

INCOME DIVERSIFICATION AND ITS EFFECTS ON HOUSEHOLD
CONSUMPTION: EVIDENCE FROM THE HOUSEHOLD SURVEY IN CAMBODIA

By

PHAY, SOKCHENG

THESIS

Submitted to
KDI School of Public Policy and Management
in partial fulfillment of the requirements
for the degree of

MASTER OF DEVELOPMENT POLICY

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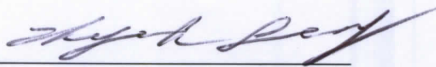
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Committee in charge:

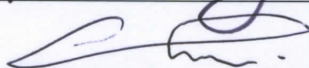
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ABSTRACT

INCOME DIVERSIFICATION AND ITS EFFECTS ON HOUSEHOLD CONSUMPTION: EVIDENCE FROM HOUSEHOLDS SURVEY IN CAMBODIA

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This paper is based on nationally representative household survey data from Cambodia Socio Economic Survey conducted by National Institute of Statistics in 2004, 2007, 2009, and 2011. The primary objective of the study is to explore the main sources of household income, to understand the patterns of income diversification, and the effects on household consumption. Although there are various methods to measure income diversification, we apply Herfindahl index to measure income diversification in this study. The data shows that wage and salary, non-farm activities, and crop production are the three main income sources for Cambodian households during the survey periods. Meanwhile, the key determinants to income diversification are the presence of household head with technical/vocational training, the number of dependents aged from 5-9, the number of male household members aged from 15-64, household head primarily engaged in agriculture, agricultural land ownership, and village shocks (flood/drought) .

Village shocks (flood/drought) in the past five years are used as instrumental variables (IV) to estimate the impacts of income diversification on household consumption per capita. We

find that the income of the poor households tend to be more diversified than that of the rich households. In other words, income diversification is mainly used as a survival strategy rather than the portfolio instrument of asset accumulation. This finding highlights important policy implications on infrastructure development, increases in access to rural credit and market information, and non-farm enterprise development. Policy-makers should put more focus on designing a suitable social safety net to minimize the risks faced by poor and vulnerable households. Furthermore, development of non-farm activities should be aligned with agricultural development since they complement to agricultural income in contributing to smoothing household income and consumption.

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TABLE OF CONTENTS

LIST OF TABLES	iii
LIST OF FIGURE.....	iii
CHAPTER I: INTRODUCTION.....	1
1.1. STATEMENT OF THE PROBLEM	1
1.2. THESIS STATEMENT.....	3
1.3. RESEARCH QUESTIONS.....	6
CHAPTER II: LITERATURE REVIEW	7
CHAPTER III: DATA SOURCES AND DESCRIPTIVE STATISTICS.....	12
CHAPTER IV: METHODOLOGY	15
4.1. MEASUREMENT OF HOUSEHOLD INCOME DIVERSIFICATION.....	15
4.2. ECONOMETRIC MODEL.....	16
CHAPTER V: EMPIRICAL FINDINGS	19
5.1. DESCRIPTIVE RESULTS	19
5.2. ECONOMETRIC RESULTS.....	27
CHAPTERIV: CONCLUSIONS	32
BIBLIOGRAPHY.....	34

LIST OF TABLES

Table 1: Sample Size of CSES.....	12
Table 2: Composition of Household Income	20
Table 3: Growth Rate of Household Income	21
Table 4: Average Income per Capita by Income Quintiles ('000 riels at 2009 prices)	22
Table 5: Patterns of Income Diversification by Household and Geographical Characteristics....	25
Table 6: Descriptive Statistics, 2004-2011	26
Table 7: Determinants of Income Diversification 2004-2011	28
Table 8: Effects of Income Diversification on Consumption per Capita.....	31

LIST OF FIGURE

Figure 1: Income Diversification by Initial Income Quintiles.....	23
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CHAPTER I: INTRODUCTION

1.1. STATEMENT OF THE PROBLEM

In developing countries, household income diversification is a research topic which could barely attract attention from development economists.¹ Very few of them generate income from only one source, thereby income diversification is a distinguish characteristic of rural households.² According to Ellis (1998), “income diversity is defined as a composition of household income in a given time; diversification means an active social process where households are supposed to get involved in portfolio activities increasingly over time.” Meanwhile, livelihood diversification is more than a diversification of portfolio of activities alone; rather it combines social supports which help households to struggle for their survival or to improve their economic condition.³ Despite the given various definitions, the terms will be used interchangeably in this study.

There are a number of studies examining the determinants and impacts of income diversification on household income, poverty, and inequality (Reardon *et al.* (1992), Ellis (1998), Barret *et al.* (2001), Babatunde *et al.* (2009), Sen *et al.* (2010), and Tong *et al.* (2013)). According to literature, factors which influence on diversification can be classified into five main groups: (1) individual and household characteristics (age, gender, education, marital status, household size, and dependent ratio); (2) household farm characteristics (agricultural land, number of cropping per year, value of farm equipment, participation in farm association, access

¹Frank Ellis, “The Determinants of Rural Livelihood Diversification in Developing Countries,” *Journal of Agricultural Economics* 51, no.2 (May 2000): 289.

Raphael O. Babatunde and Matin Quaim, “Patterns of Income Diversification in Rural Nigeria: Determinants and Impacts,” *Quarterly Journal of International Agriculture* 48, no.4 (2009): 305.

²Ibid., 290.

³Frank Ellis, “Household Strategies and Rural Livelihood Diversification,” *Journal of Development Studies* 35, no.1 (1998): 4, <http://www.informaworld.com/smpp/title~content=t713395137>.

to agricultural extension services, and access to irrigation system); (3) location (access to main road, access to electricity, and distance from markets or towns); (4) market constraints (market information and provision of affordable credit scheme); and (5) risk (variation of returns from different economic activities).⁴ The literature also explains income diversification as a risk reduction approach—responding to household income shocks and asset accumulation strategies. It suggests that there are two main motivations for households to approach income diversification. ‘Desperate led-diversification’ approach is perceived by poor groups to relax consumption during a period of crisis or income shocks, while ‘opportunity led diversification’ approach is when the rich collect more income sources to increase their income and consumption during certain occasions.⁵ Since causes and effects of income diversification vary across time, geographical areas, social conditions, and household characteristics, the discussion on the perception to livelihood diversification is still ongoing.

Patterns, determinants, and roles of income diversification in Cambodia can be found in very few studies such as Chan and Acharya (2002), Fitzgerald and So (2007), and Tong and Phay (2013), where sample size is relatively small and unable to represent the aspects of income diversification as a whole. That is why in our study, we use Cambodia Socio-Economic Survey to gain a better understanding of the nature of income diversification in Cambodia. Our primary objective is to contribute a more powerful empirical literature whether income portfolio is able to relax the economic stress and/or increase the household livelihood. Moreover, we also look into the patterns and driving factors of income diversification.

⁴Tong Kimsun and Phay Sokcheng, “Role of Income Diversification during the Global Financial Crisis: Evidence from Nine Villages in Cambodia,” Working paper 78 (2013), Phnom Penh: CDRI, 4.

⁵Jann Lay, Ulf Narloch and Toman O. Mahmoud, “Shocks, Structural Change, and the Patterns of Income Diversification in Burkina Faso,” *African Development Review* 21, no.1 (2009), 13.

1.2. THESIS STATEMENT

“Income diversification is one of the most common aspects of risk management and coping strategies for people in developing countries.”⁶ The poor are likely to be affected the most by external shocks and face unpredictable risks because they do not have enough means or assets to protect themselves from adverse income and employment shocks, agricultural seasonality, and natural disasters. Then income diversification is expected to be an effective strategy that most rural people could rely on in order to handle with livelihood vulnerability.

There are various studies focusing on factors that explain income diversification as “risk reduction strategies, responses to household shocks, and asset accumulation.”⁷ As far as it is concerned, people would try to gather income from different means in the unstable employment market during the recession, so that they would not face severe impacts from unfavorable moments such as employment uncertainty, unstable wage rate, and price fluctuation. On the one hand, when facing with sudden shocks such as loss of employment, loss or sickness of family members, households would turn to earn income from as many sources as possible in order to maintain the household’s living condition. On the other hand, from the point of view of economies of scope in production, household would choose to diversify their income sources in order to reach profit maximization as long as they can utilize the same amount of resources. This means diversifying income portfolio is a favorable strategy for all households regardless of their conditions. For these reasons, discussion on this matter remains inconclusive whether this strategy should be promoted to the rich or the poor/disadvantaged people. Analyzing based on

⁶Frank Ellis, “Household Strategies and Rural Livelihood Diversification,” 5.

⁷Raphael O. Babatunde and Matin Quaim, “Patterns of Income Diversification in Rural Nigeria: Determinants and Impacts,” 306.

Ralitza Dimova and Kunal Sen, “Is Household Income Diversification a Means of Survival or a Means of Accumulation? Panel Data Evidence from Tanzania”, Working Paper 122 (2010), Manchester, Brooks World Poverty Institute: University of Manchester, 2.

household survey data, we will take a closer look at which motivation is applicable and to what extent income diversification can help Cambodian households to sustain or improve their livelihood.

According to literature, households diversify income sources for several reasons: to generate more income when the substantial resource is unreliable, to maintain income when facing with market shortfall, to exploit available resources from various means, and to earn more income in cash or in-kind for farm production once access to credit is limited.⁸ These causes are grouped as “push” and “pull” factors. Among the push factors, income diversification could be a result of “ex-ante risk reduction”, “ex-post risk coping”, response to crisis, liquidity constraints, low returns from agriculture, and agricultural seasonality.⁹ These factors force poorest households, with little hope to cope with risk and vulnerability, to diversify their income sources. Pull factors include “complementarities between income activities such as crop livestock integration, new market opportunities, infrastructure development, and diversification for asset accumulation”¹⁰ These factors encourage rich households to pursue for more income sources, taken as an incentive to improve their economic condition.

One aspect of the household income diversification has been recognized as a matter of necessity and survival due to household poverty. It explains that diversifying income is critical for poor people because they are lack of productive assets and landholdings, and asteriated to credit service or insurance scheme, which cause them to be vulnerable to “external shocks” such as income uncertainty and seasonality.¹¹ Another aspect views income diversification as a matter

⁸Ralitza Dimova and Kunal Sen, “Is Household Income Diversification a Means of Survival or a Means of Accumulation? Panel Data Evidence from Tanzania,” 5.

⁹Ibid., 6.

¹⁰Ibid.

¹¹Raphael O. Babatunde and Matin Quaim, “Patterns of Income Diversification in Rural Nigeria: Determinants and Impacts,” 315.

of choice and opportunity in order to improve their living standards. It suggests that rich households seem to have higher level of diversification than the poor due to “skill and education limits.”¹² Capacity to diversify income sources signifies an improvement in the livelihood security and income-increasing capacities of rural households.¹³ Moreover, the rich are more potential to maximize their income sources due to entry barriers of the poor (skilled labor, initial investment, and access to land) to farm and non-farm activities. Therefore, “Income diversification is not only a risk management strategy, nor simply a response to shrinking farm land availability; but also it is a means of income accumulation.”¹⁴

Both arguments are based on clear theoretical literature, supporting income diversification as survival and accumulation approach. This paper does not intend to resolve this discussion; yet we plan to add more empirical evidence to the existing literature. Basically, we are going to investigate which factors and household characteristics that determine income diversification for households in Cambodia and on which point of view that Cambodian households stand.

¹²Ibid., 318.

¹³Frank Ellis, “Household Strategies and Rural Livelihood Diversification,” 10.

¹⁴Raphael O. Babatunde and Matin Quaim, “Patterns of Income Diversification in Rural Nigeria: Determinants and Impacts,” 318.

1.3. RESEARCH QUESTIONS

The following questions are going to be explored in this research project:

- What are the main income sources in Cambodia?
- What are the determinants of income diversification for Cambodian households?
- What are the impacts of diversification on household consumption?

The paper is divided as follow. Section 2 views some significant literature of key determinants and impacts of income diversification. Section 3 describes household survey data, while Section 4 explains our proposed methodologies. Subsequently, Section 5 illustrates empirical findings and Section 6 draws conclusions and policy implications.

CHAPTER II: LITERATURE REVIEW

Cambodia has experienced a high economic growth of an annual GDP growth of two digits in average from 2004 to 2011, except in 2009 when it dropped to only 0.1 percent due to global financial crisis. At the same time, national poverty rate has gradually reduced from 53.2 percent in 2004 to 20.5 percent in 2011.¹⁵ As a result, its growth is narrowly based on four main sectors including agriculture, construction, garment, and tourism, which simply means that the country is vulnerable and prone to external shocks and crisis.¹⁶ At the same time, there were also undesirable phenomena which were seen as barriers to economic development and poverty reduction. In the beginning, there was a high increase in commodity price and energy in 2007-2008, following by the global financial crisis in 2009, which severely affected on the already fragile economy. Consequently, poverty headcount increased from 1 percentage point to 4 percentage points during 2007-08.¹⁷ There was also a massive flood across the country in 2011, especially in rural areas. As a result, basic infrastructure, rural road, and agricultural production were destroyed in a huge amount—the estimation of loss was around 12 million USD.

It is assumed that households are desperately looking for different income sources to sustain their livelihood in order to respond to this income shortfall. There are few studies using household survey to examine the key factors of income diversification and its roles in poverty alleviation in Cambodia.

Chan and Acharya (2002) study on “Facing the challenges of rural households: a Perspective from nine villages in Cambodia”, using a panel survey in 1997/1998 and 2001. The

¹⁵“World Bank data,” last modified 16 September 2013, <http://data.worldbank.org/country/cambodia>.

¹⁶Hem Sochet, “Impacts of Global Financial Crisis on the Cambodian Economy at Macro and Sectoral Level,” Working paper 72 (2013), Phnom Penh: CDRI, 3.

¹⁷World Bank, “Poverty Profile and Trends in Cambodia: Findings from the 2007 Cambodia Socio-Economy Survey,” *Washington, DC: World Bank* (2009), 5.

study highlights that crop production and wage labor are two primary income sources in rural sample villages. In addition, income from common property resources keeps decreasing due to over-exploitation.¹⁸

A study by Fitzgerald and So (2007) on Moving out of poverty: Trends in community well-being and household mobility in nine Cambodian villages, using panel data in 1997, 2001, and 2004 suggests that agriculture is the most important income source, following self-employment and selling labor. The rich are more engaged in self-employment, while the poor households rely more on wage labor. Household head gender and land ownership are significant factors contributing to income diversification in rural Cambodia. It also confirms that better off groups are able to diversify their income sources more than their counterparts due to limitation of affordable rural credit.¹⁹

A study by Tong and Phay (2013) on roles of income diversification during global financial crisis provides more empirical work by using panel data from nine rural villages (2001, 2003/4, 2008, and 2011)—a follow up survey from Fitzgerald and So (2007). The study shows that male headed household, household whose main occupation engaged in agriculture, asset ownership, and agricultural land are the key determinants for households to search for multiple occupations. Income diversification is seen as asset accumulation strategy exploited by rich households during the crisis.²⁰

In addition, there are several similar studies on the field of income diversification in many developing countries which would help to deepen our understanding of this topic. Reardon,

¹⁸Chan Sophal and Sarthi Acharya, “Facing the Challenge of Rural Livelihoods a Perspective from Nine Villages in Cambodia,” Working paper 25 (2002), Phnom Penh: CDRI, 51-61.

¹⁹Ingrid FitzGerald and So Sovannarith: Moving out of Poverty: Trends in Community Well-Being and Household Mobility in Nine Cambodian Villages (Phnom Penh: CDRI publication, 2007), 23-83.

²⁰Tong Kimsun and Phay Sokcheng, “Roles of Income Diversification during the Global Financial Crisis: Evidence from Nine Villages in Cambodia,”1-18.

Delgado, and Matlon (1992) study determinants and the effects of income diversification in Burkina Faso of 150 surveyed households in three different agro-ecological areas. Two regression models have been used in this study. Firstly, level regression was applied to measure levels of income diversification by calculating the share of non-farm income, total net income, and consumption as a function of income. Secondly, variation regression has been tested to estimate inter year variability against average income level, household resource endowment, and crop yield. The result suggests the important “push” factor including agriculture failure and “pull” factors such as trade availability to be a motivation of income diversification. Land has no significant relationship with income diversification which is contrast to the finding in the Asian contexts, while wealth has positive correlation as a driving factor to the variation.²¹

Dickson (2000) in his Ph. D dissertation focuses his study on household livelihood diversification and its effects on poverty. In this study, he uses panel data of 1014 surveyed households in Uganda for two periods; 1992 and 1999/2000. His main argument is whether wealth accumulation is the driving force for households to diversify income portfolios or income diversification could help households to relax from chronic poverty. The report suggests that poverty might push households to earn income from different sources in order to secure their consumption, while the other households might utilize their existing assets to accumulate more wealth. He finds that varying income sources does have positive impacts on households’ welfare as well as poverty reduction. Household size, education attainment, welfare of the household, household head age, and sex are proposed to be significant determinants of income diversification in rural Uganda.

Barrett, Bezuneh, and Aboud (2001) study on income diversification, poverty traps and policy shocks in Cote d’Ivoire and Kenya by using longitudinal data for macro policy shocks and

²¹Ibid., 264-296.

devaluation of currency, and cross-sectional data for local policy shocks. Besides descriptive analysis, Multinomial Logit Estimation (MLE) is employed for more in-depth analysis. The study reports that income diversification involves more in non-farm activities which is associated with high skilled work and self-employment. That is why poor households could not gain benefits from opportunities ahead. Moreover, skills, social network, and capital market could help small households to overcome with entry barriers (land endowment and initial investment on inputs).²²

Raphael and Matin (2009) use cross sectional household data in 2006 to study structures of income sources and factors of income diversification in north central Nigeria. In this study, income diversification is measured by an “income based approach” measuring number of income sources, share of off farm income to total income, and “herfindahl diversification index.” The findings suggest that farming is a predominant income source for poor households, while non-farm and self-employment are main occupation for wealthy households. Most importantly, better off households enjoy diversifying income sources more than those in other household groups.²³

The study of Lay, Narloch, and Mahmoud (2009) examine the patterns of income diversification of farm households in rural Burkina Faso by using cross sectional household survey in 1994, 1998, and 2003. Income diversification matrix and multivariate probit model are applied in this study. Results confirm that non-farm income becomes increasing opportunity-led, while desperate households decide to migrate to nearby town or other urban areas. The existence of entry barriers (skilled labor, land endowment, and initial investment on inputs) prevents poor

²²Christopher B. Barret, Mesfin Bezuneh and Abdillahi Aboud, “Income Diversification, Poverty Traps and Policy Shocks in Cote d’Ivoire and Kenya,” *Food Policy* 26, no.4 (2001a), 367-384.

²³Raphael O. Babatunde and Matin Quaim, “Patterns of Income Diversification in Rural Nigeria: Determinants and Impacts,” 305-320.

households from diversifying income sources, whereas rich households could gain benefit from farming income.²⁴

To the best of my knowledge, all of existing studies which address income diversification issues in Cambodia are based on a very small sample size—that is extremely difficult to generalize their findings. Therefore, our study which utilizes nationally representative household survey data is expected to provide broader view of the key determinants of income diversification and its impacts on household consumption with expectation to identify the key constraints and to draw some policy implications relevant to income diversification in Cambodia.

²⁴Jann Lay, Ulf Narloch and Toman O. Mahmoud, “Shocks, Structural Change, and the Patterns of Income Diversification in Burkina Faso,” 36-58.

CHAPTER III: DATA SOURCES AND DESCRIPTIVE STATISTICS

The analysis of this study is based on Cambodia Socio-Economic Survey (CSES) data in 2004, 2007, 2009, and 2011. These study periods have captured certain important events that had significant impacts on Cambodian economy such as oil and food price increase in 2008, global financial and economic downturn in 2009 and the server flood across the country in 2011.

CSES captures information on eight important areas: demographic characteristics, housing condition, agricultural activities, education, labor force, health and nutrition, vulnerability, victimization, and household income and consumption.

The sample is selected in three stages. In stage one, sample villages are randomly selected. In stage two, an Enumeration Area (EA) is randomly selected from each village selected in stage one. The last stage is the selection of household sample from each EA selected in the stage two. The sampling frame of villages was stratified by province, urban, and rural areas. The total sample size is divided into two: one sample size for urban villages and the other for rural villages. The calculation of the sample sizes for urban and rural areas is done using the proportion of consumption in the two parts of the population.²⁵

Table 1: Sample Size of CSES

Sample	2004	2007	2009	2011
Urban	2994	1195	2385	1355
Rural	11990	2398	9586	2237
Total	14984	3593	11971	3592

Source: CSES 2004, 2007, 2009, 2011

²⁵“National Institute of Statistics: Ministry of Planning,” <http://www.nis.gov.kh>.

Explanatory variables:

- Gender of household head: Male and female, by nature, virtually have unequal participation in specific income opportunities. Male might be more productive in manual work, while female is more active in other non-farm activities such as in food processing or petty trade. Therefore, it also affects on patterns and diversity of income earning.
- Education of household head classified in specific levels: It is widely accepted that education is a great asset for households to obtain potential income opportunities besides doing farm works. Household head with higher education might also prefer to have a specific well paid job.
- Age of household head: Age is determined as years of experience of household head in income earning. Older age household head may accumulate more experiences in particular activities, while younger age one needs to spend time learning it.
- Main occupation of household head: Occupations in agriculture contain unique patterns of income diversification. They are cropping, raising livestock, and fishing. Farming is a seasonal work which allows households to get involved in other off-farm and non-farm activities.
- Household size: Household size can be categorized into two groups; dependents and active members. Large household has many active members to work and many mouths to feed. It also reflects the high diversity of income sources for individual household.
- Household member: household members aged less than 15 and over 64 years old are defined as dependent. Households with many dependents put heavy responsibility on active members in taking care of household welfare; hence more assured income sources are needed for food security. Meanwhile, household members aged between 15 and 64 are defined as active members who could contribute to household income. Besides agricultural work, some active

members might take non-farm activities or migrate elsewhere either in the country or abroad/at the border.

- Agricultural land ownership: Land is a factor of production for agrarian households. However, small land holders or near landless households would have little opportunity to gain benefit from agricultural activities. Therefore, they tend to take part in all kinds of economic activities that are available for them.

CHAPTER IV: METHODOLOGY

4.1. MEASUREMENT OF HOUSEHOLD INCOME DIVERSIFICATION

There are various approaches to measures household income diversification across literatures. Broadly speaking, income diversification is measured by two main approaches: (i) income based approach takes into account the number of income sources in which household members participate, share of off farm income, and Herfindahl index; and (ii) asset based approach examines diversification behavior focused on household's asset endowment. Unfortunately, off farm income is very challenging to measure due to geographical differences of job location (rural and urban areas), and an inaccuracy in calculating the actual amount of income. In addition, counting number of income sources is very arbitrary if there is a different definition given to each category.²⁶

Among these many proposed ways to measure income diversification, Herfindahl index is recognized to be more accurate than other measures because it does not need additional assumptions on grouping households into different income categories.²⁷ The index was originally constructed to measure the degree of industrial concentration in the industrial literature review. It can be calculated as the sum of squares of income shares from each income source, and the

²⁶Raphael O. Babatunde and Matin Quaim, "Patterns of Income Diversification in Rural Nigeria: Determinants and Impacts," 308-310.

Christoper B. Barret, Mesfin Bezuneh and Abdillahi Aboud, "Determinants and Effects of Income Diversification amongst Farm Households in Burkina Faso," 7.

²⁷Ralitzia Dimova and Kunal Sen, "Is Household Income Diversification a Means of Survival or a Means of Accumulation? Panel Data Evidence from Tanzania," 10.

increasing value of index means the less diversification of income sources.²⁸ This approach will be taken for analysis in the study on income diversification in Cambodia.

In our analysis, income sources are categorized into income from salary and wage, crop production, livestock, fishing and aquaculture, non-agriculture, and income from other sources. Salary and wage are incomes from off farm work, exchange labor, civil servant, and employee. Income from crop production includes paddy, home gardening, fruit, vegetable (imputed consumption and cash from production sold). Income from fishing and aquaculture is taken into account both natural inland fish and farm raised aquatics. Non-agricultural income are those from petty trade, own business, handicraft, and the like. Lastly, there are other income sources such as pension, rental, local and international remittances, scholarship, and assistance from NGOs etc.²⁹

4.2. ECONOMETRIC MODEL

In this study, our main focus is the impacts of income diversification on household consumption. We use the following regression model:

$$C_i = \alpha H_i + \beta X_i + a_i + v_i \quad (1)$$

where C_i is per capita consumption for household i

H_i is income diversification index

²⁸Lire Ersado, "Income diversification in Zimbabwe: Welfare Implications from Urban and Rural Areas," Discussion paper 152 (2003), International Food Policy Research Institute: Washington, D.C. USA, 4-5.

²⁹Frank Ellis, "Household Strategies and Rural Livelihood Diversification," 5.

X_i is explanatory variables which represent the characteristics of household head such as gender, age, education, household marital status, household size, dependency, agricultural land, and regions

v_i is as a random error term

α, β are the parameters to be estimated

It is often assumed that income diversification is an endogenous variable because it can be correlated with a household's ability or risk perception which is unobservable.³⁰ In order to address the problem of endogeneity, as suggested in the literature, we adopt Instrumental Variables (IV) approach. This approach requires other observable variables Z_i , which is not in equation (1) that satisfies two conditions: (a) Z_i must be uncorrelated with C_i ; (b) Z_i must have a relationship with H_i . The correlation between H_i and Z_i can be tested by estimating the simple regression as

$$H_i = \varphi X_i + \theta Z_i + b_i + u_i \quad (2)$$

Existing studies use different types of village level shocks (e.g. refugee inflow, natural disaster), rainfall variability over the past year, and the death of working member(s) of the household in the past year as instrumental variables given the reasons that these variables will cause income shock and impact on decision to diversify income sources but have no direct effect on present consumption or poverty status.³¹ In our study, we take a village shocks (disaster-

³⁰Lire Ersado, "Income diversification before and after economic shocks: evidence from urban and rural Zimbabwe," 8-9.

Ralitza Dimova and Kunal Sen, "Is Household Income Diversification a Means of Survival or a Means of Accumulation? Panel Data Evidence from Tanzania," 12-13.

³¹Ibid, 12-13.

Raphael O. Babatunde and Matin Quaim, "Patterns of Income Diversification in Rural Nigeria: Determinants and Impacts," 315.

flood/drought in the village during the past five years) as instrumental variables. Equations (1) and (2) are simultaneously estimated by using “ivregress” command of Stata.

CHAPTER V: EMPIRICAL FINDINGS

5.1. DESCRIPTIVE RESULTS

Table 2 presents composition of household income from 2004 to 2011. Wage and salary, non-agriculture, crop production, and income from other sources are the main household income earning activities. Share of wage and salary has increased over time from 24.30 percent in 2004 to 33.71 percent in 2011, though there is a slight decrease in 2009 due to external financial shock. Non-agriculture income contributes 27 percent in 2004 to 34 percent in 2009 to total household income. However, the proportion suddenly drops to 25 percent in 2011. Other incomes from various sources take a significant share of 21 percent to household income in 2004. But the share keeps decreasing gradually to 15 percent in 2011. Crop production has increased its share to around 10 percent in 2004 and 15 percent in 2011 thanks to high increase of food commodities and the implementation of rice exporting policy which might has encouraged farm production through market demand. Yet, the share remains relatively small compared with that of other income sources. Incomes from livestock production, fish and aquaculture, forest and hunting have decreased its share to total household income significantly during the study periods.

Table 2: Composition of Household Income

Shares of Income source (%)	2004	2007	2009	2011
Wage and salary	24.30	28.06	25.53	33.71
Crop production	09.57	13.84	13.67	15.28
Livestock production	08.36	05.26	04.01	04.29
Fish and aquaculture	04.06	03.13	02.60	01.85
Forest and hunting	05.68	04.83	03.96	04.22
Non-agriculture	26.97	27.94	33.86	25.53
Other sources	21.07	16.93	16.36	15.12
Total Income	100.00	100.00	100.00	100.00

Note: Household sampling weight is applied

Source: Author's calculation based on CSES 2004, 2007, 2009, and 2011

Growth rate of each income source in Table 3 will give more precise information of which income source is vulnerable to external shocks. Incomes from wage and salary and crop production have increase significantly by 48 percent and 85 percent respectively in 2007. Income from almost all other sources except from non-agriculture income registers negative growth rate of two digits in 2009. Non-agriculture income, mainly from small petty trade and self-employment, manages to sustain itself from negative growth in 2009. The income source is supposed to support basic need of local people. By looking at growth rate of all economic activities in 2011, it is assumed that the economy starts to resume back to its original activities like in the period before the crisis.

Table 3: Growth Rate of Household Income

Growth rate (%)	2007	2009	2011
Wage and salary	48.00	-21.71	63.01
Crop production	85.47	-15.00	38.00
Livestock production	-19.34	-34.40	31.92
Fish and aquaculture	-01.12	-28.43	-12.06
Forest and hunting	08.99	-29.51	31.73
Non-agriculture	32.82	04.26	-06.91
Other sources	03.02	-16.86	14.12
Total Income	28.19	-13.96	23.47

Note: Household sampling weight is applied

Source: Author's calculation based on CSES 2004, 2007, 2009, and 2011

Table 4 presents an absolute value of average per capita monthly income by income quintiles (1= lowest income group, 5= highest income group). Per capita income from all household groups has grown significantly from 2004 to 2011. In general view, people could reap benefit from economic development and improve their living standard. However, the fruit of growth has not been proportionately distributed to its citizens—the second quintile households are likely to get the least, while the fourth quintile households receive the most benefit from the economic growth during the study periods. According to the table, average income per capita in the first quintile is only one third of those in the fifth quintile. During the most difficult time, the poor are affected the most with a negative growth of 27.48 percent, while the rich have their income drop by 13.88 percent in 2009.

Table 4: Average Income per Capita by Income Quintiles ('000 riels at 2009 prices)

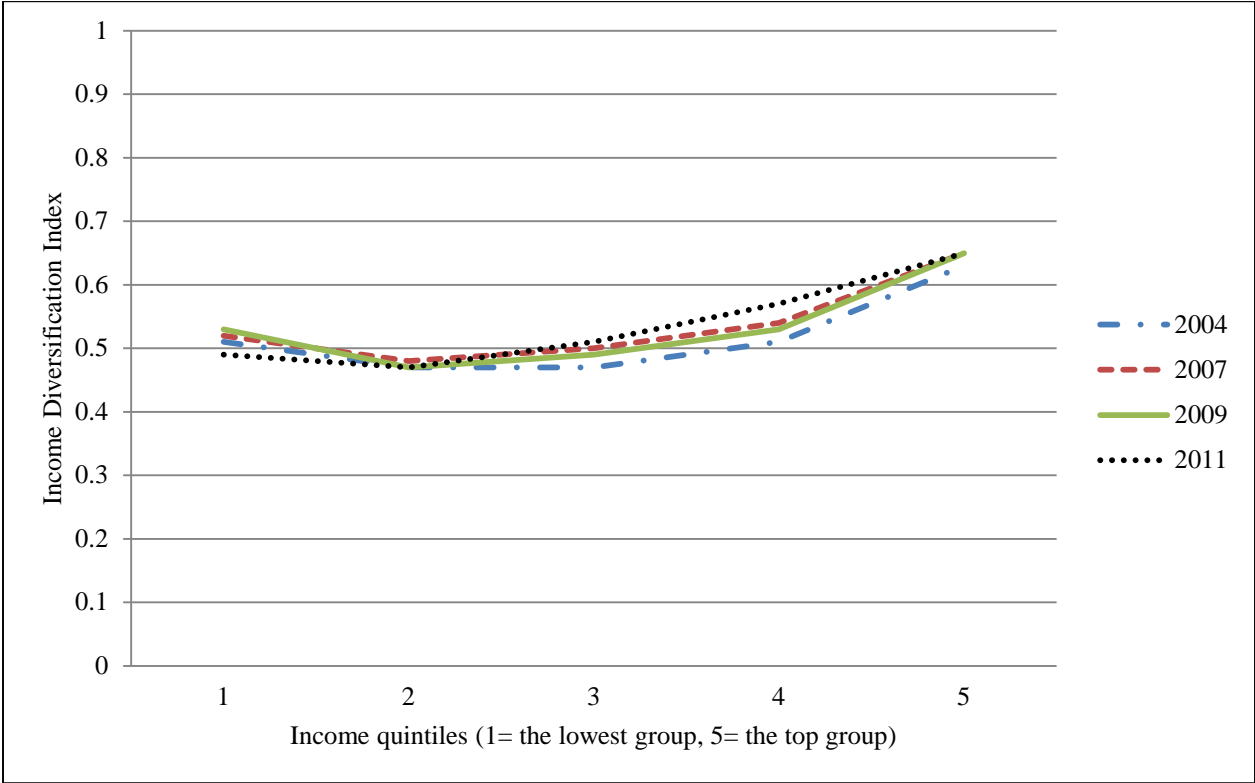
Total Income	2004	2007	2009	2011
Quintile 1	115.59	149.14	108.16	170.42
Quintile 2	137.54	170.08	124.49	182.93
Quintile 3	149.46	201.45	137.35	217.84
Quintile 4	165.35	289.05	201.51	327.36
Quintile 5	338.24	481.42	414.59	426.91
Growth rate (%)	2007	2009	2011	2004-2011
Quintile 1	29.03	-27.48	57.56	47.43
Quintile 2	23.66	-26.81	46.94	33.00
Quintile 3	34.79	-31.82	58.6	45.75
Quintile 4	74.81	-30.29	62.45	97.98
Quintile 5	42.33	-13.88	2.97	26.22

Note: Household sampling weight is applied

Source: Author's calculation based on CSES 2004, 2007, 2009, and 2011

Figure 1 plots income diversification index against income quintiles. Households in the first, second, and third quintile are the most diversified income group, given advantages of existing productive resources including assets and livestock. Meanwhile, households in the top quintile gain benefit from income specialization since they are already engaged in a high returned work and it is more beneficial for them to expand on a specific work which is relatively more productive. On the other hand, households in the lowest quintile is observed to struggle to diversify their income showing from little growth rate of diversification index over the years.

Figure 1: Income Diversification by Initial Income Quintiles



Note: Household sampling weight is applied
 Source: Author’s calculation based on CSES 2004, 2007, 2009, and 2011

Table 5 indicates variation of diversification index with household and geographical characteristics. It shows male-headed households, married household heads, dependency ratio (more than 50 percent), household heads who primarily engaged in agriculture activities, and households who reside in rural area tend to diversify income sources more than their counterparts. In the context of Cambodia, rural households are likely to diversify their income than households in the urban area, which is consistent with the study of Ersado (2005), mentioning the higher degree of diversification of rural household and the strong negative correlation between urbanization and income diversification.³² However, age of household head does not contribute much to the difference of income diversification. More interestingly, household heads obtaining higher education tend to diversify their income less and prefer income specialization. Compared to non-land households, households possessing land less than one hectare have to vary their income sources intensively. In general, Herfindahl index did not vary much over the years; it seems to remain stable with a moderate level of diversification.

³²Lire Ersado, "Income Diversification Before and After Economic Shocks: Evidence from Urban and Rural Zimbabwe," 13.

Table 5: Patterns of Income Diversification by Household and Geographical Characteristics

Variables	2004	2007	2009	2011
HH head gender				
Male	0.50	0.51	0.52	0.53
Female	0.55	0.56	0.56	0.57
HH head age				
<34	0.49	0.50	0.52	0.54
35-50	0.51	0.53	0.53	0.54
>50	0.52	0.52	0.53	0.54
HH head marital status				
Married/Live together	0.50	0.52	0.52	0.53
Divorced/Separated	0.54	0.59	0.58	0.56
Window	0.54	0.54	0.55	0.57
Never married	0.54	0.55	0.66	0.56
HH head educational attainment				
No formal schooling	0.49	0.50	0.50	0.49
Primary incomplete	0.49	0.49	0.51	0.51
Primary complete	0.54	0.56	0.56	0.57
Lower secondary	0.60	0.62	0.62	0.64
Upper secondary	0.65	0.73	0.74	0.70
Technical/vocational	0.61	0.67	0.66	0.61
University	0.76	0.81	0.81	0.83
HH head main occupation				
Agriculture	0.43	0.44	0.45	0.45
Industry	0.54	0.57	0.57	0.57
Services	0.62	0.67	0.65	0.67
Dependency				
0	0.54	0.57	0.57	0.57
< 50%	0.51	0.52	0.52	0.53
> 50%	0.49	0.49	0.51	0.51
Agriculture land				
no-land	0.72	0.75	0.74	0.75
<1 ha	0.46	0.47	0.47	0.47
1-2 ha	0.41	0.42	0.43	0.42
2-3 ha	0.40	0.42	0.43	0.43
>=3 ha	0.42	0.46	0.45	0.45
Region				
Urban	0.70	0.71	0.76	0.77
Rural	0.47	0.48	0.48	0.48
Total	0.51	0.52	0.53	0.54

Note: Household sampling weight is applied

Source: Author's calculation based on CSES 2004, 2007, 2009, and 2011

Table 6 illustrates descriptive statistics of explanatory variables from 2004 to 2011. In general, there is no much variation among demographic variables across the study periods. The large proportion of sample household is led by male and engaged in agricultural activities. Household size and agricultural landholding remain stable with an average of 5 members and 1.4 hectare per household, respectively. Importantly, villages that experienced weather shocks i.e. flood or drought in the last 5 years are high with a decline trend throughout the years.

Table 6: Descriptive Statistics, 2004-2011

	2004	2007	2009	2011
HHH gender (1=male)	0.78	0.81	0.78	0.77
HHH education (1= incomplete primary)	0.29	0.21	0.25	0.20
HHH age (years)	45.04	43.68	45.54	46.68
HHH marital status (1=married)	0.79	0.82	0.79	0.78
HHH occupation (1=agriculture)	0.59	0.58	0.59	0.58
HH size	4.98	4.86	4.77	4.52
Children aged 0-4	0.48	0.49	0.47	0.42
Children aged 5-9	0.59	0.57	0.52	0.47
Children aged 10-14	0.72	0.63	0.54	0.48
Adults aged 15-64 (male)	1.39	1.43	1.44	1.37
Adults aged 15-64 (female)	1.59	1.57	1.59	1.55
Adults aged 65+	0.21	0.17	0.22	0.22
Agricultural land (ha)	1.36	1.42	1.36	1.33
Village shocks in the last 5 years (1=yes)	0.84	0.74	0.64	0.60

Note: Household sampling weight is applied

Source: Author's calculation based on CSES 2004, 2007, 2009, and 2011

5.2. ECONOMETRIC RESULTS

Table 7 presents the results for equation (2), where key independent variables explain determinants of Herfindahl diversification index. The results from OLS estimation of each cross section and pooled data suggest that household heads who engaged mainly in industrial and service sector and households in fourth and fifth quintiles are positively associated with income diversification index—meaning those households would be less diversified their income sources than their counterparts. Household head educational attainment, agricultural landholding, and ecological zone play an important role in diversifying household income sources. Household heads who have technical or vocational training, households with agricultural landholding more than 1 hectare, and households reside in coastal and rural area are likely to be diversified than other groups. There is a great diversification among households with land holdings over a certain level—implying that there is an inverse U-shape relationship between land holding and income diversification. Importantly, we have confirmed that household perception to risks such as natural disasters (flood/drought) and other external shocks tend to be the key factors for households to thrive for various income sources. Most importantly, rural households in Cambodia seem to have higher degree of income portfolio than those in urban area. This finding is in line with the literature e.g. Ellis (2000b) who highlights that “income diversification is a common practice of rural household to sustain their livelihood”.³³

³³Frank Ellis, “The Determinants of Rural Livelihood Diversification in Developing Countries,” 2.

Table 7: Determinants of Income Diversification 2004-2011

Variable	2004	2007	2009	2011	All
Village shocks (flood/drought for the last 5 years)	-0.02798***	-0.01748**	-0.01039***	-0.01269*	-0.01440***
HHH sex (1=female)	-0.00040	0.02287*	0.00147	0.02219	0.01014**
HHH education (1=primary incomplete)	-0.00239	-0.02214***	-0.00522	0.00845	-0.00613**
HHH education (1=primary complete)	-0.00025	-0.02283**	0.00052	0.02688**	0.00147
HHH education (1=lower secondary)	-0.00797	-0.01623	-0.00753	0.02925**	0.00077
HHH education (1=upper secondary)	-0.00864	-0.00975	0.05618***	0.00041	0.00617
HHH education (1=technical/vocational)	-0.04338***	-0.08390**	-0.04097*	0.01785	-0.03976***
HHH education (1=university)	-0.02450	0.03203	0.01849	0.03873	0.02398**
HHH age	0.00015	0.00038	-0.00039**	-0.00020	-0.00009
HHH marital status(1=divorced/separated)	0.00157	0.04135**	0.01240	-0.00360	0.01647**
HHH marital status (1=widow)	0.016615**	-0.00041	0.00695	0.00361	0.00821*
HHH marital status (1=never married)	0.00450	-0.05663**	0.04044***	-0.03121	-0.00864
HHH occupation (1=industry)	0.02567***	0.08569***	0.03919***	0.03550***	0.04800***
HHH occupation (1=services)	0.02785***	0.06447***	0.01662***	0.02297***	0.03377***
Household aged 00_04	-0.00102	-0.00371	-0.00698**	0.00675	-0.00219
Household aged 05_09	-0.00583***	-0.00702	-0.00136	-0.00899*	-0.00600***
Household aged 10_14	-0.00243	-0.00145	-0.00214	0.00499	-0.00101
Household aged 15_64 (male)	-0.00323*	-0.00358	-0.00469**	-0.00175	-0.00287**
Household aged 15_64 (female)	0.00103	-0.00824**	-0.00637***	0.00458	-0.00204
Household aged 65+	-0.00010	-0.00326	-0.00494	-0.00491	-0.00400
HH land <1 ha	-0.17338***	-0.16626***	-0.16424***	-0.16756***	-0.16885***
HH land =1-2 ha	-0.20611***	-0.19468***	-0.19470***	-0.20085***	-0.20020***
HH land =2-3 ha	-0.21978***	-0.20771***	-0.19333***	-0.18887***	-0.20163***
HH land >=3 ha	-0.20985***	-0.17332***	-0.17405***	-0.19619***	-0.18815***
HH consumption quintile=2	-0.00515	0.01774*	0.00177	-0.01040	0.00129
HH consumption quintile=3	0.00848*	0.02033**	-0.00089	-0.00289	0.00676**
HH consumption quintile=4	0.01793***	0.03680***	0.01858***	0.00965	0.02049***
HH consumption quintile=5	0.04887***	0.05305***	0.03792***	0.06006***	0.04783***
Plain	-0.00021	-0.02720	0.00269	-0.01176	-0.00805
Tonle Sap	-0.00811	-0.01843	0.01803**	-0.02273	-0.00773
Coastal	-0.02898***	-0.06026***	-0.00703	-0.05308***	-0.03590***
Plateau and Mountain	-0.02844***	-0.02289	0.00471	-0.03377*	-0.01643**
Rural	-0.03026***	0.03722***	-0.02519***	-0.02067*	-0.00935**
Year dummy (1=2007)					0.01602***
Year dummy (1=2009)					0.00488
Year dummy (1=2011)					0.00295
Constant	0.74262***	.67029***	0.74170***	0.70126***	0.71035***

Note: * significant at 10%, ** significant at 5%, *** significant at 1%.Household sampling weight is applied.

Source: Author's calculation based on CSES 2004, 2007, 2009, and 2011

Now we are looking more insights into what extent income diversification impacts on household consumption. Table 8 presents the results of equation (1) explained in Section 4.2.

Table 8 shows that OLS and 2SLS estimation produce comparable results. Taking the endogeneity problem of income diversification index into account, the following explanation will be based on column 3 (2SLS estimation). Holding other factors constant, Herfindahl index is positively correlated with household consumption per capita and statistically significant at 1 percent level, which means the less income diversification goes in line with an increase of household consumption. This implies that income diversification is not responsible for the improvement of household welfare; yet it could only help households to survive and maintain their daily livelihood during economic depression or in occasion of unpredictable income shocks. Therefore, the finding strongly supports the view of income diversification as survival strategies for disadvantaged and low income groups. Multiple income sources are pivotal for survival of rural poor households because the poor are prone to external risks and seasonality of their income earning.³⁴ Inadequate agricultural land, high cost of inputs for investment, and imperfect market prevent households from generating more earning for a proper living and push them to seek more income opportunities.³⁵

However, our finding is opposite to the study of Sen (2010), Quaim (2009), Ersado (2005), and Block and Webb (2001) suggesting that income diversification is a means of accumulation.³⁶ A study by Tong and Phay (2013) proposes that wealthy households grasp

³⁴Frank Ellis, "Household Strategies and Rural Livelihood Diversification," 26.

³⁵Ibid., 25-27.

³⁶Ralitz Dimova and Kunal Sen, "Is Household Income Diversification a Means of Survival or a Means of Accumulation? Panel Data Evidence from Tanzania," 24.

Raphael O. Babatunde and Matin Quaim, "Patterns of Income Diversification in Rural Nigeria: Determinants and Impacts," 318.

Ersado Lire, "Income diversification before and after economic shocks: evidence from urban and rural Zimbabwe," 13.

S. Block and P. Webb, "The Dynamics of Livelihood Diversification in Post-famine Ethiopia," 348.

income diversification strategies to increase household income during crisis.³⁷ However, as explained earlier, Tong and Phay (2013) rely on the relatively small sample of 793 households which could represent incomplete results for Cambodia as the whole.

Our results also highlight that female headed household, household head's main occupation, and the number of dependents is negative associated with household consumption. On the other hand, educational attainment of household head, age of household head, and land ownership produce positive effects on household consumption. According to literature, it is widely accepted that education is a powerful asset for households to access to high income earning. Age of household head also contributes to high income earning activities since it is counted as household head's experience in labor market.

³⁷Tong Kimsun and Phay Sokcheng, "Role of income diversification during the Global financial crisis: Evidence from nine villages in Cambodia," 18.

Table 8: Effects of Income Diversification on Consumption per Capita

Variable	OLS	2SLS
Herfindal index	0.03287***	0.92080***
HHH sex (1=female)	-0.01222**	-0.02123**
HHH education (1=primary incomplete)	0.01446***	0.02006***
HHH education (1=primary complete)	0.02068***	0.01856***
HHH education (1=lower secondary)	0.03453***	0.03407***
HHH education (1=upper secondary)	0.03424***	0.02885
HHH education (1=technical/vocational)	0.10754***	0.14320***
HHH education (1=university)	0.14185***	0.11900***
HHH age	0.00040***	0.00049**
HHH marital status (1=divorced/separated)	0.00543	-0.00837
HHH marital status (1=widow)	0.00262	-0.00491
HHH marital status (1=never married)	0.03759***	0.04774***
HHH occupation (1=Industry)	0.00458	-0.03804**
HHH occupation (1=Services)	0.01028***	-0.01966
Household aged 00_04	-0.02219***	-0.02037***
Household aged 05_09	-0.01294***	-0.00749**
Household aged 10_14	-0.01473***	-0.01381***
Household aged 15_64 (male)	-0.00744***	-0.00480*
Household aged 15_64 (female)	-0.01034***	-0.00860***
Household aged 65+	-0.01509***	-0.01138**
HH land <1 ha	-0.00108	0.14982**
HH land =1-2 ha	0.00425	0.18246***
HH land =2-3 ha	0.01220**	0.19221***
HH land >=3 ha	0.01808***	0.18595***
HH consumption quintile=2	0.39493***	0.39439***
HH consumption quintile=3	0.65788***	0.65258***
HH consumption quintile=4	0.95395***	0.93631***
HH consumption quintile=5	1.51358***	1.4724***
Plain	0.04096***	0.05177***
Tonle Sap	0.01483**	0.02531*
Coastal	0.03442***	0.07048***
Plateau and Mountain	0.02704***	0.04527***
Rural	-0.00037	0.00919
Year dummy (1=2007)	0.17842***	0.16281***
Year dummy (1=2009)	0.14264***	0.13607***
Year dummy (1=2011)	0.44631***	0.44137***
Constant	4.34960***	3.72344***

Note: * significant at 10%, ** significant at 5%, *** significant at 1%. Household sampling weight is applied
Source: Author's calculation based on CSES 2004, 2007, 2009, and 2011

CHAPTER IV: CONCLUSIONS

The study focuses on three main areas: patterns of household income by income quintiles, the key underlying determinants of income diversification, and its impacts on household consumption in Cambodia. The study finds wage and salary and non-agriculture income contribute largely to total household income. Our results from OLS regression suggest that household head with technical/vocational training, number of dependents aged from 5-9, number of male household members aged from 15-64, household head primarily engaged in agriculture, agricultural land ownership, and village shocks (flood/drought) are the main determinants of income diversification for Cambodian households. The study also suggests that there is an inverse U-shape relationship between land holdings and household income diversification, meaning that increasing amount of land holding encourage households to diversify income; yet large amount of land holding in a certain level would draw households' attention to income specialization.

Using village shocks for the last five years as instrumental variables, we find that income diversification is positively associated with per capita consumption, meaning that income diversification would not allow households to have better consumption. This implies that desperate households tend to diversify their income only to survive. It also suggests that poor households depend on multiple income sources to relax their income pitfall and to smooth consumption, while rich households could seize benefit from specific income source.

Our results propose policy measures to reduce constraints on diversification such as infrastructure development, rural credit provision, market information, and non-farm enterprise development. There is also a necessity to have a proper design safety net for the poor and vulnerable people during crisis or income shocks. More importantly, development of non-farm

activities should be aligned together with agricultural development since they complement to each other in contributing to improve overall household income and consumption.

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