguindanao, North Cotabato, South Cotabato, Sultan Kudarat, Surigao del Sur

[1]Provinces are based on the 1990 classification.

Table 2.4. Provincial indicators of population pressure, urbanization, and infrastructure in the Philippines, 1991 and 2012

	1991	2012
Population pressure[1]		
Philippines	0.58	0.45
Provinces near a major city	0.52	0.34
Provinces far from a major city	0.62	0.51
Urbanization[2]		
Philippines	24.8	32.0
Provinces near a major city	34.5	46.2
Provinces far from a major city	19.8	24.6
Infrastructure[3]		
Electricity		
Philippines	50.11	84.6
Provinces near a major city	62.1	88.77
Provinces far from a major city	43.9	82.45
National road		
Philippines	1.08	1.27
Provinces near a major city	1.23	1.48
Provinces far from a major city	1.00	1.17
Irrigation		
Philippines	59.6	66.1
Provinces near a major city	74.3	82.0
Provinces far from a major city	51.9	57.9

Data sources: FIES, 1991 and 2012, National Statistics Office; October rounds of LFS, 1991 and 2012; CountryStat, Bureau of Agricultural Statistics.

[1]Refers to 1000 hectares of land area per member of the labor force.

[2]Refers to percentage of population living in urban areas.

[3]Electricity refers to percentage of households that have access to electricity; national road refers to average length of national road in kilometers per 1000 hectares of provincial area; refers to proportion of harvested area of rice with irrigation to total harvested area of rice.

[4]Refers to proportion of labor force with secondary and tertiary education, respectively.

Table 2.4. Provincial indicators of population pressure, urbanization, and infrastructure in the Philippines, 1991 and 2012 (continued)

	1991	2012
	Human capital[4]	
Secondary education		
Philippines	28.9	42.4
Provinces near a major city	31.9	45.2
Provinces far from a major city	27.3	40.9
Tertiary education		
Philippines	17.9	22.3
Provinces near a major city	19.2	24.4
Provinces far from a major city	17.2	21.3

Data sources: FIES, 1991 and 2012, National Statistics Office; October rounds of LFS, 1991 and 2012; CountryStat, Bureau of Agricultural Statistics.

[1]Refers to 1000 hectares of land area per member of the labor force.

[2]Refers to percentage of population living in urban areas.

[3]Electricity refers to percentage of households that have access to electricity; national road refers to average length of national road in kilometers per 1000 hectares of provincial area; refers to proportion of harvested area of rice with irrigation to total harvested area of rice.

[4]Refers to proportion of labor force with secondary and tertiary education, respectively.

Table 2.5. Sources of household income in the Philippines, 1991 and 2012.

Source	All Philippines		Provinces near a major city		Provinces far from a major city	
		1991				
	PPP$2	%	PPP$2	%	PPP$	%
Agricultural income	304	12	240	8	371	23
Wages	173	7	151	5	195	12
Crop and livestock 3	131	5	89	3	176	11
Nonfarm income	2,157	88	3,055	92	1,191	76
Wages	1,600	65	2,297	70	850	54
Self-employment	108	4	147	4	66	4
Foreign remittances	357	15	506	15	197	13
Domestic remittances	92	4	105	3	78	5
Total household income	2,460	100	3,296	100	1,562	100
Household size	5		5.3		5.3	
Per capita income	464		625.4		295.9	
Poverty incidence at $1.25	30.8		22.3		41.5	
Poverty gap at $1.25	11.7		9.3		14.7	
Poverty incidence at $2	52.0		40.5		66.3	
Poverty gap at $2	23.1		17.7		29.9	

Table 2.5. Sources of income in the Philippines, 1991 and 2012 (continued)

Source	All Philippines		Provinces near a major city		Provinces far from a major city	
	2012					
	PPP$	%	PPP$	%	PPP$	%
Agricultural income	390	7	280	4	534	13
Wages	262	5	204	3	338	8
Crop and livestock 3	128	2	76	1	196	5
Nonfarm income	5,085	93	6,338	96	3,368	87
Wages	3,626	66	4,691	71	2,169	56
Self-employment	170	3	200	3	139	4
Foreign remittances	930	17	1,114	17	670	17
Domestic remittances	359	7	333	5	390	10
Total household income	5,475	100	6,619	100	3,903	100
Household size	4.7		4.7		4.7	
Per capita income	1164.9		1420.3		825.1	
Growth rate of per capita income (% per year)	13.7		11.6		16.3	
Poverty incidence at $1.25	23.2		15.8		29.8	
Poverty gap at $1.25	7.0		4.8		8.9	
Poverty incidence at $2	45.4		33.2		56.2	
Poverty gap at $2	17.5		12.3		22.1	

Source: Author's calculations from FIES 1991 and 2012.

Table 2.6 Area harvested and revenue from traditional crops and high-value products in agriculture in the Philippines, 1990 and 2012

Source	Provinces near a major city[1]		Provinces far from a major city[1]		Provinces near a major city[1]		Provinces far from a major city[1]	
	1990				2012			
		%		%		%		%
Gross revenue ('000 PPP 2005)								
Traditional crops	6,918	41	6,812	72	4,183	7	4,389	20
Non-traditional crops	1,580	9	1,197	13	1,726	3	1,110	5
Livestock	3,966	24	1,283	14	20,498	34	7,680	35
Poultry	4,337	26	123	1	33,994	56	8,912	40

Source: Bureau of Agricultural Statistics

Table 2.7. Growth rates of value of agricultural commodities in the Philippines, 1961-2012

Component	1961-1985	1986-2012	1990-2012
Value of agricultural commodities (FAO)			BAS
All agricultural products	3.62	3.08	
Traditional crops	3.00	2.38	-1.31
High-value crops	3.44	3.00	1.21
Livestock and Poultry	3.64	4.73	9.1
Livestock	2.28	4.71	7.69
Poultry	6.59	4.80	10.54

Source: FAOStat, Food and Agriculture Organization; CountryStat, Bureau of Agricultural Statistics

Table 2.8. Determinants of income (provincial level) in rural Philippines, 1991-2012

	All Philippines					
VARIABLES	**(1) Agricultural Wage Income**	**(2) Crop Farming and Others**	**(3) Nonfarm Wage Income**	**(4) Nonfarm Self-employment**	**(5) Abroad Remittance**	**(6) Domestic Remittance**
Harvested Area per labor force (Ha/1000 per)	86.05**	190.4*	-376.6***	-1.190	-270.0***	-2.886
	(39.20)	(113.2)	(107.5)	(56.36)	(50.27)	(15.47)
Urbanization (lagged)	0.420	-3.195**	5.562**	4.824***	-2.201**	0.184
	(0.539)	(1.323)	(2.684)	(0.902)	(0.979)	(0.318)
Electrification ratio (lagged)	168.1	-984.8***	2,681***	748.5***	640.1***	147.3**
	(109.2)	(330.1)	(617.7)	(224.7)	(206.4)	(63.82)
National Road density (lagged)	-54.50***	-51.71	317.6***	-27.86	-3.280	19.00**
	(12.41)	(31.95)	(82.47)	(20.35)	(24.49)	(7.935)
Irrigation ratio	1.595***	-0.750	-3.241**	-0.635	0.570	-0.112
	(0.313)	(0.876)	(1.305)	(0.465)	(0.526)	(0.193)
Labor force	0.0127***	-0.0213***	0.00352	0.00205	0.00204	-0.00195
	(0.00440)	(0.00667)	(0.00978)	(0.00421)	(0.00376)	(0.00145)
%female	3.077*	-15.34***	6.977	4.936*	-4.801**	1.252
	(1.777)	(4.665)	(5.537)	(2.579)	(2.408)	(0.916)
% age 25-35	-5.487**	10.05	2.246	13.05***	13.04***	-3.254**
	(2.324)	(7.152)	(9.221)	(3.704)	(4.368)	(1.304)
% age 36-45	-0.515	5.890	-8.534	6.720	3.558	-2.574*
	(2.691)	(8.077)	(10.37)	(4.892)	(3.971)	(1.484)
% age 46-60	-9.588***	-48.68***	-42.65***	-1.660	13.82***	5.060***
	(2.672)	(7.024)	(12.11)	(3.775)	(4.181)	(1.492)

Table 2.8. Determinants of income (provincial level) in rural Philippines, 1991-2012 (continued)

	All Philippines					
VARIABLES	**(1) Agricultural Wage Income**	**(2) Crop Farming and Others**	**(3) Nonfarm Wage Income**	**(4) Nonfarm Self-employment**	**(5) Abroad Remittance**	**(6) Domestic Remittance**
% with secondary educ.	1.835	-7.537**	3.185	-2.504	7.514***	-0.412
	(1.388)	(3.195)	(4.382)	(2.019)	(1.755)	(0.720)
% with tertiary educ.	-5.605***	7.642*	42.04***	8.212***	10.90***	-1.507
	(1.709)	(4.527)	(7.047)	(2.937)	(2.756)	(0.982)
Distance to Metro Manila	0.00239	-0.0735	-0.229**	-0.115***	-0.177***	-0.0978***
	(0.0338)	(0.0793)	(0.102)	(0.0411)	(0.0381)	(0.0138)
Constant	462.8***	3,332***	1,161**	-256.3	-406.7*	162.8**
	(161.6)	(441.9)	(568.5)	(222.7)	(229.0)	(79.46)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	511	511	511	511	511	511
R-squared	0.294	0.565	0.666	0.396	0.515	0.363

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculations

Table 2.9. Determinants of income (household level) in rural Philippines, 1991-2012

	Philippines					
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**Agricultural Wage Income**	**Crop Farming and Others**	**Nonfarm Wage Income**	**Nonfarm Self-employment**	**Abroad Remittance**	**Domestic Remittance**
Harvested Area per labor force	-15.11	542.2***	-296.7***	-12.27	-135.0***	-43.17***
	(10.03)	(22.93)	(33.87)	(32.58)	(24.93)	(6.344)
Urbanization	0.0776	-2.053***	9.907***	4.451***	-0.899**	-0.523***
	(0.161)	(0.369)	(0.545)	(0.524)	(0.401)	(0.102)
Electrification ratio	-25.83***	-60.30***	557.1***	363.8***	177.3***	58.48***
	(4.838)	(11.06)	(16.34)	(15.72)	(12.03)	(3.061)
National Road density	-40.47***	-100.4***	75.02***	-31.62**	59.04***	32.28***
	(4.711)	(10.77)	(15.91)	(15.31)	(11.71)	(2.981)
Irrigation ratio	3.293***	-2.518***	-0.208	-1.351***	0.0506	-0.242***
	(0.0925)	(0.212)	(0.313)	(0.301)	(0.230)	(0.0585)
Working household mem.	65.36***	144.7***	266.2***	98.62***	58.82***	-17.11***
	(1.490)	(3.407)	(5.033)	(4.842)	(3.705)	(0.943)
%female	-1.638***	-1.652***	0.998***	1.806***	1.829***	0.544***
	(0.104)	(0.238)	(0.351)	(0.338)	(0.258)	(0.0658)
% age 25-35	0.673***	-2.819***	-0.124	-1.054**	0.306	-2.223***
	(0.152)	(0.349)	(0.515)	(0.495)	(0.379)	(0.0965)
% age 36-45	0.446***	-0.854**	-1.698***	1.136**	-1.440***	-2.178***
	(0.158)	(0.361)	(0.534)	(0.514)	(0.393)	(0.100)
% age 46-60	-0.756***	-0.976***	-5.279***	-1.892***	-1.843***	-0.353***
	(0.111)	(0.253)	(0.373)	(0.359)	(0.275)	(0.0699)

Table 2.9. Determinants of income (household level) in rural Philippines, 1991-2012 (Continued)

	Philippines					
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Agricultural Wage Income	Crop Farming and Others	Nonfarm Wage Income	Nonfarm Self-employment	Abroad Remittance	Domestic Remittance
% with secondary educ.	-1.529***	-0.728***	2.257***	1.998***	1.804***	0.762***
	(0.0926)	(0.212)	(0.313)	(0.301)	(0.230)	(0.0586)
% with tertiary educ.	-4.737***	1.511***	51.04***	10.29***	14.40***	0.994***
	(0.116)	(0.266)	(0.393)	(0.378)	(0.289)	(0.0736)
Distance to Metro Manila	0.0238***	-0.0647***	-0.325***	-0.0365	-0.260***	-0.0689***
	(0.00796)	(0.0182)	(0.0269)	(0.0259)	(0.0198)	(0.00504)
Constant	67.47***	726.1***	-643.5***	-332.3***	-118.2***	143.9***
	(14.76)	(33.74)	(49.84)	(47.95)	(36.68)	(9.335)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	108,056	108,056	108,056	108,056	108,056	108,056
R-squared	0.049	0.039	0.245	0.030	0.052	0.039

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations

Table 2.10. Determinants of income (household level) in the Luzon island, 1991-2012

	Luzon					
VARIABLES	**(1) Agricultural Wage Income**	**(2) Crop Farming and Others**	**(3) Nonfarm Wage Income**	**(4) Nonfarm Self-employment**	**(5) Abroad Remittance**	**(6) Domestic Remittance**
Harvested Area per labor force	191.3***	447.4***	-523.5***	-183.0***	-456.4***	2.952
	(18.19)	(55.27)	(77.06)	(63.30)	(52.08)	(15.24)
Urbanization	1.905***	-0.676	7.495***	3.545***	-1.091**	0.209
	(0.193)	(0.588)	(0.819)	(0.673)	(0.554)	(0.162)
Electrification ratio	-78.21***	25.31	535.0***	334.4***	226.6***	62.78***
	(6.692)	(20.34)	(28.35)	(23.29)	(19.16)	(5.605)
National Road Density	-38.29***	-71.03***	183.2***	11.01	-47.29***	16.54***
	(6.361)	(19.33)	(26.95)	(22.14)	(18.21)	(5.328)
Irrigation ratio	1.748***	6.135***	-2.635***	-0.988**	0.193	-1.086***
	(0.143)	(0.434)	(0.605)	(0.497)	(0.409)	(0.120)
Working hh mem.	64.90***	133.7***	322.8***	88.12***	58.87***	-20.34***
	(1.955)	(5.942)	(8.284)	(6.805)	(5.598)	(1.638)
%female	-1.726***	-2.530***	1.162**	1.773***	2.120***	0.560***
	(0.138)	(0.418)	(0.583)	(0.479)	(0.394)	(0.115)
% age 25-35	0.956***	-3.906***	-0.525	-1.198*	0.337	-2.621***
	(0.203)	(0.617)	(0.860)	(0.706)	(0.581)	(0.170)
% age 36-45	0.953***	-1.772***	-2.078**	0.677	-1.192**	-2.683***
	(0.207)	(0.629)	(0.877)	(0.720)	(0.592)	(0.173)
% age 46-60	-0.313**	-0.988**	-6.102***	-1.168**	-1.988***	-0.602***
	(0.145)	(0.440)	(0.614)	(0.504)	(0.415)	(0.121)

Table 2.10. Determinants of income (household level) in the Luzon island, 1991-2012 (continued)

	Luzon					
VARIABLES	**(1) Agricultural Wage Income**	**(2) Crop Farming and Others**	**(3) Nonfarm Wage Income**	**(4) Nonfarm Self-employment**	**(5) Abroad Remittance**	**(6) Domestic Remittance**
% with sec. educ.	-2.195***	0.125	2.125***	1.896***	2.965***	0.855***
	(0.122)	(0.371)	(0.517)	(0.424)	(0.349)	(0.102)
% with ter. educ.	-5.476***	3.742***	48.39***	10.96***	16.69***	0.952***
	191.3***	447.4***	-523.5***	-183.0***	-456.4***	2.952
Distance to MM	143.8***	136.5***	299.6***	202.2***	270.7***	161.7***
	(10.96)	(33.30)	(46.43)	(38.14)	(31.38)	(9.179)
Constant	76.05***	-48.50	-374.3***	-201.2***	-3.894	166.8***
	(21.83)	(66.35)	(92.50)	(75.99)	(62.51)	(18.29)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	47,201	47,201	47,201	47,201	47,201	47,201
R-squared	0.070	0.033	0.226	0.037	0.067	0.031

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations

Table 2.11. Determinants of income (household level) in the Visayas, 1991-2012

	Visayas					
VARIABLES	**(1) Agricultural Wage Income**	**(2) Crop Farming and Others**	**(3) Nonfarm Wage Income**	**(4) Nonfarm Self-employment**	**(5) Abroad Remittance**	**(6) Domestic Remittance**
Harvested Area per labor force	19.36	358.0***	-701.6***	-79.36	115.3	8.357
	(44.91)	(84.33)	(164.0)	(207.6)	(169.5)	(34.40)
Urbanization	0.739**	0.528	3.061**	2.976*	-4.185***	-2.226***
	(0.376)	(0.706)	(1.374)	(1.739)	(1.420)	(0.288)
Electrification ratio	-57.95***	-37.97**	412.1***	302.2***	219.6***	75.12***
	(8.409)	(15.79)	(30.71)	(38.87)	(31.73)	(6.441)
Road density	-4.778	-41.01***	7.601	-100.2***	165.4***	27.30***
	(7.621)	(14.31)	(27.83)	(35.23)	(28.76)	(5.838)
Irrigation ratio	1.248***	-2.578***	-1.369*	1.316	0.639	0.754***
	(0.198)	(0.372)	(0.724)	(0.916)	(0.748)	(0.152)
Working members	83.64***	110.7***	262.8***	123.6***	73.81***	-18.22***
	(2.659)	(4.994)	(9.711)	(12.29)	(10.04)	(2.037)
%female	-1.379***	-1.041***	1.655***	2.219***	2.269***	0.739***
	(0.175)	(0.329)	(0.639)	(0.809)	(0.661)	(0.134)
% age 25-35	0.635**	-1.889***	1.175	-0.969	0.691	-2.576***
	(0.277)	(0.519)	(1.010)	(1.278)	(1.044)	(0.212)
% age 36-45	0.871***	-0.876	-1.562	2.817**	-2.669**	-2.262***
	(0.287)	(0.539)	(1.047)	(1.325)	(1.082)	(0.220)
% age 46-60	-1.004***	-0.568	-4.687***	-1.588*	-2.735***	-0.211
	(0.188)	(0.354)	(0.688)	(0.871)	(0.711)	(0.144)

Table 2.11. Determinants of income (household level) in the Visayas, 1991-2012 (Continued)

	Visayas					
VARIABLES	**(1) Agricultural Wage Income**	**(2) Crop Farming and Others**	**(3) Nonfarm Wage Income**	**(4) Nonfarm Self-employment**	**(5) Abroad Remittance**	**(6) Domestic Remittance**
% w/ secondary educ.	-2.385***	-0.493	2.549***	2.118***	1.225*	1.072***
	(0.168)	(0.316)	(0.614)	(0.777)	(0.634)	(0.129)
% w/ tertiary educ.	-5.421***	0.626	50.17***	10.28***	18.37***	0.971***
	(0.210)	(0.394)	(0.766)	(0.970)	(0.792)	(0.161)
Distance to Cebu	0.518***	0.617***	-0.517	1.317***	-0.000677	0.0251
Constant	76.05***	-48.50	-374.3***	-201.2***	-3.894	166.8***
	(21.83)	(66.35)	(92.50)	(75.99)	(62.51)	(18.29)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	47,201	47,201	47,201	47,201	47,201	47,201
R-squared	0.070	0.033	0.226	0.037	0.067	0.031

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations

Table 2.12. Determinants of income (household level) in the Mindanao I, 1991-2012

VARIABLES	Mindanao I					
	(1) Agricultural Wage Income	(2) Crop Farming and Others	(3) Nonfarm Wage Income	(4) Nonfarm Self-employment	(5) Abroad Remittance	(6) Domestic Remittance
Harvested Area per labor force	104.1***	523.1***	-193.6***	36.41	-70.49*	-60.17***
	(20.81)	(39.05)	(63.05)	(69.17)	(37.30)	(8.938)
Urbanization	-2.516***	-0.700	-1.776	-0.249	1.000	-0.104
	(0.621)	(1.166)	(1.883)	(2.066)	(1.114)	(0.267)
Electrification ratio	-54.99***	-51.29**	648.4***	442.5***	129.4***	51.96***
	(12.00)	(22.53)	(36.37)	(39.90)	(21.52)	(5.156)
Road density	-175.1***	40.28	-127.7**	-25.30	-50.57	34.31***
	(19.15)	(35.95)	(58.04)	(63.67)	(34.34)	(8.228)
Irrigation ratio	7.517***	-7.070***	4.179***	-2.242*	1.034	-0.0923
	(0.358)	(0.672)	(1.085)	(1.190)	(0.642)	(0.154)
Working HH mem.	38.78***	151.3***	194.2***	105.6***	34.51***	-6.122***
	(3.748)	(7.036)	(11.36)	(12.46)	(6.720)	(1.610)
%female	-1.147***	-1.134**	-0.116	1.627*	1.441***	0.451***
	(0.269)	(0.505)	(0.815)	(0.894)	(0.482)	(0.116)
% age 25-35	-0.104	-2.384***	-0.838	-2.068*	0.480	-1.407***
	(0.378)	(0.710)	(1.146)	(1.257)	(0.678)	(0.162)
% age 36-45	-0.275	-0.638	-0.878	-0.0640	-1.397*	-1.348***
	(0.400)	(0.751)	(1.213)	(1.330)	(0.717)	(0.172)
% age 46-60	-0.552*	-0.786	-3.905***	-3.760***	-0.944*	-0.320***
	(0.286)	(0.537)	(0.867)	(0.951)	(0.513)	(0.123)

Table 2.12. Determinants of income (household level) in the Mindanao I, 1991-2012 (Continued)

	Mindanao I					
VARIABLES	**(1) Agricultural Wage Income**	**(2) Crop Farming and Others**	**(3) Nonfarm Wage Income**	**(4) Nonfarm Self-employment**	**(5) Abroad Remittance**	**(6) Domestic Remittance**
% w/ secondary educ.	-1.147***	-1.998***	1.461**	2.043***	0.0661	0.449***
	(0.237)	(0.445)	(0.719)	(0.788)	(0.425)	(0.102)
% w/ tertiary educ.	-2.046***	-4.495***	58.63***	10.17***	8.603***	0.845***
	(0.294)	(0.551)	(0.890)	(0.976)	(0.527)	(0.126)
Distance to CDO	0.566***	1.235***	-0.222	-0.153	0.0527	-0.131***
	(0.0666)	(0.125)	(0.202)	(0.221)	(0.119)	(0.0286)
Constant	-220.6***	513.6***	-343.2**	-158.2	-206.4**	82.32***
	(51.75)	(97.13)	(156.8)	(172.0)	(92.78)	(22.23)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,313	20,313	20,313	20,313	20,313	20,313
R-squared	0.042	0.134	0.286	0.029	0.032	0.044

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations

Table 2.13. Determinants of income (household level) in the Mindanao II, 1991-2012

VARIABLES	Mindanao II					
	(1) Agricultural Wage Income	(2) Crop Farming and Others	(3) Nonfarm Wage Income	(4) Nonfarm Self-employment	(5) Abroad Remittance	(6) Domestic Remittance
Harvested Area per labor force	-90.96**	352.5***	-326.7***	39.78	25.35	-21.50
	(40.27)	(66.17)	(86.95)	(66.02)	(52.06)	(13.68)
Urbanization	-4.803***	-7.855***	12.68***	7.977***	4.939***	1.154***
	(1.113)	(1.828)	(2.402)	(1.824)	(1.438)	(0.378)
Electrification ratio	144.6***	-131.6***	532.2***	395.4***	89.50***	36.95***
	(15.99)	(26.27)	(34.53)	(26.22)	(20.67)	(5.433)
National Road density	41.87	123.9**	-189.5***	-84.21	56.69	-8.779
	(31.73)	(52.14)	(68.52)	(52.02)	(41.02)	(10.78)
Irrigation ratio	7.353***	-5.951***	-3.808***	-1.993**	-1.353*	0.377**
	(0.552)	(0.907)	(1.193)	(0.905)	(0.714)	(0.188)
Working members	95.43***	141.5***	171.2***	70.85***	55.98***	-8.537***
	(5.302)	(8.712)	(11.45)	(8.693)	(6.855)	(1.802)
%female	-1.691***	-1.976***	1.345*	1.512**	0.665	0.344***
	(0.368)	(0.605)	(0.795)	(0.604)	(0.476)	(0.125)
% age 25-35	1.157**	-4.844***	-1.306	-0.568	-1.078*	-1.162***
	(0.504)	(0.828)	(1.088)	(0.826)	(0.651)	(0.171)
% age 36-45	-0.103	-1.611*	-1.582	1.122	-1.358**	-1.345***
	(0.531)	(0.872)	(1.146)	(0.870)	(0.686)	(0.180)
% age 46-60	-2.068***	-0.523	-4.567***	-2.112***	-0.999*	-0.185
	(0.396)	(0.651)	(0.856)	(0.650)	(0.512)	(0.135)

Table 2.13. Determinants of income (household level) in the Mindanao II, 1991-2012 (Continued)

VARIABLES	Mindanao II (1) Agricultural Wage Income	(2) Crop Farming and Others	(3) Nonfarm Wage Income	(4) Nonfarm Self-employment	(5) Abroad Remittance	(6) Domestic Remittance
% with secondary educ.	0.108	-0.730	2.672***	2.452***	1.082***	0.415***
	(0.307)	(0.504)	(0.663)	(0.503)	(0.397)	(0.104)
% with tertiary educ.	-4.604***	3.242***	51.35***	7.699***	7.391***	1.439***
	(0.429)	(0.706)	(0.927)	(0.704)	(0.555)	(0.146)
Distance to Davao	-1.147***	0.271	-1.127***	-0.97***	-0.124	0.129***
	(0.137)	(0.225)	(0.295)	(0.224)	(0.177)	(0.0465)
Constant	-5.985	1,256***	-176.0	-276.7**	-349***	-25.33
	(82.88)	(136.2)	(179.0)	(135.9)	(107.2)	(28.16)
Observations	16,179	16,179	16,179	16,179	16,179	16,179
R-squared	0.076	0.056	0.254	0.052	0.030	0.039

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations

Table 2.14. Determinants of agricultural revenue (provincial level) in rural Philippines, 1991-2012

VARIABLES	(1) Non-Trad Crop Revenue	(2) Trad. Crop Revenue	(3) Livestock	(4) Poultry
Harvested Area per Labor force	8.240	1,415	-755.3	-4,972
	(384.4)	(2,463)	(867.9)	(3,730)
Urbanization	-6.648	-110.9***	86.96***	177.8***
	(6.671)	(42.74)	(15.06)	(64.73)
Electrification Ratio (Lagged)	-12.88*	-12.01	-5.978	59.46
	(7.696)	(49.31)	(17.38)	(74.68)
National road density (Lagged)	-502.0***	779.6	692.0**	-1,227
	(147.1)	(942.6)	(332.2)	(1,428)
Irrigation Ratio (Lagged)	1.486	29.07	2.453	4.063
	(3.202)	(20.52)	(7.230)	(31.07)
Labor Force	0.00169***	0.0201***	0.0195***	0.0285***
	(0.000302)	(0.00194)	(0.000682)	(0.00293)
%female	-51.32*	-43.45	-44.72	-154.9
	(28.09)	(180.0)	(63.43)	(272.6)
% age 25-35	58.83**	-200.3	187.0***	78.52
	(29.25)	(187.4)	(66.04)	(283.8)
% age 36-45	-23.16	223.1	65.62	199.0
	(32.07)	(205.4)	(72.40)	(311.1)
%age 46-60	21.25	218.1	55.10	97.92
	(39.96)	(256.0)	(90.21)	(387.7)
% with sec. educ.	71.13***	-42.43	56.52	77.86
	(16.30)	(104.4)	(36.81)	(158.2)
% with ter. Educ.	25.96	-128.2	61.11	-162.4
	(19.56)	(125.3)	(44.16)	(189.8)
distance to MM	1.882***	-0.461	-6.228***	-3.336
	(0.322)	(2.062)	(0.727)	(3.123)
Constant	-3,137**	-2,858	-7,896**	-8,225
	(1,499)	(9,605)	(3,385)	(14,547)
Year dummies	Yes	Yes	Yes	Yes
Observations	511	511	511	511
R-squared	0.224	0.215	0.849	0.404

Robust standard errors in parenthesis
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations

Table 3.1. Number of sample households and number of school-age children in rural Philippines, 2006 and 2009

	2006 (1)	**2009 (2)**	**Panel (3)**
Households			
Total	21,216	21,065	4,478
Households with school-age children	15,869	15,706	3,139
Percentage	74.7	74.5	70.0
Children in FIES-LFS[a]	41,751	41,169	3,611

[a]Children refer to household members between 6 and 21 years old.
[b]Refers to perfectly matched children from the panel households.
Source: Author's calculations using FIES 2006 and FIES 2009

Table 3.2. Characteristics of rural households in the Philippines with school-age members, 2006 and 2009

Items	2006 (1)	2009 (2)
Average per capita income (PPP US $)	734	982
Average per capita remittance from abroad	81	104
Average per capita domestic remittance	29	48
Average family size	6	5
Distribution by age group (%)		
0-5	11	10
6-11	18	17
12-16	16	16
17-21	11	11
22-64	40	42
65 and above	3	4
Distribution of income by source (%)		
Remittance from abroad	12	12
Domestic Remittance	4	5
Farm income	35	32
Nonfarm income	48	50
Distribution by education status of household head		
With primary schooling	57	56
With secondary schooling	31	31
With tertiary schooling	12	13
Distribution of expenditure		
Food	48	49
Housing	27	26
Education	5	5
Health	2	3
Clothing	6	6
Others	11	11
Per capita expenditure (PPP$)	820	940
Per capita expenditure (PPP$/ month)	68	78

Source: Author's calculations using FIES 2006 and FIES 2009

Table 3.3 Progress in school of children aged 6–21 years old in rural Philippines, 2006

	Girls					Boys				
Age in 2006	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
	Not in school	**Previously in school**	**Returnee**	**Always**	**Total**	**Not in school**	**Previously in school**	**Returnee**	**Always**	**Total**
Elementary school-age children										
6	2	0	36	97	135	6	1	47	89	143
	(1.48)	(0.00)	(26.67)	(71.85)	(100.00)	(4.20)	(0.70)	(32.87)	(62.24)	(100.00)
7	3	3	18	125	149	5	1	17	120	143
	(2.01)	(2.01)	(12.08)	(83.89)	(100.00)	(3.50)	(0.70)	(11.89)	(83.92)	(100.00)
8	0	2	1	114	117	1	4	6	158	169
	(0.00)	(1.71)	(0.85)	(97.44)	(100.00)	(0.59)	(2.37)	(3.55)	(93.49)	(100.00)
9	4	6	4	130	144	3	4	4	140	151
	(2.78)	(4.17)	(2.78)	(90.28)	(100.00)	(1.99)	(2.65)	(2.65)	(92.72)	(100.00)
10	1	10	5	122	138	4	13	5	114	136
	(0.72)	(7.25)	(3.62)	(88.41)	(100.00)	(2.94)	(9.56)	(3.68)	(83.82)	(100.00)
11	3	10	6	127	146	8	25	8	114	155
	(2.05)	(6.85)	(4.11)	(86.99)	(100.00)	(5.16)	(16.13)	(5.16)	(73.55)	(100.00)
High school-age children										
12	6	15	2	93	116	16	26	7	112	161
	(5.17)	(12.93)	(1.72)	(80.17)	(100.00)	(9.94)	(16.15)	(4.35)	(69.57)	(100.00)
13	11	30	7	32	80	40	48	7	35	130
	(13.75)	(37.50)	(8.75)	(40.00)	(100.00)	(30.77)	(36.92)	(5.38)	(26.92)	(100.00)

Table 3.3 Progress in school of children 6–21 years old in rural Philippines, 2006 (Continued)

Age in 2006	Girls					Boys				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Not in school	Previously in school	Returnee	Always	Total	Not in school	Previously in school	Returnee	Always	Total
14	6	37	4	58	105	26	50	6	55	137
	(5.71)	(35.24)	(3.81)	(55.24)	(100.00)	(18.98)	(36.50)	(4.38)	(40.15)	(100.00)
15	8	50	3	49	110	34	48	7	31	120
	(7.27)	(45.45)	(2.73)	(44.55)	(100.00)	(28.33)	(40.00)	(5.83)	(25.83)	(100.00)
Tertiary school-age children										
16	11	30	7	32	80	40	48	7	35	130
	(13.75)	(37.50)	(8.75)	(40.00)	(100.00)	(30.77)	(36.92)	(5.38)	(26.92)	(100.00)
17	20	18	4	19	61	45	25	9	14	93
	(32.79)	(29.51)	(6.56)	(31.15)	(100.00)	(48.39)	(26.88)	(9.68)	(15.05)	(100.00)
18	33	20	2	9	64	59	18	4	13	94
	(51.56)	(31.25)	(3.13)	(14.06)	(100.00)	(62.77)	(19.15)	(4.26)	(13.83)	(100.00)
19	28	15	2	2	47	54	10	2	10	76
	(59.57)	(31.91)	(4.26)	(4.26)	(100.00)	(71.05)	(13.16)	(2.63)	(13.16)	(100.00)
20	34	8	0	0	42	50	21	6	2	79
	(80.95)	(19.05)	(0.00)	(0.00)	(100.00)	(63.29)	(26.58)	(7.59)	(2.53)	(100.00)

Table 3.3 Progress in school of children 6–21 years old in rural Philippines, 2006 (Continued)

	Girls					Boys				
Age in 2006	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
	Not in school	**Previously in school**	**Returnee**	**Always**	**Total**	**Not in school**	**Previously in school**	**Returnee**	**Always**	**Total**
21	22	2	0	0	24	42	12	0	1	55
	(91.67)	(8.33)	(0.00)	(0.00)	(100.00)	(76.36)	(21.82)	(0.00)	(1.82)	(100.00)
Total	187	254	97	1,079	1617	412	342	144	1096	1994
	(11.56)	(15.71)	(6.00)	(66.73)	(100.00)	(20.66)	(17.15)	(7.22)	(54.96)	(100.00)

*Numbers in parenthesis are percentage

Source: Author's calculations using FIES-LFS 2006 and FIES-LFS 2009

Table 3.4. First-stage regression results of the log of per capita expenditure

Variables	First stage Log Per Capita Expenditure
Log household size	-0.720***
	(0.0230)
Age of Head	0.00754***
	(0.000640)
Sex of Head (1=male)	0.0120
	(0.0225)
Head has high school educ. (1=yes)	0.217***
	(0.0173)
Head has college educ. (1=yes)	0.624***
	(0.0242)
Domestic remittance (% of income)	-0.00164**
	(0.000644)
Foreign remittance (% of income)	0.00742***
	(0.000473)
Nonfarm income (% of income)	0.00291***
	(0.000246)
Working age members (lagged)	0.0853***
	(0.00841)
Constant	6.631***
	(0.170)
Provincial dummies	Yes
F (1,3057)=	16.77
Observations	3,084

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations

Table 3.5. Second stage regression results

Variables	Second Stage					
	(1) Food (% of Total Expenditure)	(2) Housing (% of Total Expenditure)	(3) Education (% of Total Expenditure)	(4) Health (% of Total Expenditure)	(5) Clothing (% of Total Expenditure)	(6) Others (% of Total Expenditure)
Log Per Capita Expenditure (predicted)	-5.916	2.100	-1.923	-2.051	0.340	6.624***
	(3.629)	(3.365)	(2.404)	(2.037)	(1.014)	(2.565)
Household size (log)	-0.610	-2.861	-0.293	-0.678	0.351	4.077***
	(1.918)	(1.753)	(1.265)	(1.072)	(0.527)	(1.336)
Age of Head	-0.117***	0.0707**	0.0466**	0.0397**	-0.0225**	-0.00834
	(0.0325)	(0.0298)	(0.0214)	(0.0182)	(0.00896)	(0.0227)
Sex of Head (1=male)	-0.246	-0.278	1.580***	-0.391	-0.250*	-0.229
	(0.566)	(0.506)	(0.370)	(0.316)	(0.151)	(0.385)
Head has HS educ. (1=yes)	-2.773***	1.402*	1.794***	0.991**	0.388	-1.343**
	(0.883)	(0.810)	(0.582)	(0.495)	(0.244)	(0.617)
Head has college educ. (1=yes)	-8.219***	3.942*	5.571***	1.941	0.116	-2.368
	(2.345)	(2.168)	(1.551)	(1.316)	(0.653)	(1.653)
Domestic remittance (% of income)	-0.0336**	0.0182	0.00502	0.0344***	0.00789*	-0.0265**
	(0.0163)	(0.0145)	(0.0105)	(0.00904)	(0.00431)	(0.0110)
Foreign remittance (% of income)	-0.124***	0.0803***	0.0863***	0.033 3**	0.00670	-0.0715***
	(0.0310)	(0.0286)	(0.0205)	(0.0174)	(0.00861)	(0.0218)
Nonfarm income (% of income)	-0.0458***	0.0357***	0.0134*	0.00438	0.00440	-0.00769
	(0.0121)	(0.0111)	(0.00799)	(0.00679)	(0.00333)	(0.00845)
Proportion of household members:						
Males aged:						

Table 3.5. Second stage regression results (Continued)

Variables	Second Stage					
	(1) Food (% of Total Expenditure)	(2) Housing (% of Total Expenditure)	(3) Education (% of Total Expenditure)	(4) Health (% of Total Expenditure)	(5) Clothing (% of Total Expenditure)	(6) Others (% of Total Expenditure)
0-5	0.214	0.0455	-0.419***	0.0872	-0.0843	0.0998
	(0.239)	(0.228)	(0.161)	(0.135)	(0.0693)	(0.174)
6-11	0.608***	-0.197	0.136	-0.173	-0.123*	-0.118
	(0.222)	(0.212)	(0.149)	(0.126)	(0.0645)	(0.162)
12-16	0.762***	-0.262	0.0774	-0.0888	-0.0572	-0.342**
	(0.221)	(0.211)	(0.148)	(0.125)	(0.0640)	(0.161)
17-21	0.507**	-0.363*	0.408***	-0.288**	-0.0404	-0.351**
	(0.222)	(0.212)	(0.150)	(0.126)	(0.0645)	(0.162)
65 and above	0.243	0.131	-0.509*	0.175	0.0685	-0.210
	(0.388)	(0.370)	(0.261)	(0.219)	(0.112)	(0.282)
Females aged:						
0-5	0.227	-0.0876	-0.282**	0.129	-0.133***	0.109
	(0.165)	(0.158)	(0.111)	(0.0933)	(0.0479)	(0.120)
6-11	0.459***	-0.0307	-0.0471	-0.0726	-0.120***	-0.0960
	(0.142)	(0.135)	(0.0947)	(0.0802)	(0.0411)	(0.103)
12-16	0.276*	-0.249*	0.281***	-0.0826	0.00304	-0.107
	(0.142)	(0.136)	(0.0947)	(0.0802)	(0.0411)	(0.103)
17-21	-0.185	-0.250	0.684***	-0.133	-0.00129	-0.213*
	(0.169)	(0.161)	(0.113)	(0.0955)	(0.0490)	(0.123)
22-64	-0.0862	0.0771	0.0323	-0.0672	0.156***	-0.0904
	(0.165)	(0.157)	(0.111)	(0.0932)	(0.0477)	(0.120)

Table 3.5. Second stage regression results (Continued)

Variables	Second Stage					
	(1) Food (% of Total Expenditure)	(2) Housing (% of Total Expenditure)	(3) Education (% of Total Expenditure)	(4) Health (% of Total expenditure)	(5) Clothing (% of Total Expenditure)	(6) Others (% of Total Expenditure)
65 and above	-0.556**	0.475*	-0.114	0.213	0.0600	-0.0883
	(0.282)	(0.270)	(0.190)	(0.159)	(0.0819)	(0.206)
Constant	107.5***	4.245	6.896	6.804	6.181	-33.62**
	(23.94)	(22.16)	(15.85)	(13.58)	(6.678)	(16.89)
Provincial dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,084	3,084	3,084	3,084	3,084	3,084

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations

Table 3.6. Results of multinomial logit expressed as relative risk ratios

	Relative risk ratios								
	Primary School (Ages 6-11)			Secondary school (Age 12-15)			Tertiary school (Age 16-21)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	**Previously in school**	**Returnee**	**Always**	**Previously in school**	**Returnee**	**Always**	**Previously in school**	**Returnee**	**Always**
Child's characteristics									
Child's sex (female=1)	1.513	1.819	2.492**	2.960***	1.381	3.928***	1.251	0.900	1.237
	(0.652)	(0.723)	(0.899)	(0.783)	(0.603)	(1.032)	(0.233)	(0.322)	(0.295)
Child is 6 years old (base)	base	base	base						
Child is 7 years old (yes=1)	4.590	0.402*	1.786						
	(5.653)	(0.214)	(0.888)						
Child is 8 years old (yes=1)	62.62***	0.740	17.53***						
	(95.85)	(0.846)	(18.89)						
Child is 9 years old (yes=1)	13.45**	0.110***	2.161						
	(16.09)	(0.0733)	(1.247)						
Child is 10 years old (yes=1)	44.67***	0.199**	2.584						
	(53.09)	(0.136)	(1.574)						
Child is 11 years old (yes=1)	30.59***	0.128***	1.200						
	(34.63)	(0.0724)	(0.601)						
Child is 12 years old (yes=1)				base	base	Base			
Child is 13 years old (yes=1)				1.235	0.919	0.596			
				(0.474)	(0.507)	(0.209)			
Child is 14 years old (yes=1)				1.305	0.513	0.213***			
				(0.480)	(0.293)	(0.0752)			
Child is 15 years old (yes=1)				1.119	0.421	0.113***			
				(0.406)	(0.245)	(0.0398)			
Child is 16 years old (yes=1)							base	base	Base

Table 3.6. Results of multinomial logit (Continued)

	Relative risk ratios								
	Ages 6-11			Age 12-15			Ages 16-21		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Previously in school	Returnee	Always	Previously in school	Returnee	Always	Previously in school	Returnee	Always
Child is 17 years old (yes=1)							0.312***	0.488	0.243***
							(0.0888)	(0.229)	(0.0775)
Child is 18 years old (yes=1)							0.169***	0.161***	0.109***
							(0.0473)	(0.0979)	(0.0360)
Child is 19 years old (yes=1)							0.124***	0.108***	0.0533***
							(0.0391)	(0.0688)	(0.0231)
Child is 20 years old (yes=1)							0.110***	0.140***	0.00782***
							(0.0343)	(0.0829)	(0.00607)
Child is 21 years old (yes=1)							0.0558***	4.56e-08***	0.00285***
							(0.0230)	(2.17e-08)	(0.00317)
Eldest child (yes=1)	1.185	0.937	1.113	0.697	1.573	0.844	1.969***	1.646	1.601*
	(0.693)	(0.538)	(0.570)	(0.202)	(0.724)	(0.236)	(0.405)	(0.620)	(0.402)
Youngest child (yes=1)	0.318	2e-07***	0.0912**	0.230	1e-05***	0.418	11.45**	1e-06***	6.533
	(0.454)	(3.01e-07)	(0.0928)	(0.311)	(1.26e-05)	(0.417)	(12.65)	(1.93e-06)	(9.871)
School age sibling (% of fsize)	1.13	1.22	0.98	0.99	1.05	0.68**	1.00	1.12	0.87
	(0.344)	(0.335)	(0.228)	(0.174)	(0.333)	(0.114)	(0.111)	(0.222)	(0.131)
Household characteristics									
Head has at most sec. educ. (yes=1)	1.332	0.821	1.579	3.796***	1.331	3.78***	1.524**	1.844*	2.111***
	(0.659)	(0.366)	(0.634)	(1.248)	(0.718)	(1.202)	(0.312)	(0.679)	(0.565)
Head has at most col. educ. (yes=1)	1.039	0.590	1.939	2.816	1.826	7.93***	4.256***	5.887***	12.32***
	(1.090)	(0.567)	(1.703)	(1.883)	(1.732)	(4.989)	(1.548)	(3.434)	(5.088)

Table 3.6. Results of multinomial logit (Continued)

	Relative risk ratios								
	Ages 6-11			Age 12-15			Ages 16-21		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Previously in school	Returnee	Always	Previously in school	Returnee	Always	Previously in school	Returnee	Always
Household size	0.903	0.926	0.937	0.911	0.845	1.109	1.013	0.980	1.156
	(0.223)	(0.206)	(0.180)	(0.133)	(0.222)	(0.150)	(0.0939)	(0.165)	(0.154)
Access to electricity (yes=1)	1.037	0.863	2.258**	1.136	0.714	1.761**	0.679	1.298	0.662
	(0.488)	(0.375)	(0.900)	(0.303)	(0.292)	(0.477)	(0.164)	(0.689)	(0.205)
HH members 5 yrs old and lower (% of family size)	1.031	1.025	1.013	1.005	1.007	0.981	0.951***	0.977	0.948***
	(0.0246)	(0.0228)	(0.0198)	(0.0178)	(0.0284)	(0.0166)	(0.0132)	(0.0269)	(0.0193)
Remittances from abroad (log)	0.801	0.996	0.977	0.678**	1.467	0.957	1.135	1.101	1.287*
	(0.197)	(0.162)	(0.119)	(0.128)	(0.595)	(0.150)	(0.159)	(0.232)	(0.174)
Domestic remittances (log)	1.233	0.975	1.271	1.212	0.958	1.406**	1.115	1.315	1.446**
	(0.304)	(0.233)	(0.277)	(0.159)	(0.181)	(0.190)	(0.126)	(0.249)	(0.219)
Farm income (log)	0.956	0.924	0.925	1.031	1.518*	1.203	1.221*	1.110	1.474***
	(0.256)	(0.235)	(0.217)	(0.156)	(0.343)	(0.172)	(0.130)	(0.222)	(0.218)
Non farm income (log)	1.059	1.212	1.201	0.884	1.166	1.117	1.426***	1.512*	1.431***
	(0.233)	(0.268)	(0.234)	(0.118)	(0.220)	(0.140)	(0.141)	(0.322)	(0.178)
Zero abroad remittances (yes=1)	0.0957	0.202	0.129*	0.244*	5.305	0.526	0.816	0.680	1.735
	(0.143)	(0.270)	(0.156)	(0.192)	(11.53)	(0.390)	(0.573)	(0.706)	(1.256)

Table 3.6. Results of multinomial logit (Continued)

	Relative risk ratios								
	Ages 6-11			Age 12-15			Ages 16-21		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Previously in school	Returnee	Always	Previously in school	Returnee	Always	Previously in school	Returnee	Always
Zero domestic remittances (yes=1)	2.684	1.059	2.292	0.952	0.341	1.992	1.977	2.347	7.244***
	(3.088)	(1.154)	(2.293)	(0.529)	(0.273)	(1.151)	(1.072)	(2.228)	(5.462)
Zero farm income (yes=1)	0.741	0.636	0.509	1.625	41.58**	5.609*	2.623	1.231	10.15**
	(1.441)	(1.175)	(0.873)	(1.685)	(68.07)	(5.579)	(1.965)	(1.620)	(10.74)
Zero nonfarm income (yes=1)	0.444	2.101	1.210	0.553	4.356	3.217	8.722***	17.12*	9.524**
	(0.646)	(3.075)	(1.548)	(0.501)	(5.844)	(2.817)	(6.321)	(27.17)	(8.596)
Village characteristics									
Has ES in bgy (yes=1)	2.310	1.979	3.084***	0.623	0.795	0.581	0.792	1.376	0.912
	(1.256)	(0.960)	(1.306)	(0.272)	(0.580)	(0.251)	(0.203)	(0.675)	(0.294)
Has HS in bgy (yes=1)	0.397*	0.713	0.512	1.730	3.761***	2.344**	1.143	0.863	1.777**
	(0.217)	(0.328)	(0.211)	(0.599)	(1.821)	(0.798)	(0.279)	(0.415)	(0.490)
Observations	1,726	1,726	1,726	1,038	1,038	1,038	843	843	843

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculations

Table 4.1. Number of Migrant Households in the Central Luzon Village, 1992-2013

	No. of Migrant households		
	1992	**2004**	**2013**
No. of Households	230	381	509
No. of Migrants[1]	31 (100)	29 (100)	70 (100)
Farmer	13 (42)	5 (17)	12 (17)
Landless	18 (58)	24 (83)	58 (83)

[1]Numbers in parenthesis are proportions to total migrants
Source: Author's calculations

Table 4.2. Adoption of modern rice technology profile in the Central Luzon Village, by season, 1977-2013

	1977		**1992**	**2004**	**2013**	
	Wet	**Dry**	**All Seasons**	**All Seasons**	**Wet**	**Dry**
No. of observations	83	43	131	129	140	134
% of HYV users	98	100	93	96	99	98
% of fertilizer users	60	88	99	NA	97	96
% of pesticide users	71	74	95	73	74	78
% of tractor users	34	30	52	100	76	79
% of threshing machine users	49	100	94	98	95	95
Chemical cost[1] (PPP $/ha)	8	17	43	NA	31	33
Fertilizer cost (PPP $/ha)	38	100	171	NA	139	157

[1]Chemical herbicides and insecticides
[2]NA – not available
Source: Author's calculations

Table 4.3. Land tenure in the Central Luzon Village, 1992 to 2013

	1992		2004		2013	
	Parcels	**Area**	**Parcels**	**Area**	**Parcels**	**Area**
Owned	82	93	103	98	94	54
	(44)	(37)	(46)	(29)	(42)	(26)
Leased	79	128	19	24	29	24
	(42)	(51)	(8)	(7)	(13)	(11)
Mortgage	15	18	18	28	16	13
	(8)	(7)	(8)	(8)	(7)	(6)
Borrowed	9	9	11	12	5	11
	(5)	(4)	(5)	(4)	(2)	(2)
Shared-tenant	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Others	3	3	0	0	5	2
	(2)	(1)	(0)	(0)	(2)	(1)
Porcientuhan	0	0	73	180	75	108
	(0)	(0)	(33)	(53)	(33)	(51)
Total	188	250	224	342	224	210
	(100)	(100)	(100)	(100)	(100)	(100)

Note: Numbers in parenthesis are proportions to total.
Source: Author's calculations

Table 4.4. Evolution of land sales in the Central Luzon Village, 2004 and 2013

	2004	**2013**
No. of farmers	7	11
No. of parcels	7	19
Average land size sold	4.32	0.65
Reason for selling (No. of parcels)		
Consumption	1	5
Debt payment	3	2
Education	0	2
Medical	3	1
Production	0	3
Others[1]	0	6

[1]Others include a combination of education, consumption and production
Source: Author's calculations

Table 4.5. Socioeconomic characteristics of *porcientuhan* households in the Central Luzon Village, 2004 and 2013

	2004		**2013**	
No. of Households	57		77	
Average household size	5		5	
Education of household head (years)	12		7	
Age of household head (years)	50		42	
Proportion with electricity	76		79	
Proportion with sanitary toilet	86		86	
Relation to landlord (%)				
Direct relative	7		6	
Distant relative	30		32	
Not related	63		62	
Average POR share (%)	10		10	
Average size of POR land (ha)	2		2	
Residence of landlord (%)				
Within CLV	42		34	
Outside CLV but in Munoz	44		54	
Outside NE	14		12	
Farm income (PPP US$)[1]	187	(6)	1,873	(35)
Non-farm income (PPP US$)	2,497	(85)	3,268	(61)
Remittances (PPP US$)	243	(8)	225	(4)
Total income (PPP US$)	2,927	(100)	5,366	(100)

[1]Numbers in parenthesis are proportions to total income
Source: Author's calculations

Table 4.6. Distribution of sample households by general occupation in the Central Luzon Village, 1977-2013

Occupational category of household heads	1977		1992		2004		2013	
	No.	%	No.	%	No.	%	No.	%
Farmers	88	74	134	58	129	34	142	28
Landless workers	30	26	96	42	252	66	367	72
a. Agricultural landless	15	13			150	39	164	32
i. Daily wage workers					92	24	87	17
ii. Porcientuhan					58	15	77	15
b. Non-agricultural landless	15	13			102	27	203	40
Total	118	100	230	100	381	100	509	100

Source: Author's calculations

Table 4.7. Demographic characteristics and Indicators of population pressure of the Central Luzon Village, 1977-2013

Items		1977	1992	2004	2013
Size of the village (ha)	[A]	301	301	301	301
Crop area (ha)	[B]	301	250	242	210
Total population	[C]	649	1110	2292	2925
Total no. of households	[D]	118	230	381	509
Total no. of farmers' household	[E]	88	134	129	142
Population density (man/land ratio)	[F]	2.2	3.7	7.6	9.7
Population pressure over the land					
a. Land/family ratio	[A/D]	2.6	1.3	0.8	0.6
b. Land/farmer hh ratio	[A/E]	3.4	2.2	2.3	2.1
c. Land/person	[A/C]	0.5	0.3	0.1	0.1

Source: Author's calculations

Table 4.8. Distribution of households by distance to urban area, 2004 and 2013

	2004			2013		
	Near	**Central**	**Far**	**Near**	**Central**	**Far**
Farmer	48	23	58	53	23	66
	(37)	(18)	(45)	(37)	(16)	(47)
Non-agricultural	39	26	27	102	50	51
	(43)	(28)	(29)	(50)	(25)	(25)
Daily wage	57	19	26	38	22	27
	(56)	(19)	(25)	(44)	(25)	(31)
Porcientuhan	31	11	16	35	17	25
	(53)	(19)	(28)	(45)	(22)	(33)

Note: Numbers in parenthesis are percentage to row total.
Source: Author's calculations

Table 4.9. Number and per cent of respondents and family members by educational attainment in Central Luzon Village, 1977-2013

Educational level	**1977**		**1992**		**2004**		**2013**	
	No.	%	No.	%	No.	%	No.	%
1. Non-schooling age	112	17.3	198	17.8	285	12.4	341	11.7
2. No education	43	6.6	21	1.9	67	2.9	72	2.5
3. Primary level	151	23.3	291	26.2	348	15.2	900[1]	30.8
4. Elementary level	198	30.5	243	21.9	451	19.7		
5. High school (unfinished)	64	9.9	148	13.3	339	14.8	412	14.1
6. High school graduate	57	8.8	135	12.2	477	20.8	727	24.9
7. College (unfinished)	18	2.8	45	4.1	171	7.5	276	9.4
8. College graduate	6	0.9	29	2.6	154	6.7	197	6.7
Total	649	100.0	1110	100	2292	100.0	2925	100.0

[1] includes primary level

Source: Author's calculations

Table 4.10. Infrastructure indicators for the CLV, 1992-2013

	1992	2004	2013
Access to electricity (% of households)	Not collected	83	86
Access to toilets (% of households)	66	91 [1]	87
Total rice area	250	242	210
Irrigated Area (ha) by source			
National Irrigation System	0	0	184
Pumps	114	153	2
Rainfed	133	89	23
Others	3	0	1
Per cent Irrigated (%)			
National Irrigation System	0	0	88
Pumps	46	63	1
Rainfed	53	37	11
Others[2]	1	0	0

[1]includes households who share toilets
[2]Others in 1992 is community project
Source: Author's calculations

Table 4.11. Distribution of income (PPP in 2005) of Central Luzon Village households, by source, 1977-2013

Sources	1977		1992		2004		2013	
	Farmers	**Landless**	**Farmers**	**Landless**	**Farmers**	**Landless**	**Farmers**	**Landless**
1. Farm income	398	241	1,774	717	2,229	342	3,856	598
	(59)	(48)	(57)	(42)	(27)	(7)	(25)	(8)
1.1 Wage[1]	56	196	194	578			392	508
	(8)	(39)	(6)	(34)			(3)	(7)
1.2 Rice	224	0	1,186	0	1,482	0	2,682	0
	(33)	(0)	(38)	(0)	(18)	(0)	(18)	(0)
1.3 Other Crops	118	45	196	76	747	342	127	28
	(18)	(9)	(6)	(4)	(9)	(7)	(1)	(0)
1.4 Livestock			198	63			656	62
			(6)	(4)			(4)	(1)
2. Non-farm income	271	259	1,071	553	5,191	3,919	9,638	5,629
	(41)	(52)	(34)	(32)	(64)	(80)	(64)	(77)
2.1 Non-farm wage	158	207	618	236			5,713	3,263
	(24)	(41)	(20)	(14)			(38)	(44)
2.2 Non-farm enterprises	114	52	453	317			3,925	2,367
	(17)	(10)	(14)	(19)			(26)	(32)
3. Remittances	0	0	281	433	731	617	1,634	1,113
	(0)	(0)	(9)	(25)	(9)	(13)	(11)	(15)
Total	670	499	3,126	1,703	8,151	4,878	15,128	7,341
	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)

[1]Data for wages in 2004 was included in Rice and Other Crops

Note: Numbers in parenthesis are shares to total

Source: Author's calculations

Table 4.12. Poverty indicators and its decomposition 1992-2013

1992	Poverty Headcount		Poverty Gap		Squared Poverty Gap	
Overall	55		29		19	
Farmer	48	(53)	23	(47)	14	(46)
Landless	65	(47)	38	(53)	25	(54)

2004	Poverty Headcount		Poverty Gap		Squared Poverty Gap	
Overall	50		21		12	
Farmer	44	(30)	18	(30)	10	(29)
Non-agricultural	29	(16)	13	(17)	9	(19)
Daily wage workers	66	(32)	31	(36)	18	(36)
Porcientuhan	71	(22)	23	(17)	11	(15)

2013	Poverty Headcount		Poverty Gap		Squared Poverty Gap	
Overall	52		29		20	
Farmer	38	(20)	20	(19)	13	(19)
Non-agricultural	46	(35)	24	(33)	16	(33)
Daily wage workers	74	(24)	47	(28)	33	(29)
Porcientuhan	71	(21)	38	(20)	26	(20)

Note: Numbers in parenthesis are subgroup poverty ‘share’ of each subgroup
Source: Author’s calculations

Table 4.13. Distribution of household types by categories of poverty transition

	Chronic Poor		Transient Poor		Fallen into Poverty		Never Poor	
	92-04	04-13	92-04	04-13	92-04	04-13	92-04	04-13
Total number of households	58	112	29	49	34	60	45	103
Distribution of households (%)								
Farmers	41	22	28	37	44	28	53	48
Non-agricultural	9	31	31	33	21	42	31	43
Daily Wage	29	21	21	20	21	12	11	5
Porcientuhan	21	26	20	10	14	18	5	4

Source: Author's calculations

Table 4.14. Gini coefficients for Land holdings and total income of households in the CLV, 1992-2013

	1992	2004	2013
Income Gini coefficient	0.4842	0.5689	0.6074
95% Conf. Interval	[.4482 .5267]	[.4998 .6438]	[.5636 .6586]
Land Gini coefficient	0.7129	0.7688	0.8691
95% Conf. Interval	[.6458 .7619]	[.7329 .7906]	[.8394 .9040]

Source: Author's calculations;

Table 4.15. Decomposition of total income by income source

Sources	1992			2004			2013		
	Gini	Share	% Change	Gini	Share	% Change	Gini	Share	% Change
Farm income									
Wage	0.6868	1	-0.1298				0.7635	0	-0.0747
Rice	0.7598	29	0.0201	0.8665	8	-0.0013	0.9244	15	0.0231
Other Crops	0.8536	5	-0.0083	0.847	8	-0.0001	0.9734	0	-0.0057
Livestock	0.7913	4	-0.0155				0.9788	5	0.0102
Non-farm income				0.5692	62	-0.0376			
Non-farm wage	0.8811	25	0.0657				0.7871	29	-0.0138
Non-farm enterprises	0.8563	16	0.0071				0.9325	10	0.0068
Remittances	0.9366	20	0.0607	0.7902	22	0.039	0.8323	41	0.0541
Total Income	0.4842	100		0.5689	100		0.6074	100	

Source: Author's calculations

Figures:

Figure 1.1 Modernizing Forces and Pathways out of Poverty

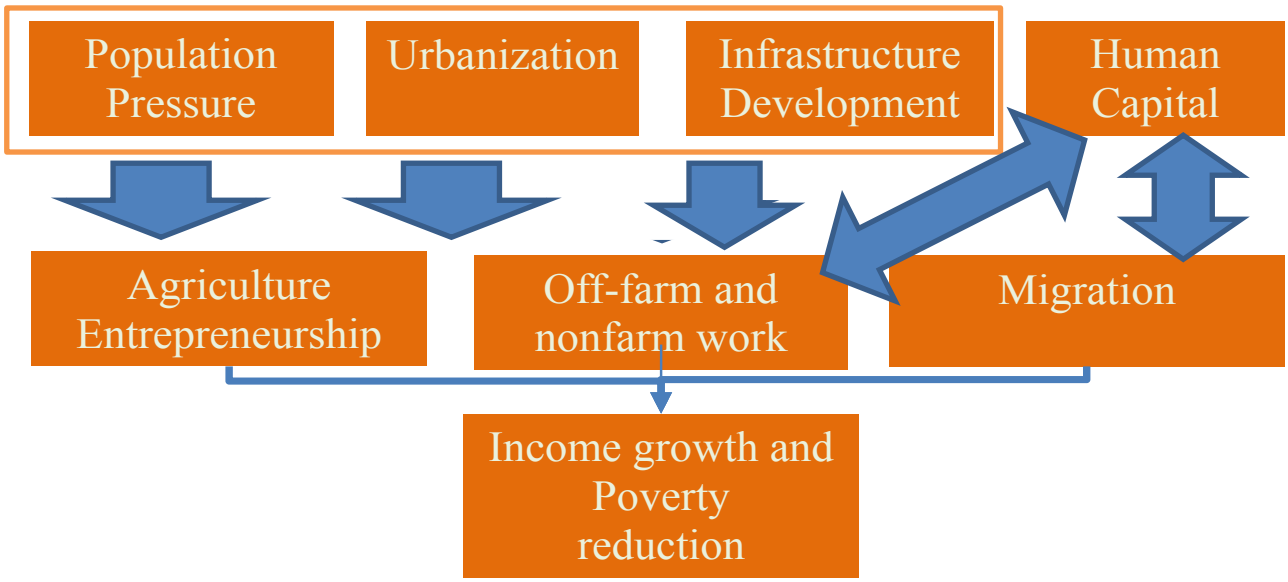
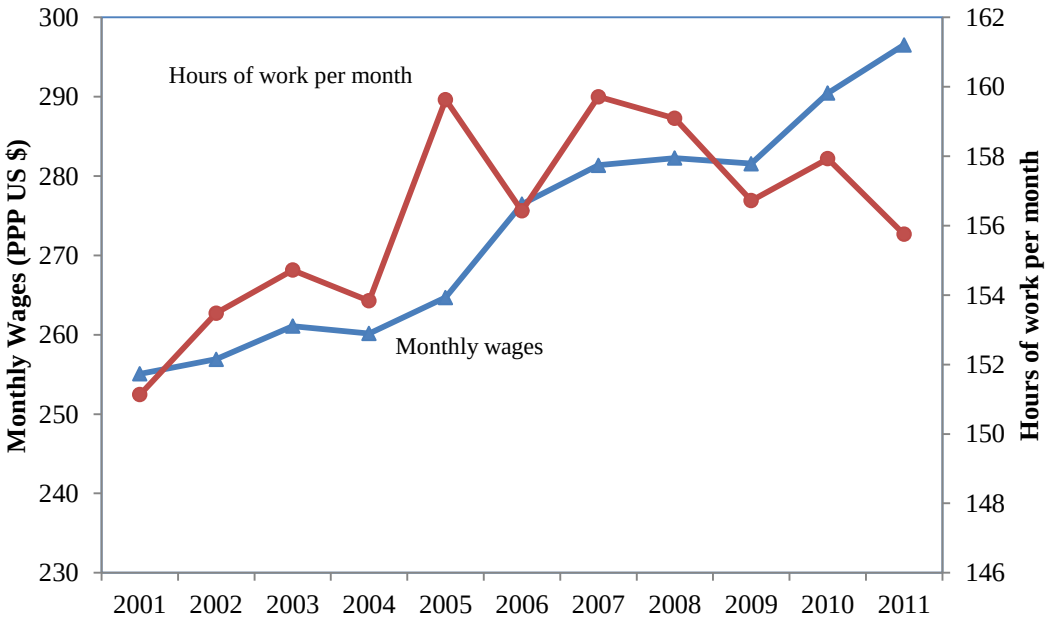
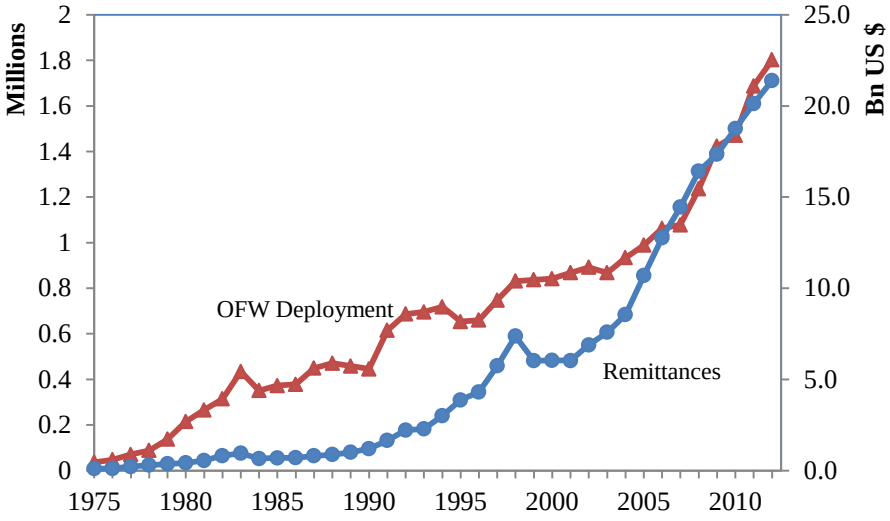


Figure 2.1 Wages and hours of work in the Philippines, 2001-2011



Note: Since data on hours per sector per day is not available as a long time series, I used number of hours worked per month
Data source: Philippine Statistics Authority

Figure 3.1 Filipino overseas migrants and remittances, 1975-2011



Data source: Philippine Statistics Authority

Figure 4.1. Location of the CLV

Source: https://upload.wikimedia.org/

Figure 4.2. Population growth of Cities near the CLV

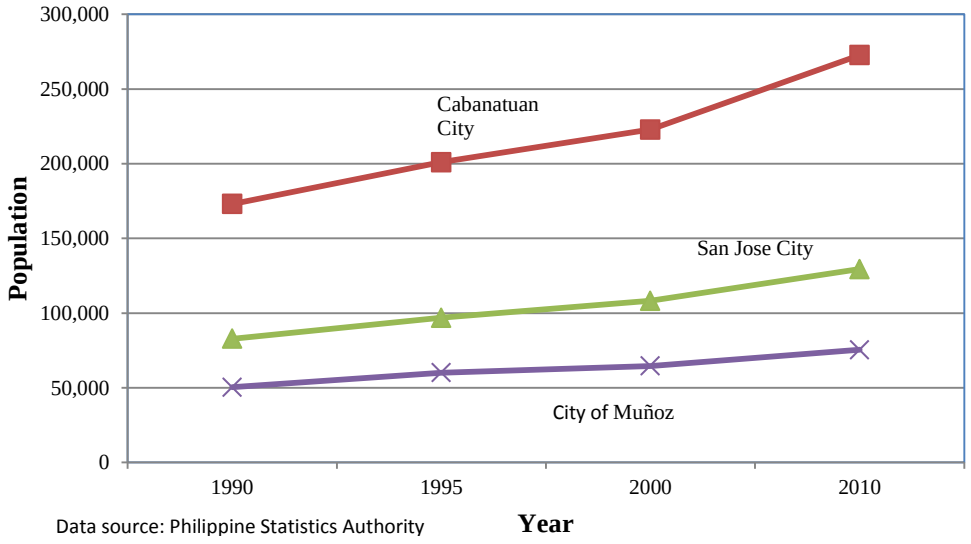
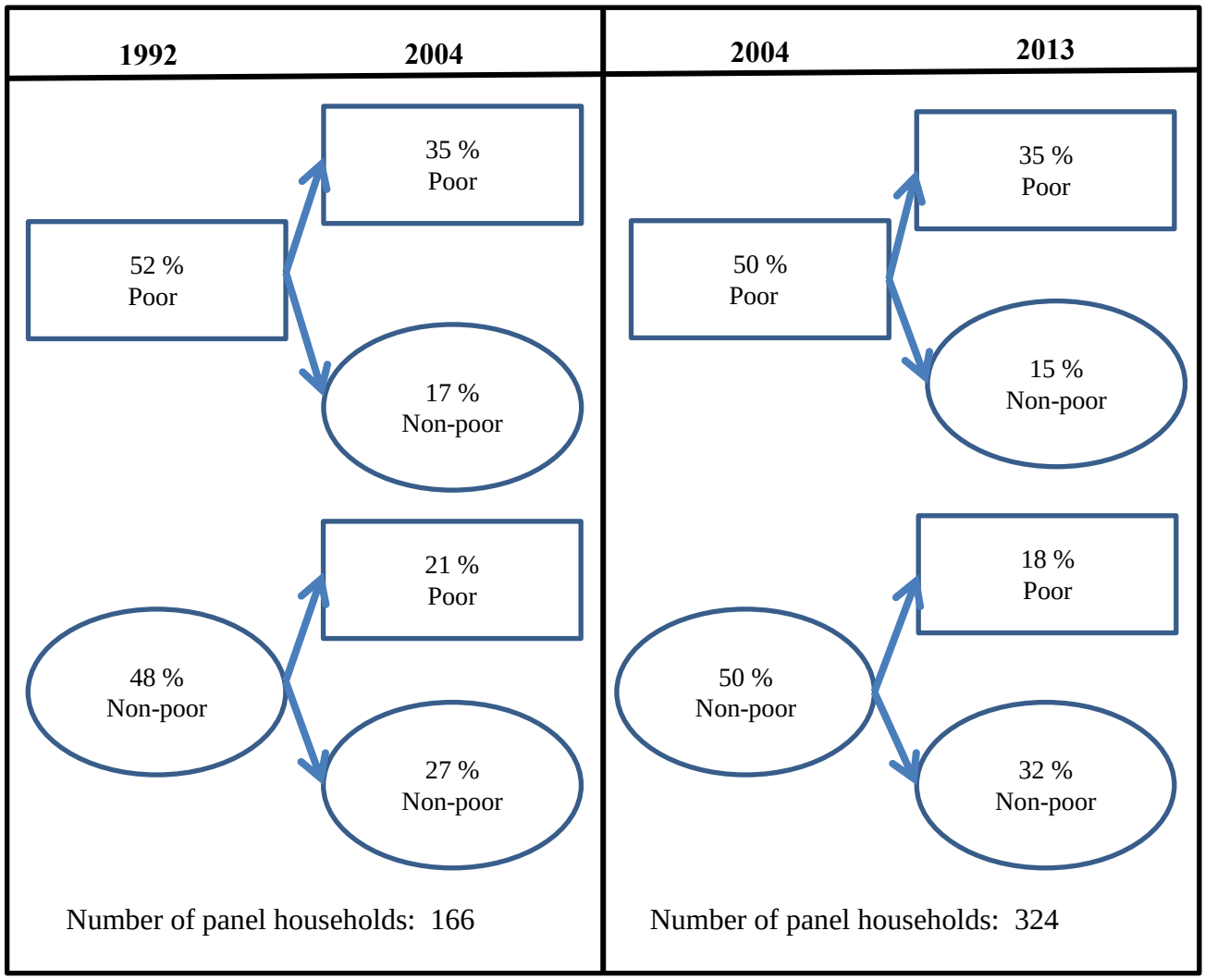
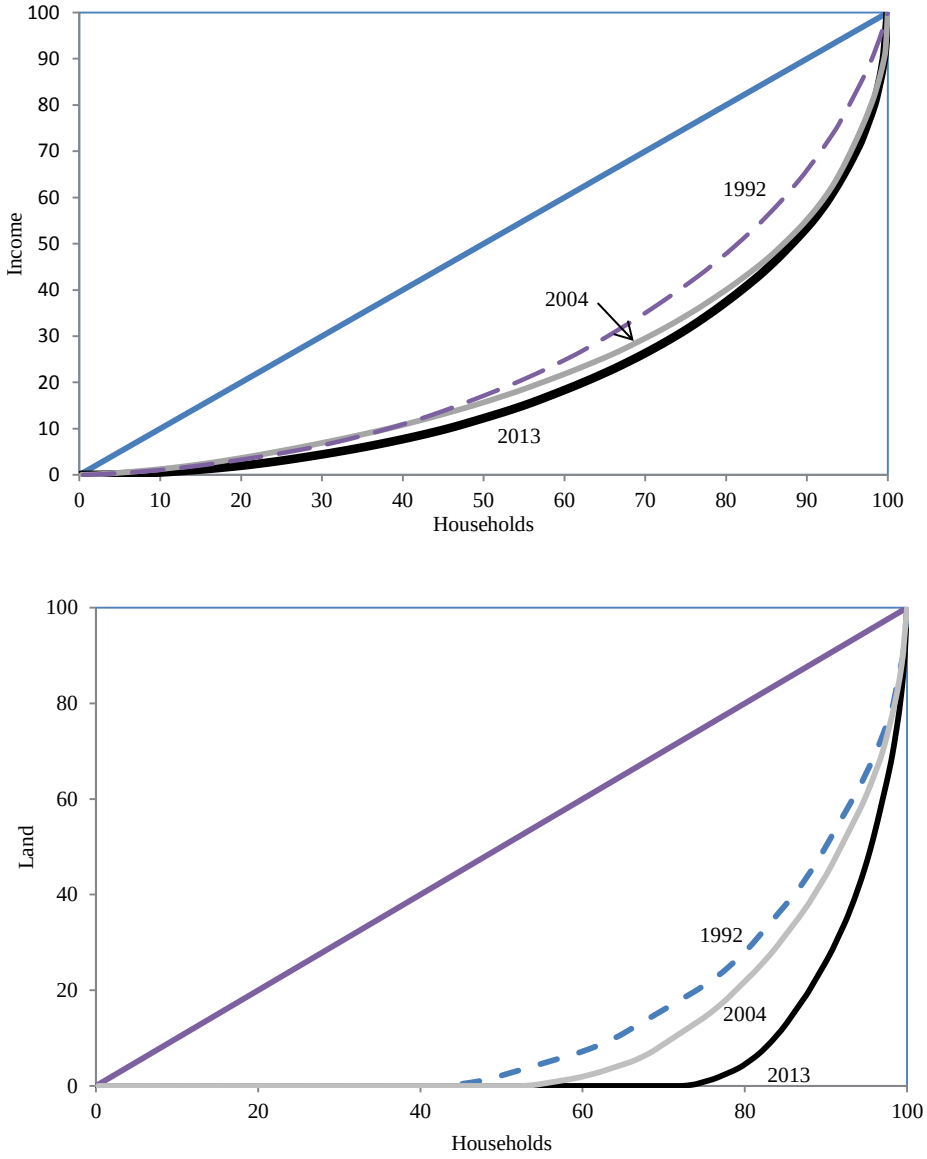


Figure 4.3. Poverty transition in the Central Luzon Village for adjacent survey years



Source: Author's calculations using various CLV datasets

Figure 4.4. Income and Land distribution in the Central Luzon Village, 1992-2013



Source: Author's calculations using various CLV datasets