LABOR PRODUCTIVITY, REMITTANCE USE, AND THE IMPACT OF THE POVERTY ALLEVIATION FUND PROGRAM IN NEPAL

BY

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DISSERTATION

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Abstract

This dissertation presents three studies related to labor productivity, remittances use, and the effect of an anti-poverty program on migration and remittances. Labor is the biggest endowment available to the poor. Understanding labor issues is important in addressing the problems of poverty, inequality, migration, and economic development. In this dissertation, I estimate the labor productivity of agricultural household because most of the agricultural households in developing countries work in their own farms, it is not possible to observe wages.

The first chapter estimates the shadow wage (marginal productivity of labor) of the agricultural household in the context of Nepal. How different is marginal productivity of labor for women compared to men in agricultural households? In developing countries, where most of the families work on their farms, wage or labor-related income cannot be observed directly. This paper contributes to the literature on gender wage difference in labor and development economics by developing a new approach to estimate the shadow wage of agricultural households in Nepal. Using a general functional form, we first derive the shadow wage from a theoretical model. Then, a model with ward-level fixed effects is used to estimate the shadow wage by gender for Nepalese agricultural households. We find that the productivity of women is not that different than that of men. Despite the vast difference

in observed market wages for women, the distribution of shadow wages of women is not that different from that of men, calling for policies to increase the market wages for women.

The second chapter of this dissertation, attempts to understand the use of remittances among the households of Nepal. Remittances are transfers made by migrant workers to their family and relatives in their country of origin. In Nepal, remittances account for 25-30% of the GDP, and the trend of youths seeking work in other countries– mostly in Southeast Asia and the Middle East– has been increasing. Understanding the expenditure pattern of remittances-receiving households compared to non-recipients provides an understanding of the effect of remittances. In this chapter I employ nationally representative data from Nepal to investigate the effect of remittances on household expenditure patterns, and I compare the prevalence of poverty between remittance recipients and non-recipients. The findings that emerge are as follows: households receiving international and both domestic and international remittances have increased expenditure shares on education, suggesting investments in human capital in the household. In contrast I find a decrease in education expenditures for households receiving domestic remittances. Food expenditures share decreases for households receiving all types of remittances. Households receiving remittances increase the expenditure shares on durables and other consumption expenditures. Households receiving remittances have decreased shares in health expenditures. With regards to poverty, the paper shows that receiving remittances reduces the likelihood of being poor.

In the third chapter of the dissertation, I evaluate the effects of the Poverty

Alleviation Fund program (PAF) on remittances and migration using the data from a quasi-experiment. The PAF is a social fund program that has been providing services to marginalized communities in Nepal through various income-generating activities since 2006. Unlike previous research that has used conditional cash transfer programs (CCTs) to study the role of a development program on migration and remittances, I employ the data from the community-driven anti-poverty program that provides income-generating activities to participants. Using a panel dataset collected by Center for Economic Development and Administration (CEDA) of the Tribhuwan University and the PAF, and taking advantage of a quasi-randomized phase-in experimental design, I estimate the causal effects of a development program on remittances, migration, and welfare measures. I show that policy makers should be aware that community-driven development programs have unintended consequences for migration and remittances, which are distinct from the primary goals of the program: alleviating poverty and improving food security. The program results in a decrease of approximately Rs.6000 (approximately six percent of total household consumption) in remittances received, crowding out private transfers in the presence of public transfers. The paper shows an increase in domestic migration, but no change in international migration due to the program.

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CHAPTER 1

INTRODUCTION

Agriculture plays a crucial role in the non-industrial economy. The agricultural sector not only provides food to the country but also acts as the reservoir of the semi-skilled and unskilled labor in the economy. The agricultural sector in developing countries is mostly subsistence, labor intensive, small scale, and low skilled. In most of the cases, perfectly functioning labor markets are absent. Hence, the productivity of subsistence households is hard to measure. The measurement of productivity can provide insights for the difference in agricultural productivity across households by gender and region, which is essential to implement appropriate policy interventions for economic development.

The setting of my dissertation is Nepal, where the majority of employment is in the agricultural sector. The young unskilled and semi-skilled labor force do not have domestic opportunities outside the agricultural sector to trade their labor. In my dissertation, I address issues that are essential for the economic development of Nepal. Nepal is an agricultural economy. According to the Ministry of Agriculture of Nepal (2013), agriculture provides employment to about 66 percent of the population and contributes 33 percent of GDP. Agriculture in Nepal is performed mostly at the subsistence level, i.e., farmers produce as well as consume most of the products within their household. Individuals in developing countries increasingly want to move

away from agriculture, which is also the case in Nepal. In the absence of a domestic manufacturing sector to absorb the excess labor from subsistence agriculture, surplus labor can look for opportunities internationally that can provide better income sources than working on farms. In Nepal, youths between the ages of 15-49 are increasingly likely to migrate in search of opportunities abroad. I analyze the effect of remittances sent by migrants on household consumption and poverty incidence in Nepal. I also utilize data from an anti-poverty program to understand how creating local opportunities through local income-generating opportunities, can affect the migration and remittances for households.

In Chapter 2, I propose a new estimation approach to quantify the productivity of agricultural households by gender. Using the utility maximization of agricultural households, I first solve for the marginal productivity of labor by gender, which is a function of data and parameters. Then, using the data from the Nepal Living Standard Survey 2010 (NLSS3) I empirically estimate the shadow wages of males and females in the household, which is the marginal productivity of self-employed labor. I find that even though the shadow wages for men and women are not that different, we see the market wages for women tend to be much lower than men. The results from this paper suggest a need for direct intervention to increase wages for women recognizing their productivity.

In Chapter 3, I explore how households receiving remittances are different from households not receiving remittances. Using expenditure data on food, apparel, durables, home improvement, education, and health from the NLSS3, I analyze how households differ in expenditure shares. I also in-

vestigate the role of remittances on poverty incidence to see if remittances have any effect on the poverty status of households in Nepal. I find that remittance-receiving households spend more on durables and other consumption goods. The share of educational expenditures increases for households receiving international and both(domestic and international) remittances, suggesting an increase in human capital investment. Additionally, I find that households receiving remittances have a lower likelihood of being poor.

In Chapter 4, I apply impact evaluation techniques to understand the effect of an anti-poverty program on remittances and migration using data from the Nepal Poverty Alleviation Fund Program. The relationship I explore in the chapter the effect of increased income-generating activities on migration and remittances in poor communities in Nepal. The working hypothesis in this chapter is if the lack of local opportunities motivates migration, then the creation of local opportunities should have an effect on migration and remittances. The data from the program provides an ideal setup to understand the role of local opportunities on migration and remittances. I find that the program slows migration and crowds out private transfers from the migrants. To support the argument, I estimate the effect of the program on welfare measures of the households receiving the program. I find an increase in welfare measures that can be attributed to the program. The chapter concludes that the increase in migration can be attributed to a lack of opportunities locally, giving Nepali individuals little choice but to choose the route of international migration, which tends to provide substantially larger payoffs than opportunities available locally for low skilled labor.

The questions I study in my dissertation are some of the major challenges

for developing countries around the world. Even though I only use data from Nepal, the presence of imperfect labor markets and self-employed individuals on their own farms is a common issue in developing countries. The labor productivity for individuals working on their own farms is hard to measure for a major proportion of the workforce in these economies. The ability to measure the productivity of individuals on their own farms provides a tool to understand the effect of programs that are implemented to increase the agricultural productivity of individuals in such settings. The issue of migration is another major challenge facing developing economies around the world. The inability of manufacturing and construction sectors to absorb the surplus semi-skilled or unskilled labor from the agricultural sector in developing countries will create pressure on available resources creating a push factor for migration to areas within or beyond ones national boundary.

The question of the effect of remittances on household consumption and investment decisions in labor-sending settings becomes necessary to analyze as socio-economic consequences are associated with migration and transfers. Migration is going to be important in the years to come as individuals from poorer countries would like to migrate due to the lack of opportunities. Regions where migration is common face competition for limited resources to create economic opportunities for a large share of the population. The lack of opportunities in migrant-sending countries can encourage migration and put pressure on migrant-receiving countries leading to social tensions and lack of harmony. One of the potential solutions can be coordination between the migrant-sending and migrant-receiving countries to create opportunities for individuals in migrant-sending countries. It would be interesting to understand the effect of local economic opportunities on migration to address

the issue of migration.

CHAPTER 2

ESTIMATION OF THE SHADOW WAGES IN AN AGRICULTURAL HOUSEHOLD MODEL IN NEPAL

2.1 Introduction

This paper proposes a new estimation approach to calculating the marginal productivity of labor by gender for agricultural households. Agriculture plays a significant role in developing economies in part because a significant portion of the workforce is self-employed in it. Most agricultural households work on their own farms, practicing subsistence agriculture. The dominance of self-employment in the absence of observable wages from the labor markets poses difficulties for policy analysis related to agricultural households, as the marginal productivity of labor becomes difficult to measure. For self-employed individuals, the shadow wage, or opportunity cost of time, is determined by household production. The shadow wage is equal to the market wage in a functioning labor market, and it can be estimated in the absence of functioning labor markets (when the separability hypothesis fails) (Jacoby, 1993; Skoufias, 1994).[1] It is derived from the first-order condition of the agricultural household's utility maximization problem after profit has been incorporated into the budget constraint. The estimation of shadow wages can help facilitate understanding the contribution of household members to household production when individuals do not participate in formal labor

[1] We have performed a test for separability following Le (2010) and rejected the separability hypothesis. The separability results are available upon request.

markets.

In developing countries, women's participation in agriculture is common. Gender plays a significant role in agricultural labor markets of developing countries. A persistent gender wage gap exists in both developing and developed countries. Wages for women are 60-75% of men's wages for similar types of jobs in developed countries. A major reason for the wage gap can be either biological or social factors (Aly and Shields, 2010). In developing countries where women participate in non-formal labor markets, it is harder to measure the disparity of wages compared to developed countries. Bardhan and Udry (1999) point out that gender differences in wages and occupational segmentation of women can lead to different labor market conditions, especially for women. Women in developing countries are usually restricted to traditional gender roles due to socio-cultural factors and the absence of functioning labor markets. Thus, the contribution of women could be underestimated. In a patriarchal society such as Nepal, wages and jobs may be gender-specific. Men and women internalize these standards and help perpetuate disparities. The ability to measure productivity by gender is necessary to understand the contribution of both men and women to reduce these disparities.

In Nepal, where men and women carry traditional gender roles, failing to account for household output can lead to an underestimation of the role of women in household productivity. Women supply more hours in household work such as cooking, fetching water, child care among other household tasks. Figure 2.1 shows the distribution of hours supplied by men and women in household work in Nepalese agricultural households. In addition, women in agricultural households, who are both producers and consumers, also supply

a similar amount of labor on their farm as shown in Figure 2.2. The estimation of shadow wages helps us analyze the productivity of individuals, which can help understand gender productivity gaps in the production process of agricultural households. This paper contributes to the estimation of shadow wages in Nepalese agricultural households by applying the semi-parametric production function introduced by Le (2009). We estimate the structural parameters of agricultural household labor supply from estimated reduced form equations using the classical minimum distance estimation approach.

Previous works by Jacoby (1993), Skoufias (1994), Abdulai and Regmi (2000), Carter and Yao (2002), Le (2009), and Barrett, Sherlund, and Adesina (2008) are a few examples that have estimated shadow wages. Barrett, Sherlund, and Adesina (2008) estimate structural household labor supply models in the presence of unobservable wages and possible deviation(s) in the marginal revenue product of self-labor from their shadow wage. The method proposed by Le (2009) uses a flexible functional form without having to estimate a production function. We identify the shadow wage of men and women in Nepalese agricultural households using a structural model that incorporates the models in Jacoby (1993). Jacoby (1993) uses a pair of labor supply equations along with a specific functional form to estimate the shadow wage. He uses instruments to estimate correctly the production function (Cobb-Douglas and translog) to avoid bias in estimated marginal productivity. The model in our paper uses a semi-parametric production function used in Le (2009). A semi-parametric functional form is a novel approach as it relaxes specific functional forms such as Cobb-Douglas, translog or log-linear. Instead, it uses a more general functional structure to derive the shadow wage.

Unlike Jacoby, who uses instrumental variables, we obtain consistent estimates of reduced form parameters by including ward fixed effects to control for community level unobserved variables that influence the shadow wage. We also employ household-specific proxy variables to control for the effects of household unobserved variables (Benjamin, 1992). We improve the Le (2009) empirical approach to estimate the structural parameters without having to use an iterative procedure that requires arbitrary selection of starting values. The consistent reduced form estimates are then used to recover estimates of the structural parameters using minimum distance estimation (Rothenberg, 1973). Estimates of shadow wages (in Table 2.6) along with kernel density plot in Figure 2.4 show the distribution of shadow wages of women is not much different than the distribution of shadow wages of men as compared to market wage for men and women. These differences provide evidence that female productivity difference is less than the wage differences prevalent in the labor market. Hence, policies geared towards equal wages for women should be supported.

We make three major contributions to the literature. (1) We improve the empirical model to estimate the marginal productivity of labor in agricultural households using a structural model of labor supply. Structural modeling attempts to use data to identify the parameters of an underlying economic model, which is based on a model of relations among the variables. (2) We develop a simple model to understand the contribution of household members in the production process and provide evidence that the marginal productivity of females are not lower compared to that of their male counterparts. (3) We find that when labor supplied by individuals constitutes the total of own farm work, household work, and market work, an increase in shadow

wages may not increase the labor supply because of time constraints faced by individuals. The previous literature shows that an increase in market wages has a positive effect on off-farm labor supplied but the inclusion of household work and own farm work is not included in such analyses. Similarly with regards to shadow income, which include unearned income plus the value of home production, farm profits, and income from wage labor, an increase in shadow income could decrease leisure. Our results suggest the presence of structural discrimination hence, policies geared toward reducing these structural discrimination is required.

2.2 Theoretical Model

The theoretical framework in this paper is based on a standard time-allocation model. A farm household maximizes a joint utility function defined over leisure (l), consumption (C) and a vector of preference shifters (A-demographic variables, m- males, f-females). Households maximize their utility function subject to the budget constraints, which includes income from agricultural production, wage earned on labor, and unearned income. We assume the factor markets for agricultural inputs are imperfect but functioning. We assume that household labor is substitutable by hired labor. We assume male and female labor are substitutable for household and farm works. The households can work as many hours as they want on their farms. Therefore, the agricultural household solves the following maximization problem:

$$\max_{C,l_m,l_f} U(C, l_m, l_f; A) \tag{2.1}$$

s.t. Full Income Budget Constraint (FIBC):

$$C + l_f w_f^* + l_m w_m^* = \Pi + Y + w_m M_m + w_f M_f + V(N_m, N_f; J). \tag{2.2}$$

where,

$$\Pi = pQ(L_m, L_f, z; F) - p_z z. \tag{2.3}$$

Total Time Available and Labor Supplied:

$$T_i = h_i + l_i \quad \& \quad h_i = L_i + M_i + N_i. \tag{2.4}$$

where, $U(.)$ and $Q(.)$ are quasi-concave utility and concave farm production functions respectively. One of the working assumptions is that men and women have equal access to all the production technology available to the household. C is goods consumed either purchased in the market (c) or produced at home (v), i.e. $C = c + v$. Π is the profit from farm production; Y is the unearned income of the household. p is the price of farm output; w_m and w_f are the male and female market wages; p_z is the price of farm input z; M_m and M_f are time spent in the labor market by men and women; h_i is the total labor supplied by individual i; L_i is the labor supplied to own farm by individual i; M_i is the labor supplied to the market; and N_i is the labor supplied to household production. F is quasi-fixed inputs such as land and machinery. $V(N_m, N_f; J)$ is the household production function with J being inputs such as electricity and refrigerators. Solving the utility maximization problem in equation 2.1 using constraints in equations 2.2, 2.3, and 2.4, the

shadow wage is derived. The theoretical model is connected to the empirical model using shadow income and shadow wage which are derived using the semi-parametric production function in the utility maximization problem as the household members are both producers and consumers of produced agricultural products. The solution to this utility maximization problem gives us the optimal household labor supply function $h_i = h_i(w_m^*, w_f^*, y^*; A)$. w_m^*, w_f^*, and y^* are optimal shadow wages for men and women and shadow income.

2.3 Empirical Model

2.3.1 Estimation of the Shadow Wage and Shadow Income

Skoufias (1994) and Jacoby (1993) point out the shadow wage can be estimated even if the labor market is imperfect, as the shadow wage is the marginal productivity of labor (MPL) at the optimal point on the production function. To determine the MPL, we define a semi-parametric production function, $\bar{Q} = L^{\lambda_L} f(z, F, \sigma)$, where f(.) is a non-parametric function, z includes all the inputs, F is the quasi-fixed input and σ is the stochastic component in agricultural production. This functional form is more flexible than most widely used Cobb-Douglas or translog functions in the literature because it does not require us to make specific assumptions on capital and other inputs that may affect agricultural production.

In order to account for the differences in productivity between genders, we modify $\bar{Q}$ and define it as:

$$\bar{Q} = L_m^{\lambda_m} L_f^{\lambda_f} z_1^{\lambda_1} f_1(z_2, F, \sigma) \tag{2.5}$$

where L_m, L_f are male and female labor respectively, z_1 is one variable input, z_2 represents remaining variable inputs and f(.) is a non-parametric function as shown above.

Agricultural productivity is affected by random weather shocks. In order to account for the weather shocks, we define the production function as,

$$Q = \bar{Q} e^{\epsilon} \tag{2.6}$$

where ϵ is a random weather shock and $E(e^{\epsilon}) = 1$. Farmers do not know Q so their MPL is based on the expectation of Q. $E(Q(L_m, L_f, z; F)) = E(\bar{Q})$.

$$MPL_i = p\frac{\partial E(Q)}{\partial L_i} = p\frac{\partial \bar{Q}}{\partial L_i} = p\lambda_i \bar{Q}/L_i \tag{2.7}$$

Also, from the utility maximization, the variable input z_1 is used until its marginal product is equal to price, i.e.

$$p_z = p\frac{\partial \bar{Q}}{\partial z_1} = \lambda_1 p\frac{\bar{Q}}{z_1} \tag{2.8}$$

Combining equations 2.7 and 2.8,

$$MPL_i \equiv w_i^* = \frac{\lambda_i z_1 p_z}{\lambda_1 L_i} \tag{2.9}$$

To estimate shadow wages, it is necessary to estimate the λ parameters. Shadow income for agriculture households is the sum of profit from agricultural production, unearned income, wage income, and the value of household production. Shadow income can be defined mathematically as,

$$y^* = pQ(L_m, L_f, z; F) - p_z z + w_m M_m + w_f M_f + Y + V(N_m, N_f; J) \quad (2.10)$$

The shadow income in equation 2.10 includes household production $V(N_m, N_f; J)$. The household production is semi-parametrically defined as $V = Nf_2(K)$ where N is the labor input for household production and $f_2(.)$ is the non-parametric function that takes in K, the vector of other inputs that affect household production. $N = \delta_m N_m + \delta_f N_f$, where δ_m and δ_f are coefficients of efficiency for male and female labor. For household production, labor can be substitutable between males and females. Defining the household production function as a general production function $V = N^{\delta} f2(k)$, and using the marginal productivity of labor $MPL = \delta V/N$, we can derive $V(N_m, N_f; J) = MPL_m N_m + MPL_f N_f$ by setting $\delta = 1$ to facilitate computation.[2] We know $MPL_i = w_i^*$, regardless of market failure. The labor supply function can be defined as $h_i = h_i(w_m^*, w_f^*, y^*; A)$. Most papers assume a log-log form for shadow estimation equations. Becasue the log form will not work for the non-linear shadow wages and shadow income parameters, we use labor supply functions at levels for econometric estimation as

[2]We can set household production to 0 to estimate the MPL for only agricultural production. However, in this framework, if we make that assumption we will not satisfy the condition to implement minimum distance approach as minimum distance requires having at least as many reduced form parameters as structural parameters.

follows:

$$h_m = \alpha_{m1} w_m^* + \alpha_{m2} w_f^* + \alpha_{m3} y^* + \alpha_{m4} A_m + \omega_m \tag{2.11a}$$

$$h_f = \alpha_{f1} w_f^* + \alpha_{f2} w_m^* + \alpha_{f3} y^* + \alpha_{f4} A_f + \omega_f \tag{2.11b}$$

The shadow wage is calculated by solving equations 2.11a and 2.11b by substituting w_i^* and y^* from equations 2.9 and 2.10. Dependent variables in regression equations 2.11a and 2.11b are total labor supplied by male (h_m) and females (h_f) in a household, respectively. The distribution of the dependent variables is presented in Figure 2.3.

2.3.2 Reduced Form Solution Estimation

Plugging equations 2.9 and 2.10 into equations 2.11a and 2.11b. We get,

Male equation in reduced form:

$$h_m = \alpha_{m1}\left(\frac{\lambda_m}{\lambda_1}\frac{P_{z1}z1}{L_m}\right) + \alpha_{m2}\left(\frac{\lambda_f}{\lambda_1}\frac{P_{z1}z1}{L_f}\right) + \alpha_{m3}\left(\frac{P_{z1}z1}{\lambda_1} - P_z Z + Y + w_m M_m + w_f M_f\right) + \left(\frac{\lambda_m}{\lambda_1}\frac{P_{z1}z1}{L_m}\right) N_m + \left(\frac{\lambda_f}{\lambda_1}\frac{P_{z1}z1}{L_f}\right) N_f) + \alpha_{mi} Ai$$

$$h_m = \underbrace{\alpha_{m1}\frac{\lambda_m}{\lambda_1}}_{\beta 1}\frac{P_{z1}z1}{Lm} + \underbrace{\alpha_{m2}\frac{\lambda_f}{\lambda_1}}_{\beta 2}\frac{P_{z1}z1}{Lf} + \underbrace{\frac{\alpha_{m3}}{\lambda_1}}_{\beta_3} P_{z1}z1 - \underbrace{\alpha_{m3}}_{\beta_4}(P_z Z + Y + w_m M_m + w_f M_f) + \underbrace{\alpha_{m3}\frac{\lambda_m}{\lambda_1}}_{\beta_5} P_{z1}z1\left(\frac{N_m}{L_m}\right) + \underbrace{\alpha_{m3}\frac{\lambda_f}{\lambda_1}}_{\beta_6} P_{z1}z1\left(\frac{N_f}{L_f}\right) + \underbrace{\alpha_{mi}}_{\beta_7} Ai$$

$$h_m = \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + controls + error \tag{2.12}$$

Female equation in reduced form:

$$h_f = \alpha_{f1}\left(\frac{\lambda_f}{\lambda_1}\frac{P_{z1}z1}{L_f}\right)+\alpha_{f2}\left(\frac{\lambda_m}{\lambda_1}\frac{P_{z1}z1}{L_m}\right)+\alpha_{f3}\left(\frac{P_{z1}z1}{\lambda_1} - P_zZ + Y + w_mM_m + w_fM_f\right)+ \left(\frac{\lambda_m}{\lambda_1}\frac{P_{z1}z1}{L_m}\right)N_m + \left(\frac{\lambda_f}{\lambda_1}\frac{P_{z1}z1}{L_f})N_f\right) + \alpha_{fi}Ai$$

$$h_f = \underbrace{\alpha_{f1}\frac{\lambda_f}{\lambda_1}}_{\delta 1}\frac{P_{z1}z1}{Lf} + \underbrace{\alpha_{f2}\frac{\lambda_m}{\lambda_1}}_{\delta 2}\frac{P_{z1}z1}{Lm} + \underbrace{\frac{\alpha_{f3}}{\lambda_1}}_{\delta_3}P_{z1}z1 - \underbrace{\alpha_{f3}}_{\delta_4}(P_zZ + Y + w_mM_m + w_fM_f) + \underbrace{\alpha_{f3}\frac{\lambda_f}{\lambda_1}}_{\delta_5}P_{z1}z1\left(\frac{N_f}{L_f}\right) + \underbrace{\alpha_{f3}\frac{\lambda_m}{\lambda_1}}_{\delta_6}P_{z1}z1\left(\frac{N_m}{L_m}\right) + \underbrace{\alpha_{fi}}_{\delta_7}Ai$$

$$h_f = \delta_1X_1 + \delta_2X_2 + \delta_3X_3 + \delta_4X_4 + \delta_5X_5 + \delta_6X_6 + controls + error \quad (2.13)$$

2.3.3 Structural Parameter Estimation

The estimating equations (2.12 and 2.13) are highly nonlinear in the structural parameters. A previous study (Le, 2009) proposes the nonlinear generalized method of moments estimation. However, the nonlinearities are so severe that it is difficult to achieve convergence of the nonlinear estimator. Le (2009) recognizes this convergence problem and implements an iterative estimation procedure that takes advantage of the reduced form equation, which is linear in its parameters, but the iterative procedure requires an arbitrary selection of starting values on each iteration.

Alternatively, estimating structural parameters is ideal for minimum distance estimation proposed by Rothenberg (1973). We adopt this estimation strategy that requires consistent estimation of the reduced form equation, followed by estimation of the structural parameters by minimizing the Euclidean distance between the unknown structural parameters and the estimated reduced form parameters. Derivation of structural parameters in our paper is depicted in Table 2.1. βs and δs in 2.12 and 2.13 are the reduced

form parameters, αs and λs are structural parameters, which are denoted as θ.

The first challenge to identification is the consistent estimate of the reduced form parameters. The reduced form variables are complicated nonlinear functions of the data. Those functions almost certainly contain variables that are correlated with unobserved variables at the regional and household levels. Following Benjamin (1992), we control for unobserved regional variables by controlling for ward-level fixed effects. The ward is the smallest observed geographical unit in the household data. The sampling scheme sampled multiple households in each ward.

In the absence of natural experiments or instruments satisfying exclusion to correct for household level unobserved variables, we employ imperfect proxy variables to mitigate the confounding effects of household level unobserved variables. Proxy variables must exhibit two properties. First, they must be correlated with unobserved variables, a property that cannot be verified. Second, they must be redundant in the estimation equation. That is, if we include proxy variables, a, in an estimation equation $E(y|x)$, then we must have:

$$E(y|x,q) = E(y|x,q,a)$$

That is, the proxy variables must have no explanatory power after the control variables, x, and unobserved variables, q, are accounted for. Their only significance in the estimating equation is due to their correlation with the unobserved variables. The response variable in the reduced form equations is

labor supply. The control variables include wage and income variables that are standard explanatory variables for labor supply. We control for demographic shifters such as number of adult males in the household, number of adult females in the household, and number of children in the household. Age of household head, age squared, and educational dummy variables are used as proxy variables to capture unobserved level effects such as ability and experience. We argue that these variables should satisfy the redundancy requirement of proxy variables.

Thus, a consistent estimation of the reduced form parameters is accomplished with a combination of regional fixed effects and household-level proxy variables. The consistent reduced form parameters, $\hat{\beta}$, are used to recover structural parameters, θ, through the minimum distance estimation, which can be considered a special case of nonlinear generalized method of moments. Minimum distance estimation requires at least as many reduced form parameters as structural parameters, otherwise the structural parameters are not uniquely identified. In our model, the number of structural parameters equals the number of reduced form parameters, so we have exact identification. Given the mapping $f(\theta) = \hat{\beta}$ from structural to reduced form parameters, minimum distance estimation estimates structural parameters, θ, by minimizing:

$$\left(f(\theta) - \hat{\beta}\right)' \hat{V}^{-1} \left(f(\theta) - \hat{\beta}\right)$$

where $\hat{V}$ is the variance-covariance matrix of the reduced form parameters.

2.4 Data

The data in this study come from the 2010 Nepal Living Standard Survey Phase III (NLSS III) which follows the Living Standards Measurement Survey (LSMS) methodology developed and promoted by the World Bank. The NLSS III contains a survey of 5,988 households from about 500 primary sampling units throughout the country. The survey covers both rural and urban areas of Nepal. We define a household as an agricultural household if (a) the household has non-zero revenue from crops or livestock, and (b) the household head's main occupation is agriculture even though the head can have multiple jobs.

The sample in the analysis consists of 2,246 households after dropping households that do not match the definition of agricultural household above. In addition, households with missing fertilizer costs are dropped because we use fertilizer in estimating the shadow wage. Individuals with no own farm labor are also dropped from the analysis to reach the sample size used in our analysis. All the individuals in a household below the age of 14 are characterized as children. Table 2.2 depicts the mean and standard deviation of variables used in the analysis. To deal with the issues of extreme outliers in the sample, we winsorize the data at the 10% level for labor supply, inputs, and market wage variables in the analysis.[3]

[3]Without winsorizing we were getting estimates for shadow wages to be 100 times at the top end of shadow wage distribution

2.5 Results

The reduced form estimates are obtained from equations 2.12 and 2.13 separately. The equations are estimated separately to satisfy the identification condition for minimum distance estimation. Joint estimation of equations will not satisfy the crucial condition for the minimum distance approach. The first columns of Table 2.3 and Table 2.4 are ordinary least squares (OLS) estimates of reduced form coefficients. The estimates in the second columns of Table 2.3 and Table 2.4 account for fixed effects and household proxies. The proxy variables strip out the marginal effects from unobserved attributes in significant ways. The reduced form estimates cannot be interpreted because they are complex variables. The reduced form estimates are used to recover the structural parameters using minimum distance estimation. In Table 2.5, we show the structural parameters recovered from the reduced form model. These structural parameters are used to calculate shadow wages as shown in equation 2.9.

Estimates of shadow wages of males and females using λ values and the mean of the data are 130 and 115 rupees per hour respectively, and they show a statistically significant difference after controlling for ward-level fixed effects.[4] Table 2.6 shows the shadow wage by gender at each quantile of the own farm labor distribution. Figure 2.4 presents the kernel density of shadow wages by gender showing close overlap in the marginal productivity of males and females.

The shadow wage is calculated using equation 2.9 for males and females.

[4] 2011 Exchange rate: 1 USD = Rs (70 to 85) Central Bank of Nepal

We use λ_m and λ_1 from equation 2.11a to estimate the shadow wage for males in equation 2.9. Similarly, λ_f and λ_1 from equation 2.11b are used to estimate the shadow wage for females in 2.9. α_{m1} is the coefficient of male shadow wage in the male labor supply equation 2.11a while, α_{m2} is the coefficient of female shadow wage in the male labor supply equation 2.11a. The result from male labor supply equation 2.11a shows a reduction of 0.038 male hours per day with an increase in shadow wages by 1 rupee per hour. The coefficient of shadow income α_{m3} implies an increase of 0.002 male hours as a result of a 1 rupee increase in income. The change in the coefficient of female shadow wage in the male equation is not statistically significant. For the female labor supply equation 2.11b, the change in shadow wage of male α_{f2} is not statistically significant. The female α_{f1} shows a reduction of 0.027 female hours per day with an increase of 1 rupee per hour. The coefficient for shadow income α_{f3}, also positive, shows the increase of 0.001 female hours per day as a result of a 1 rupee increase in income.

One question that can be raised based on the structural estimates obtained in the analysis is the signs of shadow wage and shadow income parameters in the labor supply equations. Economic theory predicts that the increase in prices of a good should increase the supply of that commodity in the market. In this context, the commodity is the amount of labor hours supplied and the price in this case is the shadow wage. A couple of points should be noted to understand the parameters obtained in the current analysis. First, in previous work, labor supply equations are modeled as a function of observed wage and observed income. The labor supply equations 2.12 and 2.13 in this analysis use shadow wages and shadow income. Second, the labor supply of agricultural households aggregates labor supplied to farm, mar-

ket, and household work. The coefficients for shadow wage is interpreted as the change in labor supplied when marginal productivity changes. For individuals who are already using a large number of hours for labor, we would not expect individuals to supply more labor when there is an increase in marginal productivity. Previous theoretical and empirical work shows that in poor settings, we might expect farmers to behave similar to having a backward bending supply curve (Hanoch, 1965) and (Huang, 1976). With regards to the coefficients for shadow income the result suggests the income effect dominating the substitution effect.

To further illustrate this point, we report the results of regressing market wages and unearned income on market labor supply in Table 2.8, own farm labor supply in Table 2.9, and household chores in Table 2.10. The results in these specifications indicate that an increase in market wage will increase the labor supply to the market but decrease labor supplied to own farm and household chores, implying substitution of types of work. With regards to shadow income, the coefficient means the change in labor supplied in response to unit increase in shadow income. Shadow income includes the value of household production and profit from the farm in addition to unearned income. If it only represents the unearned income then the coefficients for unearned income would be negative as shown in Tables 2.7, 2.8, 2.9 and 2.10. Since it represents household production and profits, we would expect the change in shadow income to have an effect on household production and profits, which would be translated to an increase in total labor supplied. The parameters obtained in the analysis imply a decrease in leisure when shadow income increases. In the context of rural Nepal, limited ability to substitute household chores such as cooking to restaurant food, fetching water to tap

water in the absence of infrastructure and services, an increase in income will not increase the amount of leisure. More often, increased income would lead to better and more varied meals, which would increase the time spent on preparation and cooking of food. The similarity in marginal productivity of labor of male and female as depicted in Figure 2.4 implies household productivity and labor market productivity can be significantly increased by supporting investments to encourage female roles in the production process.

2.6 Conclusion and Discussion

The shadow wage of women is lower than the shadow wage of men in agricultural households in Nepal, on average. However, the distribution shows the range in productivity is similar (Figure 2.4). In this paper shadow wages have been measured with a semi-parametric household production function. One potential limitation of the estimates is the cross-sectional data. We might not fully account for time-varying unobserved heterogeneity. We control for unobserved regional variables by performing fixed effects estimation at the ward level. For the estimation of shadow wages, labor supplied to own farm plays a very important role in this framework. The result from this study suggests that females have a higher marginal productivity of labor in household production compared to the market wage they receive. The average market wage is significantly higher for males than females but the shadow wage shows that females have similar productivity to males. This finding suggests that females are underpaid in the labor market compared to their marginal productivity, calling for direct intervention for equal compensation and to end discriminatory practices.

The method used in the paper can be applied to various outcomes where we cannot directly observe wages. This method can be used in studies to better understand the non-monetary labor contribution of members of the household. It can also be used to understand the productivity in informal labor markets. The estimates of the shadow wage obtained can be used to determine household labor allocation in agricultural households since we cannot observe the market wages for families that work on their own farms. This paper provides a new estimation method with a flexible functional form to estimate the shadow wage.

2.7 Tables and Figures

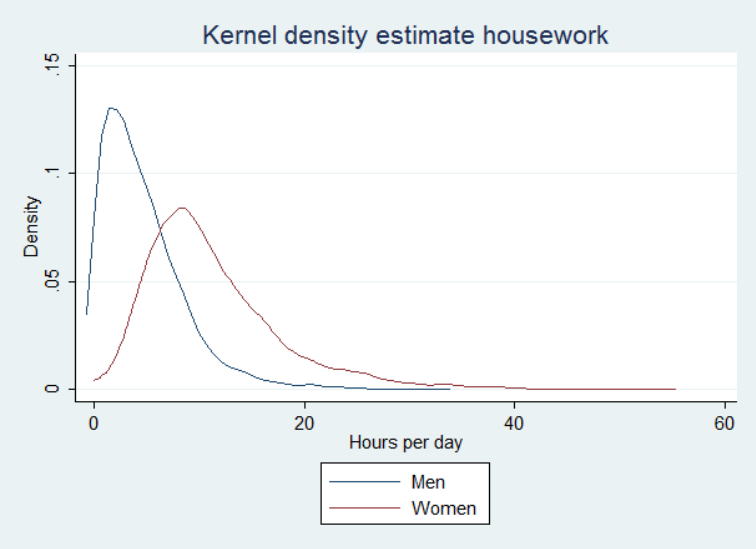

Figure 2.1: Hours supplied in house work by gender

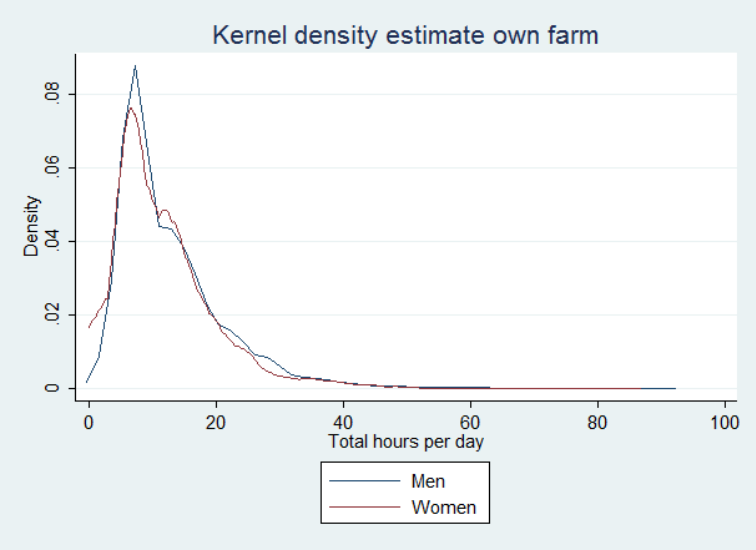

Figure 2.2: Hours supplied on own farm by gender

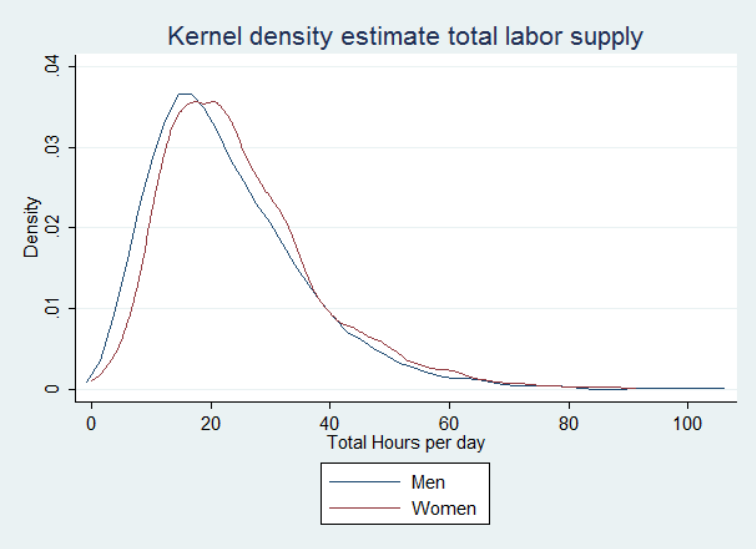

Figure 2.3: Household total labor supply by gender

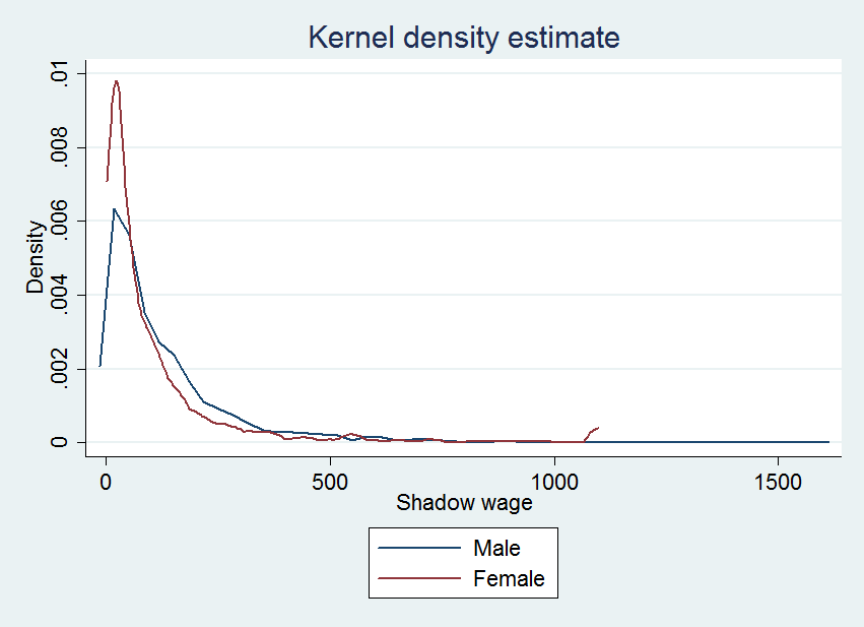

Figure 2.4: Kernel distribution of shadow wage by gender

Table 2.1: Structural parameters derived from reduced form parameters

θ	β
θ_1	$\frac{\beta_1\beta_4}{\beta_5}$
θ_2	$\frac{\beta_5}{\beta_3}$
θ_3	$\frac{\beta_3}{\beta_4}$
θ_4	$\frac{\beta_2\beta_4}{\beta_6}$
θ_5	$\frac{\beta_6}{\beta_3}$
θ_6	β_4

Table 2.2: Summary statistics

Variable	**Mean**	**Std. Dev.**
Own farm labor male(Lm) (Hr/Day)	11.871	6.112
Own farm labor female(Lf) (Hr/Day)	10.784	5.861
Market labor male(Mm) (Hr/Day)	5.146	5.771
Market labor female(Mf) (Hr/Day)	1.874	3.167
Household labor male(Nm) (Hr/Day)	4.198	2.853
Household labor female(Nf) (Hr/Day)	10.674	4.641
Total labor male (Hm) (Hr/Day)	21.899	10.291
Total labor female (Hf) (Hr/Day)	24.22	10.052
Market wage male(wm) (Rs/hr)	133.867	149.594
Market wage female (wf) (Rs/hr)	36.587	64.842
Cost of all input (Rs/day)	28.674	25.806
Cost of fertilizer (Rs/day)	7.891	7.399
UUnearned Income (Rs/day)	6.063	10.354
No. of male	1.632	0.898
No. of female	1.919	0.979
No. of children	1.908	1.623
N	2246	

Table 2.3: Reduced form estimates for male equation

	(OLS) Hm	(Cluster) Hm
x1	-8.043***	-5.845***
	(0.782)	(0.648)
x2	-0.325	-0.0747
	(0.209)	(0.181)
x3	0.723***	0.442***
	(0.0505)	(0.0535)
x4	0.00279***	0.00238***
	(0.0000699)	(0.0000809)
x5	0.529***	0.368***
	(0.0679)	(0.0672)
x6	0.0365*	-0.00537
	(0.0149)	(0.0112)
No. of Male		4.095***
		(0.232)
No. of Female		-0.569***
		(0.164)
No. of Children		0.448***
		(0.0950)
Age		0.0197
		(0.0730)
Age sq		-0.000157
		(0.000732)
Formal Education		0.872
		(1.314)
Primary Education		1.754
		(1.275)
Secondary Education		1.153
		(1.419)
High School or more		-0.474
		(1.329)
Constant	16.59***	10.17***
	(0.277)	(2.257)
N	2246	2246
Fixed effect	No	Yes

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.4: Reduced form estimates for female equation

	(1) Hf	(2) Hf
X1	-4.924***	-2.611***
	(0.334)	(0.234)
X2	-0.524	0.178
	(0.317)	(0.315)
X3	0.528***	0.200***
	(0.0358)	(0.0439)
X4	0.000940***	0.000857***
	(0.0000947)	(0.000104)
X5	0.228***	0.0819***
	(0.0206)	(0.0185)
X6	0.0342	-0.0167
	(0.0527)	(0.0473)
No. of Male		-0.695**
		(0.245)
No. of Female		5.036***
		(0.197)
No. of Children		1.097***
		(0.139)
Age		0.230**
		(0.0820)
Age sq		-0.00233**
		(0.000826)
Formal Education		2.372
		(1.514)
Primary Education		1.451
		(1.438)
Secondary Education		2.027
		(1.716)
High School or more		1.678
		(1.790)
Constant	21.89***	5.451*
	(0.325)	(2.201)
N	2246	2246
Fixed effect	No	Yes

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.5: Structural estimates for male and female equations using cluster estimation

	(Male equation 11a)	(Female equation 11b)
α_{i1}	-0.0378 ***	-0.0273***
	(0.004)	(0.006)
λ_i	0.834***	0.409 ***
	(0.131)	(0.131)
λ_1	0.005***	0.004***
	(0.001)	(0.001)
α_{i2}	0.033	-0.009
	(0.137)	(0.025)
λ_{-i}	-0.012	-0.084
	(0.025)	(0.238)
α_{i3}	0.002***	0.001***
	(0.0001)	(0.0001)

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

i - male or female -i female or male

Table 2.6: Shadow wage of male and female by quantile (Rs)

	Shadow Wage Male	**Shadow Wage Female**	p-value
mean	129.990	115.190	0.000
std. Err	3.370	4.018	
sd	159.710	190.450	
25th percentile	27.728	18.689	
50th percentile	76.119	49.548	
75th percentile	163.119	119.325	
95th percentile	444.651	484.039	

Table 2.7: Labor Supply Equation (total) with wage and income

	(1) Hm	(2) Hf
Wage male	0.0230***	-0.000116
	(0.001)	(0.001)
Wage female	0.00870**	0.0514***
	(0.003)	(0.003)
Income	-0.0670***	-0.0732***
	(0.018)	(0.016)
No. of male	5.768***	-0.211
	(0.213)	(0.195)
No. of female	-0.257	5.756***
	(0.197)	(0.180)
No. of children	0.727***	1.299***
	(0.114)	(0.104)
Constant	8.594***	9.619***
	(0.465)	(0.426)
No. of Households	2246	2246

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.8: Labor Supply Equation (market) with wage and income

	(1) Mm	(2) Mf
Wage male	0.0283***	0.000438*
	(0.001)	(0.0001)
Wage female	0.0123***	0.0450***
	(0.001)	(0.0004)
Income	-0.0384***	-0.00233
	(0.008)	(0.003)
No. of male	0.754***	0.0146
	(0.098)	(0.034)
No. of female	-0.271**	0.0468
	(0.090)	(0.031)
No. of children	0.113*	0.00230
	(0.052)	(0.0181)
Constant	0.217	0.0646
	(0.213)	(0.0741)
No. of Households	2246	2246

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.9: Labor Supply Equation (own-farm) with wage and income

	(1) Lm	(2) Lf
Wage male	-0.00138	-0.000422
	(0.001)	(0.001)
Wage female	-0.00195	0.00726***
	(0.002)	(0.002)
Income	-0.0356**	-0.0579***
	(0.012)	(0.011)
No. of male	3.587***	-0.400**
	(0.146)	(0.13)
No. of female	0.169	3.011***
	(0.134)	(0.12)
No. of children	0.367***	0.379***
	(0.078)	(0.069)
Constant	5.463***	5.078***
	(0.318)	(0.284)
No. of Households	2246	2246

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.10: Labor Supply Equation (household work) with wage and income

	(1) Nm	(2) Nf
Wage male	-0.000989*	-0.000227
	(0.0004)	(0.001)
Wage female	-0.00206*	-0.00210
	(0.001)	(0.00129)
Income	-0.0049	-0.0123
	(0.006)	(0.008)
No. of male	1.057***	0.0896
	(0.072)	(0.099)
No. of female	-0.163*	2.117***
	(0.067)	(0.091)
No. of children	0.184***	0.818***
	(0.039)	(0.053)
Constant	2.671***	5.087***
	(0.158)	(0.216)
No. of Households	2246	2246

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

CHAPTER 3

THE USE OF REMITTANCES AND THE STATUS OF POVERTY IN NEPAL

3.1 Introduction

Do the increased income opportunities of individuals due to migration translate to improved living standards of migrant-sending households? The hope of better economic opportunities motivates migration. Remittances are the pathway on which migration can have a direct effect on the living standards of migrant-sending households. Remittances are the transfers made by migrant workers to their families and relatives in the country of their origin. The transfer mostly includes money and goods to the migrant's household. Remittances directly influence household budget constraints and affect the consumption of various goods and services that were previously unattainable. The money transferred from migrants to households can provide more disposable income for increased consumption, savings, investment in child's education, and home improvement, among others.

In the context of Nepal, migration is common on both the domestic and international frontier. In recent years, international labor migration has surged, mostly to the Middle East (26 percent) and South East Asia (9 percent) (Sapkota, 2013). The increase in international migration has also increased international remittances received by migrant-sending households. Remittances comprise 25-30 percent of GDP in the recent years (Sapkota, 2013).

Given the rise in the flow of international remittances to Nepal in recent years, the questions I address are as follows: (1) How do the consumption patterns differ between remittance-receiving households and non-receiving households? (2) Do remittances affect the poverty status of Nepalese households? These questions are crucial to understanding the impact of labor migration on poverty and the well-being of migrant-sending households because the volume of money that is being transferred is substantial to the household as well as to the country's economy. Because remittances are directly received by the households, expenditure analysis using a nationally representative household survey provides a better picture of how households are utilizing the money than looking at macroeconomic trends.

In 2012, remittances to developing countries were estimated at US$406 billion and by 2015 it is predicted to reach US$534 billion (Ratha, Mohapatra, and Silwal, 2010). According to Ratha, Mohapatra, and Silwal (2010), the volume and stability of remittances flowing to developing countries have been higher than official development assistance and foreign direct investment. While official development assistance and foreign direct investments help in development projects at the community or national level, they don't have a direct impact at the household level. The inflow of a large volume of remittances to a developing country like Nepal can have a direct impact, especially at the household level because remittances are directly received by households. Nepal was the sixth-highest recipient of remittances (share of GDP) in 2010 and 2011 among all countries (Sapkota, 2013). The total amount of remittances received has been increasing in the recent years along with number of migrants in Nepal. Figure 4.1 shows the migration and remittances trends according the official estimates (The Ministry of Finance,

2013). The increasing trend implies the increase in the proportion of migrants and remittances receiving households. Hence, it is essential to understand the direct impact of remittances at the household level. To understand household use of remittances in Nepal, this paper provides a comparison of the consumption between households receiving remittances (domestic and international) and households that do not receive remittances.

The previous literature has documented the effects of remittances on various economic outcomes. The literature highlights the role of remittances on risks and uncertainty, poverty, investments, income inequality, and entrepreneurship, among others. Some other common uses of remittances include insurance against income risk and uncertainty, and a risk sharing mechanism (Rosenzweig and Stark, 1989; Niimi, Pham, and Reilly, 2008; de la Briere, Sadoulet, de Janvry, and Lambert, 2002). Studies have found a positive effect of remittances on poverty alleviation, reduction of income inequality, and investment in human and physical capital (Chiwuzulum Odozi, Taiwo Awoyemi, and Omonona, 2010; Adams and Cuecuecha, 2010, 2013; Jimenez-Soto and Brown, 2012; Yang, 2008). However, some studies have shown that remittances can increase income inequality, corruption, and decrease institutional quality, the rule of law, government effectiveness and overall welfare (Barham and Boucher, 1998; Gibson, McKenzie, and Stillman, 2010; Wouterse, 2010; Abdih, Chami, Dagher, and Montiel, 2012). Using a cross-country analysis, the effect of remittances are found to be non-monotonic, i.e., the benefits are strongest in low-income countries (Portes, 2009). Serino and Kim (2011) use a cross-country analysis to show the effect of remittances on welfare depends on the poverty quantile of the recipient, with the poor benefiting the most from remittances. Findings from

the studies mentioned above imply that the effects of remittances may be heterogeneous, suggesting the presence of outstanding issues concerning the distribution and intensity of the effects associated with remittances.

A recent study by Buckley and Hoffman (2012) points out that household utilization of remittances can change based on institutional and cultural context. Structural and infrastructural context strongly influences the ability of individuals or families to invest remittances. The opportunities to use remittances in entrepreneurial activities, durables, and investments can lead to economic development. In the absence of institutions to facilitate investments and entrepreneurship, remittances can lead to increased consumption, which may not improve the economic potential for future economic development. It can lead to the low-level development trap, which serves as a vehicle to produce more educated future migrants without better job potential domestically leading to the better skilled to be attracted to the international labor market (Kapur and McHale, 2005; Castles and Miller, 2009). Because the institutional and cultural context have strong influences on how the remittances are being utilized, it is essential to analyze each setting separately to understand the actual effect of remittances for socio-economic policy recommendations (Glytsos, 2002).

Few studies have analyzed the effects of remittances in the context of Nepal. Lokshin, Bontch-Osmolovski, and Glinskaya (2007) and Milligan (2009) have used the Nepal Living Standard Survey II (NLSS2) to analyze the effect of remittances on poverty and income effects on child welfare respectively. Work-related migration, both domestic and international, can be attributed to reduced incidence of poverty in Nepal (Lokshin, Bontch-

Osmolovski, and Glinskaya, 2007). Increased income from remittances can increase the likelihood that a child will go to school and decrease child labor (Milligan, 2009). Thieme and Wyss (2005) perform a case study that evaluates the impact of remittances on foreign ex-army settlement. The study finds that out-migration contributes to sustainable livelihood, increases in financial capital, increases in child's education, and the knowledge of migration. The findings from this study cannot be generalized to the present context of Nepal because the current migration trend is mostly non-army labor migration.

This paper utilizes NLSS3 to understand the expenditure behavior of Nepalese households. As mentioned above, a few studies have used NLSS2 to analyze the effect of remittances, but the findings from these studies can't be generalized in present context due to the significant increase in migration. Since NLSS2, which was collected in 2003, the number of international migrants has almost tripled and the remittances have increased by almost five times (The Ministry of Finance, 2013, 2014). Therefore, understanding the spending patterns of households that receive remittances becomes even more significant. More importantly, none of the studies have analyzed household expenditure patterns. Therefore, this is one of the first papers to analyze the effect of remittances on household expenditure using a nationally representative survey.

Studying migration is complex. Migration requires knowledge of jobs in the potential destination, learning about the process of migrating to the destination, financial resources to make migration possible, and adaptation at the destination. The outcome of migration can affect the remittances sent

to the households left behind. Given the dynamic nature of migration, it is difficult to understand why individuals choose to migrate and send back remittances. In the absence of a longitudinal data, it is difficult to capture the migration history to understand this complex process. In the absence of existing longitudinal data, I use cross-sectional data to understand how remittances are being utilized by households in Nepal. Nepal provides an important case to understand migration and remittances. 25 percent of the population in Nepal falls below the poverty line and 66 percent of the population is dependent on agriculture. Nepal lies inbetween India and China, the world's most populated countries. The current trend of labor migration from Nepal is mostly to the Middle Eastern countries like Qatar, UAE, Saudi Arabia, Kuwait, and to Malaysia in the South East Asia. Nepal and India share open borders with Nepalese citizens having equal rights to pursue jobs in India like Indian citizens. Nepal's current migration trend shows that migrants are choosing distant opportunities over relatively cheaper alternatives, suggesting that migrants tend to choose their destinations based on various factors and not just on similar culture, language, and costs. Hence, Nepal provides a unique case to understand migration and the role associated remittances play in developing countries.

In this paper, I use a two-stage selection correction method controlling for unobservable characteristics that could be determining expenditure shares for remittance-receiving households (Adams and Cuecuecha, 2010, 2013). I use instruments that are distinct for the receipt of remittances in the first stage choice equation. In the second stage I analyze the impact of domestic and international remittances on expenditure shares at the household level in Nepal. Additionally, I estimate the effect of remittances on the poverty

status of households. Based on the source of remittances (domestic, international, and both) I determine how remittance-receiving households differ on the margins of expenditure categories such as food, durables, housing, and education, among others. The decision to send an individual outside their origin communities can be complicated due to various factors such as information about destination, job search process, and transaction costs. Also, various factors at home and abroad might influence the sending of remittances, including the duration of migrantion. In the initial period of migration, migrants mostly send remittances to repay loans for migration. I construct variables that capture the duration of migrantion, i.e., migration is less than a year, between 1 and 5 years, and greater than 5 years. Additionally, I control for regional factors since they reflect infrastructure and culture in the context of Nepal. Controlling observable factors within the household as well as geographic factors, we may be able to distinguish recipients of remittances from non-recipients. I estimate the impact of remittances by creating a counterfactual group using characteristics of remittance-receiving household with parameters from households not receiving remittances.

This paper contributes to the literature by investigating the role of remittances on households' expenditure shares and poverty. The main hypothesis that are tested in this paper are as follows: (1) Do households receiving remittances spend a higher share on consumption goods or on education and investment of assets? (2) Do remittances effect the prevalence of poverty in receiving households? To answer these questions, we need to divide the expenditures into investment and consumption expenditures. Of the six categories of expenditure used in this analysis, food and other goods are consumption categories. Home improvement, durables, and education can be

considered as investment in physical assets and human capital. Health can be considered both human capital and consumption good. With regards to prevalence of poverty, households can receive from migrants to cope with extreme poverty for survival or to transfer money to invest in new ventures. Remittances can relax financial constraints to pursue investment activities.

I have the following findings: at the mean value of household characteristics, the households receiving remittances have lower expenditure shares of food and higher expenditure shares of durables and other consumption compared to the households without remittances after controlling for demographic, regional factors, and duration. I find that households with domestic remittances spend a higher share on home improvements than households that do not receive remittance. Households with international and both domestic and international remittances spend a lower share on home improvement. With regards to health expenditure, households receiving remittances spend a lower share than household without remittances. I find that international and both domestic and international remittance-receiving household spend a higher share on education compared to household not receiving remittances, while households with domestic remittances spend a lower share than households receiving domestic remittances . In addition to households' expenditure shares, the paper analyzes the role of remittances on poverty status in Nepal. I find that the likelihood of being poor among households not receiving remittances is higher compared to households receiving some form of remittances, suggesting remittances could have effect on poverty of migrant-sending households either because migrant-sending households are better off and are able to send migrants elsewhere or they are poorer and so are supported by the migrants. This paper contributes to the literature

in the following ways. It provides an analysis of remittance use in Nepalese households and is one of the first research papers to analyze the effect of remittances on the household expenditure shares using a nationally representative survey from Nepal.

3.2 Data

Data in this study come from the Nepal Living Standard Survey 2010 (NLSS3). NLSS3 is a nationally representative survey that follows the World Bank's Living Standard Measurement Study (LSMS) methodology. The survey has 5,988 households, representing all geographic and political regions of Nepal. I use all the surveyed households in this analysis. Additionally, I use the 2010 census data to construct variables such as number of international migrants from a district, proportion of migrants to Qatar, Malaysia, India, Saudi Arabia, among others at the district level to be used as instruments in the analysis. The census data provides the number of migrants at various destinations by districts. For the analysis that follows, I group the households into four categories (A) households who do not receive any remittances (B) household receiving domestic remittances (C) household receiving international remittances (D) household receiving both types of remittances. In the rest of the paper I will use type (A)-(D) to denote household types.

Table 3.1 illustrates the demographic variables used in the analysis by household type. First compare demographic variables between remittance-receiving households and households not receiving remittances. The number of adult males in households receiving remittances is less than in households

not receiving remittances, suggesting that most of the migrants tend to be adult males. The households type (C) and (D) have more adult females than households type (A) suggesting the households receiving international remittances have more females left behind. The type (B) households have fewer adult females than type (A) household suggesting that adult females migrate with adult males within Nepal for domestic migration.

I control for the ethnic caste groups in the specification because the households of these caste groups have a history of working in the foreign military and receiving remittances. Additionally, Table 3.1 shows the highest educational attainment within a household since human capital factors can have an effect on migration and labor market outcomes, which thus influence remittances. Type (A) tend to have higher advanced education than type (C) and (D). Also, remittance-receiving households (type (B), (C), and (D)) tend to have more individuals who have never attended schools.

The main outcome variables considered in the study are expenditure shares on food, home improvement, durables, education, health and other expenditure. Summary statistics are shown in Table 3.2. Food shares include expenditure on food items such as grains, cereal, dairy, meat, fruits, vegetables, spices, and beverages. Home improvement includes the expenses to upgrade the house in the last year. Durables include jewelry, electronics, vehicles and kitchen appliances. Education includes expenses on books, fees and supplies to school. The health expenditure includes expenses on doctor visit and medicines. Other expenditures on fuel, transportation, apparel, newspaper, magazines, entertainment, and gifts.

Table 3.3 shows the variation across regions in Nepal. Nepal has 3 distinct geographic regions: Mountain, Hill, and Terai. Mountains and Hills have limited access to roads. Column 1 shows the poverty line using the "cost of basic needs" approach. Columns 3 and 4 show the remittances amount and remittances as proportion of income. Columns 5 and 6 show the distance to the capital and population in ward across regions. These variations could affect the way migration networks are formed by households in their respective regions. Table 3.4 shows the breakdown of poverty across household categories receiving remittances. I use the definition of poverty defined in the NLSS3 survey, i.e., rgw poverty line is defined as the sum of expenditures on food and non-food items based on the "cost of basic needs" approach. The cost of basic needs approach is a commonly used approach to calculate the poverty line using the cost of acquiring enough food for adequate nutrition and adding essentials such as clothing and shelter (Haughton and Khandker, 2009; Laderchi, Saith, and Stewart, 2003). Based on this definition of the poverty line, 18% of the households in the survey are poor. The number of poor households under remittances receiving categories are as follows: 21% of type (A) are poor, 15%, 19%, and 16% of type (B), (C), and (D) are poor respectively.

3.3 Model

The spending on food, home improvement, durables, other expenditure, education, and health can be different across expenditure levels of remittance-receiving households. To understand the marginal expenditure pattern, I need to choose an appropriate functional form that mathematically allows

capturing a change in the marginal propensity to spend on various expenditure levels. Functional forms that assume the same slopes across expenditure levels are not appropriate because that would assume the expenditure of households at all expenditure levels are constant. We need to have a functional form that allows for households with different expenditure levels to have different slopes. Hence, I use the Working-Lesser model in this analysis. The model relates the budget shares linearly to the logarithm of total expenditure while allowing for different slopes at different expenditure levels. The level of aggregation is the expenditure category such as food, housing, durables, education, other household expenditure, and health. The model takes the following functional form:

$$C_{ij}/Exp = \beta_{ij} + a_{ij}/Exp + \gamma_{ij}(logExp), \tag{3.1}$$

where C_{ij}/Exp is the share of expenditure on good i by household j in total expenditure (Exp) at the household level. The adding-up restriction of the expenditure function requires that all budget shares add up to one, mathematically $\sum C_{ij}/Exp = 1$. Equation 3.1 is equivalent to the Engel form:

$$C_{ij} = a_{ij} + \beta_{ij}Exp + \gamma_{ij}Exp(logExp), \tag{3.2}$$

where C_{ij} is the amount of expenditure on good i by household j. The relationship between the expenditure on good i with the total expenditure of the household is shown in Equation 3.2. To compare the expenditure behavior of households with different levels of income, several socio-economic and regional factors other than expenditure must be taken into account. The observed differences in expenditures may be due to the difference in household composition and geographic regions, among others. These household-specific

variables need to be included in the model to allow the shift in the intercept and slope of the Engel functions. The ability to incorporate shifts in intercept and slope is a valuable property to be able to distinguish households at different expenditure levels. If the model imposes the same slope across expenditure levels, then in cross-sectional analysis behavioral differences between households with differing characteristics cannot be observed, leading to the same effect across all the households. Let Z_k denote the kth household characteristic. The complete model after including the household characteristics is written as:

$$C_{ij} = a_{ij} + \beta_{ij} Exp + \gamma_{ij} Exp(logExp) + \sum_k [(\mu_{ijk}) Z_{jk} + \theta_{ijk}(Exp) Z_{jk}]. \quad (3.3)$$

In terms of expenditure share, the above equation is :

$$C_{ij}/Exp = a_{ij}/Exp + \beta_{ij} + \gamma_{ij}(logExp) + \sum_k [(\mu_{ijk}) Z_{jk}/Exp + \theta_{ijk} Z_{jk}]. \quad (3.4)$$

Including the various household characteristics is important because it allows the flexibility to calculate the marginal budget shares that can vary with household characteristics. The marginal budget shares (MBS) and average budget shares (ABS) for i are as follows:

$$MBS_{ij} = dC_{ij}/dExp = \beta_{ij} + \gamma_{ij}(1 + logExp) + \sum_k [(\theta_{ijk}) Z_{jk}]. \quad (3.5)$$

$$ABS_{ij} = C_{ij}/Exp. \quad (3.6)$$

Various factors can determine why some households receive remittances and why some do not. In the absence of natural experiments to exploit the causal mechanism for receiving remittances, selection on unobservables can

affect the outcome. To account for the possible choices a household makes about receiving remittances, I use the Dubin and McFadden (1984) method, which is a generalization of the Heckman two-stage method of selection correction. The assumption is that households first choose the state s: (A) not receiving remittances (B) receiving domestic remittances (C) receiving international remittances and (D) receiving both domestic and international remittances. Based on the choice a household makes for state s, they decide the optimal consumption for goods. Some factors can affect both the choice of state s and the consumption behavior. Failing to account for the unobserved correlation between choice and consumption can lead to bias. The selection correction method can help mitigate the bias if the choice model is estimated using a logit framework. However, the logit framework requires the independent of irrelevant alternatives (IIA) assumption. I only observe the state s being chosen by the household thus cannot verify the IIA assumption given I only observe one state per household. The study by Bourguignon, Fournier, and Gurgand (2007), however, shows that Dubin and McFadden (1984) performs better than other selection methods in Monte Carlo experiments even when independence of irrelevant alternatives assumptions are not met.[1]

In this paper, I proceed by using the selection correction approach by Dubin and McFadden (1984). The λ_{si} are the selection correction terms obtained from the first stage estimation. The first stage involves estimating the probability of receiving remittances given household and regional characteristics including possible instruments for migration and remittances.

[1]The selmlog command by Marc Gurgand and Martin Fournier in STATA, performs this estimation Bourguignon, Gurgand, and Fournier (2002).

The migration and remittance decisions can be endogenous because these are decisions made by individuals taking into account various other factors that are not observable to the analyst. To cope with the problem of endogeneity, I use instruments that are likely to affect the migration network, which can affect migration and remittances decisions. The instruments I have considered are community level variables, which are not under the control of an individual household. However, these variables can affect the migration and remittance decision of an individual through the social network by providing information and resources for migration. The first stage selection equation includes variables such as age, gender, education of household head, the composition of household members such as children, older members, and gender compositions along with the instruments. The rationale to include these demographic variables is because human capital variables and household characteristics can affect the probability of migration. Incorporating the selection correction, λ_{si}, from the first stage of the estimation procedure the budget share equation takes the following form:

$$C_{si}/Exp = a_{si}/Exp + \beta_{si} + \gamma_{si}(logExp) + \sum_j [(\mu_{sij})Z_j/Exp + \theta_{sij}Z_j] + \sum_s \pi_{si}\lambda_{si} + \upsilon_{si}. \tag{3.7}$$

In the final specification, I use the number of migrants in the district and the proportion of migrants to Malaysia and Qatar out of the total number of migrants in the district in the first stage to obtain the independent variation in the first stage choice equation.[2] The number of migrants in the districts can influence the networks of individuals. Migration is a risky process that involves incomplete information regarding the destination and job search cost.

[2]I have considered are the distance to nearest market, distance to the capital from district headquarters, the population of the ward, and age of household head times distance to the capital. However, these instruments do not satisfy the over-identification conditions

If more migrants are in a community, the information from the previous rounds of migrants can provide potential migrants with information related to migration, job search, and help at the destination on arrival. The working conditions, wage structure in the destination, culture and opportunities of destination are more readily available within a social network. Nepal's social fabric is heavily dependent on social ties. In such a setting having someone with information about the destination can ease migration fears or concerns. The number of migrants in a district can be a good proxy for a migration network to explain migration trends (Mckenzie and Rapoport, 2007; McKenzie and Rapoport, 2010).

Qatar and Malaysia are two popular destinations for youth migrants in Nepal, accounting for 16 percent and 9 percent respectively (Sapkota, 2013). Using the data available in the Census, I create a proportion of migrants to the two major migrant destinations for instruments. Previous literature has used labor market conditions at the migrant destinations as a source of exogenous variation (Adams and Cuecuecha, 2010, 2013; Yang, 2008). I perform Wald test for joint significance of the instruments and find they are significant at 1% level.

Hence, the first stage choice function can be estimated as follows:

Prob(Y=receive remittances) = f(Human capital variables of household members such as level of education, age, ethnicity, composition of household, urban dummy, regional dummies, and instruments)

In the second stage, the selection correction term (λ) is used to estimate

the coefficients of the budget share, Equation 3.7. The coefficient of selection term captures the correlation between error terms of the consumption and choice equation. As shown in Table 3.2 there are six different expenditure categories. [3] I estimate five out of six expenditure equations and use the adding up to conditions recover the parameters for the sixth equation. Parameters must satisfy the following conditions when we add up Equation 3.7 across six categories:

$$\sum_i \beta_{is} = 1, \sum_i \alpha_{is} = 0, \sum_i \gamma_{is} = 0, \sum_i \mu_{is} = 0, \sum_i \theta_{is} = 0, \text{ and } \sum_i \pi_{is} = 0.$$

I use these conditions to retrieve the parameters for the sixth equation. The marginal budget shares (MBS) after including the selection correction terms from the first stage estimation are as follows:

$$E(MBS_i|s = m) = \beta_i + \gamma_i(1 + logExp) + \sum_j [\theta_{ij} Z_j] + \sum_s \pi_{is}\lambda_s \qquad (3.8)$$

where s= type of household.

Given the multiple categories of remittances recipients, the framework in this paper can be used to make comparisons among households that do not receive remittances and different types of remittances-receiving households. Lechner (2002) provides a framework for evaluating multiple treatments, suggesting that pairwise treatment is enough to calculate the average treatment

[3] Food, home improvement, durables, other expenditure, education and health

effect on the treated. Hence, average treatment effect on the treated (ATT) of receiving remittances compared to non-remittances household is obtained as the difference between $E(MBS_m|s = m)$ and $E(MBS_n|s = m)$, following Lechner (2002). $E(MBS_m|s = m)$ is the estimated marginal budget share of households that choose action m-receive domestic remittances, conditioning on the characteristics of household m-receive domestic remittance. $E(MBS_n|s = m)$ is the estimated marginal budget share of households that choose action n- not receive remittances, conditioning on the characteristics of household m-receive domestic remittance. The estimate allows me the ability to create the counterfactual MBS based on observable characteristics to compare the effects of remittances across household categories.

To understand the role of remittances on poverty, I estimate a multinomial logit model. The multinomial logit model allows for the outcome variable to be different by the type of household receiving remittance and the effect on poverty after selection correction. In addition to multinomial logit, I estimate the probit model and compare the predicted probability for poverty using the two models.

3.4 Results

I estimate the two-stage multinomial logit model. Table 3.5 reports the first stage of the multinomial logit estimates where households not receiving remittances are treated as the base outcome. The first stage controls for household demographic and human capital characteristics. Additionally, it also controls for duration, urban, and ethnic caste of the households. Table

3.5 also includes the instruments used in the analysis. The number of migrants in the district is statistically significant, suggesting that the number of migrants in a community can increase the likelihood of both domestic and international migration. The proportion of migrants to Qatar and Malaysia, two major destinations for Nepalese migrants are significant only for type (B). The proportion of migrants in Qatar causes a decrease in domestic remittances while the proportion of migrants to Malaysia causes an increase in domestic remittances. The explanation for the unexpected signs of these variables is not obvious given the opposite signs. The proportion of migrants to Qatar and Malaysia are not significant for type (C) and (D), which is also puzzling.

Table 3.6 displays the second stage estimates for log of expenditure, which represents the solution for expenditure shares in equation (3.7).[4] Two panels represents selection controlled and OLS estimates. The table in the appendix for the second stage shows that failing to control for selection may lead to bias as shown in food share estimates for type (A) and type (C) households and home improvement and other expenditure shares for type (C) households. However, in the absence of good instruments it is hard to say if the bias is totally corrected with selection correction method because the parameters estimates in Table 3.6 are not that different.

Table 3.7 shows that the budget shares estimated at the mean values differ across the households receiving remittances. The table is divided into 3 panels. Panel 1 is the comparison between estimated marginal budget shares between type (A) and type (B) households, panel 2 is the comparison between

[4]Full tables are in the Appendix

type (A) and type (C) households, and panel 3 is the comparison between type (A) and type (D) households. Column [1] and [2] are the estimated marginal budget shares for type of households in the panel. Column [3] is the counterfactual MBS estimated using characteristics of remittance-receiving households and selection corrected parameters of column[1] households. Column[4] shows the average treatment effect on the treated. Table 3.8 shows the Oaxaca decomposition of type (B), (C), and (D) with type (A) based on the characteristics, coefficients, and interactions. The comparison between type (A) and (B) shows the significant difference in household characteristics. For type (A) and (C) there are significant difference in coefficients except for education shares, which show differences in characteristics, coefficients and interactions. Similarly for type (A) and (D) there is significant difference in coefficients for food, durables, education, and health shares while difference in food interactions.

For households with domestic remittances, receiving remittances affects the increase in shares of expenditure to home improvement, durables, and other expenditure and the decrease in share on food, education, and health as shown in column[4] of Table 3.7 . For households with international remittances, receiving remittances increases the shares of expenditure to durables, other expenditure, and education. I find decreases in expenditure shares to food, home improvements, and health. For households that receive both international and domestic remittances, expenditure share on food, home improvement, and health decreases while increases in durables, other expenditures, and education. The results suggests that households receiving remittances are decreasing the share of food expenditures. Households receiving international and both domestic and international remittances spend a higher

share on education, suggesting the possibility of sending their children to private or more expensive schools, which is common in Nepal. However, they are decreasing the share of expenditure on home improvement. The home improvement variables only include repairs to existing home but does not include construction of new homes. Hence, we cannot rule out the possibility of newer home with fewer repairs. The health expenditure shares are decreasing for households with remittances. Health is both human capital and a consumption good. In the context of Nepal, health services are not as common in villages and the services are used mostly when someone is sick rather than regular check-ups periodically. Hence, it can be thought of as consumption expenditure given the decrease in health expenditure shares for all the remittances receiving households.

Table 3.9 shows the estimates for the second stage multinomial logit model after controlling for selection correction to understand the effect of remittances on poverty. Table 3.10 shows the estimated probability of poverty. The first row shows the probability calculation at means using the probit framework while the second row shows the probability calculation at means using the selection correction multinomial framework. The likelihood of being poor decreases with households receiving remittances when calculated at the mean of the variables. The results shows that remittances have an effect on poverty status in Nepal.

3.5 Conclusion and Discussion

This paper analyzes the role of remittances on the expenditure shares of households and poverty using nationally representative NLSS3 data from

Nepal. The paper finds that households receiving remittances spend a larger share on durables and other expenditures. The household receiving international and both international and domestic remittances spend a higher share on education. The households receiving remittances spend less on food. The decrease in home improvement could imply that household type (C) and (D) actually may have newer constructions thus requiring less home improvement.

The paper analyzes the effect of remittances on poverty. The paper finds the receipt of remittances reduces the likelihood of being poor. The probability of being poor is lowest for households that receive domestic remittances followed by household receiving both domestic and international remittances and international remittances respectively.

In Nepal, international remittances constitute almost 30 percent of GDP. Understanding the role remittances play on consumption and poverty is important to address the debate on the effect of remittances at the household level. In the absence of panel data to understand the dynamic impact of remittances, the cross-sectional approach can provide a general understanding of the effect of remittances. This paper attempts to control for potential selection issues using the two-stage method of controlling for unobservable selection by employing instruments that can affect the migration and remittances.

The findings of this paper suggest that remittances can increase spending on human capital, consumption expenditures, durables and decreases the likelihood of poverty in the context of Nepal. Given the volume of remittances Nepal receives, the utilization of remittances on investment activities

is important for sustainable poverty reduction. We see the increase in educational expenditure share for households receiving international and both domestic and international remittances. International migration has been rising in the recent years due to the absence of opportunities in the domestic labor market. In the absence of opportunities for individuals to utilize their education domestically, the scenario could imply more educated future migrants suggesting lower-level development trap. The remittances received by households should be used to create local opportunities to support the economy and create jobs to mitigate the concern of the dependence of the economy on remittances. It would be interesting to study if such opportunities to create local jobs can have an effect on the migration and remittances.

3.6 Tables and Figures

Table 3.1: Summary Statistics by remittances category

	(A)	(B)	(C)	(D)
No. adult male	1.388	1.092^a	0.924^b	0.826^c
	(0.93)	(0.952)	(0.912)	(0.981)
No. adult female	1.472	1.447	1.577^b	1.694^c
	(0.892)	(0.919)	(0.926)	(0.985)
No. of children (5-14)	1.222	1.073^a	1.323^b	1.234
	(1.244)	(1.179)	(1.290)	(1.271)
Size of HH	4.941	4.475^a	4.760^b	4.902
	(2.161)	(2.301)	(2.509)	(2.772)
Head age (25 -59)	0.773	0.708^a	0.727^b	0.654^c
	(0.419)	(0.455)	(0.446)	(0.476)
Dummy for old	0.304	0.326	0.322	0.363^c
	(0.46)	(0.469)	(0.467)	(0.481)
Dummy for infant (less than 5)	0.343	0.312^a	0.378^b	0.429^c
	(0.475)	(0.463)	(0.485)	(0.495)
Belongs to Ethnic Caste	0.688	0.619^a	0.715	0.654
	(0.463)	(0.486)	(0.452)	(0.476)
Urban	0.402	0.285^a	0.302	0.21
	(0.49)	(0.452)	(0.459)	(0.408)
Dummy for primary school(1-5)	0.195	0.182	0.214	0.225
	(0.397)	(0.386)	(0.411)	(0.418)
Dummy for secondary school(5-10)	0.337	0.336^b	0.388	0.348
	(0.473)	(0.472)	(0.487)	(0.477)
Dummy for advance education(more than 10)	0.393	0.389	0.31^b	0.35
	(0.489)	(0.488)	(0.462)	(0.477)
Dummy for never school	0.075	0.094^a	0.088	0.078
	(0.263)	(0.292)	(0.284)	(0.268)
Duration (2-5years)	0.042	0.104^a	0.217^b	0.248^c
	(0.200)	(0.306)	(0.412)	(0.432)
Duration (greater than 5)	0.053	0.249^a	0.216^b	0.302^c
	(0.224)	(0.433)	(0.412)	(0.460)
Absentee in HH	0.257	0.533^a	0.854^b	0.921^c
	(0.437)	(0.499)	(0.353)	(0.271)
No. of Households	2810	1460	1189	529

a, b, and c: at 5 percent significance level difference compared to A

Table 3.2: Average budget shares

	No remittances(A)	Domestic remittances(B)	International remittances(C)	Both(D)
Food	0.633	0.644	0.628	0.603^{b}
	(0.241)	(0.233)	(0.239)	(0.228)
Home Improvement	0.087	0.093	0.09	0.109^{b}
	(0.198)	(0.196)	(0.2)	(0.214)
Durables	0.08	0.079	0.084	0.091
	(0.097)	(0.089)	(0.09)	(0.085)
Other	0.107	0.097^{a}	0.105	0.107
	(0.101)	(0.101)	(0.116)	(0.114)
Education	0.064	0.055^{a}	0.06	0.053^{b}
	(0.094)	(0.087)	(0.087)	(0.082)
Health	0.03	0.032	0.033	0.036
	(0.071)	(0.075)	(0.079)	(0.068)
N	2810	1460	1189	529

Food: Grains, cereals, eggs, milk, meat, oil, spices, fruits, vegetable, sweets, beverages, tobacco

Home Improvement: Expenses to upgrade the house

Durables: Jewelry, electronics, vehicles, kitchen appliances

Other: Fuels, apparel, transportation, entertainment, newspapers, magazines, gifts

Education: Books, fees, supplies for school

Health: Doctors visits, expenses on medicines

a and b: at 5 percent significance level difference compared to A

Table 3.3: Mean for variables by regions

	Poverty line	Total Income	Remittances	Prop income	Distance KTM	Pop Ward	N	Migrants	Prop Malaysia	Prop Qatar
Mountain	19850	81867	24892	0.30	507	1213	408	10968	0.16	0.09
Urban Kathmandu	40933	318924	63054	0.20	2	30339	864	78525	0.06	0.07
Urban Hill	19577	242708	68423	0.28	308	8106	480	34937	0.13	0.14
Rural hill east	16551	59603	30819	0.52	625	851	384	17051	0.26	0.20
Rural hill central	18689	102657	51520	0.50	110	1240	480	31151	0.18	0.12
Rural hill west	18428	57062	47778	0.840	254	825	480	40069	0.08	0.14
Rural hill midwest	16355	46112	21494	0.47	536	826	336	19779	0.12	0.07
Rural hill farwest	16355	55351	13698	0.25	865	699	180	23783	0.02	0.01
Urban terai	21133	253709	51122	0.20	438	7440	672	49242	0.15	0.18
Rural terai east	16856	85813	40587	0.47	513	2581	480	55839	0.20	0.23
Rural terai central	17540	112803	39817	0.35	322	1352	480	28914	0.22	0.25
Rural terai west	15998	98832	63966	0.65	275	1999	384	54691	0.12	0.18
Rural terai midwest	17319	83236	41156	0.49	485	3026	240	30095	0.14	0.10
Rural terai farwest	17319	103058	30796	0.30	675	2156	156	53319	0.04	0.02

Table 3.4: Poverty Status by Remittances type

	Not Poor (in percent)	Poor (in percent)	Total
No Remittance	2,200 (78.29)	610 (21.71)	2810
Domestic	1,243 (85.14)	217 (14.86)	1460
International	994 (83.60)	195 (16.40)	1189
Both	442 (83.55)	87 (16.45)	529
Total	4879 (81.48)	1109 (18.52)	5988

The number in parentheses is row percentage

Table 3.5: First stage multinomial logit model using Dubin-McFadden Method

	(1) Domestic	(2) International	(3) Both
Size of HH	-0.047	-0.081	-0.010
	(0.044)	(0.049)	(0.0655)
Head age (25-59)	-0.522***	-0.722***	-1.001***
	(0.169)	(0.207)	(0.272)
No. of children	0.031	0.309***	0.209
	(0.075)	(0.093)	(0.111)
Dummy for old	-0.455***	-0.419*	-0.499
	(0.158)	(0.195)	(0.260)
Dummy for infant	0.157	0.431*	0.317
	(0.167)	(0.196)	(0.248)
Dummy for primary school	-0.327	-0.451	0.014*
	(0.268)	(0.346)	(0.430)
Dummy for secondary school	-0.027	-0.445	-0.306
	(0.243)	(0.332)	(0.419)
Dummy for advance education	-0.178	-0.485	-0.587
	(0.253)	(0.337)	(0.448)
Urban	-1.172***	-0.952*	-1.639*
	(0.386)	(0.384)	(0.661)
Belongs to Ethnic Caste	-0.221	0.336*	-0.353
	(0.130)	(0.150)	(0.231)
Duration (1-5 years)	0.304	0.545	0.815**
	(0.237)	(0.212)	(0.254)
Duration (Greater than 5 years)	1.489	0.598**	0.950***
	(0.206)	(0.215)	(0.243)
Absentee in the HH	0.650***	2.676***	3.071***
	(0.154)	(0.199)	(0.327)
No. of Migrant in district	0.000009***	0.000012***	-.000022***
	(0.000002)	(0.000003)	(0.000004)
Proportion of migrants in Qatar	-2.511*	0.497	0.189
	(1.104)	(0.947)	(1.624)
Proportion of migrants in Malaysia	2.345***	0.222	1.277
	(0.838)	(0.947)	(1.424)
Constant	-0.187	-1.592***	-3.232***
	(0.403)	(0.438)	(0.664)
Pseudo R^2	18.32%		
N	5,988		

Standard errors in parentheses. Regional dummies not reported in the table

Base outcome: No Remittances

Table 3.6: Consolidated coefficients

		Food	HI	Durables	Other	Education	Health
Selection Correction							
Type A	log of total expenditure	-0.178***	0.257***	-0.027***	-0.011***	-0.035***	-0.006
		(0.01)	(0.01)	(0.004)	(0.003)	(0.003)	
Type B	log of total expenditure	-0.210***	0.291***	-0.038***	-0.007	-0.029***	-0.007
		(0.014)	(0.014)	(0.005)	(0.006)	(0.004)	
Type C	log of total expenditure	-0.208***	0.291***	-0.034***	-0.011	-0.029***	-0.009
		(0.013)	(0.012)	(0.004)	(0.01)	(0.005)	
Type D	log of total expenditure	-0.187***	0.302***	-0.049***	-0.023*	-0.031***	-0.012
		(0.023)	(0.024)	(0.008)	(0.010)	(0.009)	
OLS Estimate							
Type A	log of total expenditure	-0.178***	0.253***	-0.025***	-0.011***	-0.034***	-0.005
		(0.009)	(0.008)	(0.004)	(0.003)	(0.003)	
Type B	log of total expenditure	-0.201***	0.275***	-0.034***	-0.006	-0.027***	-0.007
		(0.011)	(0.011)	(0.004)	(0.005)	(0.003)	
Type C	log of total expenditure	-0.211***	0.286***	-0.029***	-0.008	-0.027***	-0.011
	(0.013)	(0.011)	(0.005)	(0.007)	(0.004)		
Type D	log of total expenditure	-0.186***	0.297***	-0.047***	-0.021**	-0.029***	-0.014
		(0.017)	(0.020)	(0.006)	(0.008)	(0.006)	

Table 3.7: Estimated Marginal Budget Shares of households on expenditure and Average Treatment Effects for remittances receiving households with parameters from non-remittances household model

	MBS NR [1]	MBS type [2]	Counterfactual [3]	ATT [4]=[2]-[3]
No Remittances vs Domestic				
Food	0.4754	0.5391	0.8924	-0.3533
HI	0.2942	0.3205	0.0286	0.2919
Durables	0.0316	0.0606	-0.0369	0.0975
Other	0.0781	0.1179	0.0063	0.1116
Education	0.0775	0.0216	0.0416	-0.02
Health	0.0259	0.0052	0.0293	-0.0241
No Remittances vs International				
Food	0.4754	0.4038	0.4442	-0.0404
HI	0.2942	0.153	0.4709	-0.3179
Durables	0.0316	0.1002	0.0449	0.0553
Other	0.0781	0.1755	0.0227	0.1528
Education	0.0775	0.0357	-0.0121	0.0478
Health	0.0259	-0.0682	0.0292	-0.0974
No Remittance vs Both				
Food	0.4754	0.3435	0.5825	-0.239
HI	0.2942	0.2979	0.3396	-0.0417
Durables	0.0316	0.008	-0.1378	0.1458
Other	0.0781	0.1312	-0.0043	0.1355
Education	0.0775	0.0764	0.0644	0.012
Health	0.0259	-0.2103	0.1555	-0.3658

Table 3.8: Oaxaca decomposition: P-values for characteristics, coefficients, and interactions differences between types of households

	Endowments	Coefficients	Interaction
No Remittances vs Domestic			
Food	0.029	0.277	0.092
HI	0.042	0.873	0.618
Durables	0.020	0.263	0.747
Other	0.227	0.06	0.989
Education	0.000	0.059	0.003
Health	0.028	0.07	0.998
No Remittances vs International			
Food	0.207	0.000	0.085
HI	0.451	0.678	0.471
Durables	0.975	0.014	0.226
Other	0.127	0.307	0.662
Education	0.042	0.000	0.008
Health	0.209	0.055	0.663
No Remittances vs Both			
Food	0.762	0.000	0.042
HI	0.405	0.104	0.487
Durables	0.39	0.000	0.094
Other	0.522	0.208	0.984
Education	0.006	0.001	0.657
Health	0.162	0.019	0.082

Table 3.9: Multinomial Probit estimate using the Dubin Mcfadden method for poverty

	Poor [1]	Poor [2]	Poor [3]	Poor [4]
No. of HH member	-0.00936	0.0133	0.0116	-0.00161
	(0.00895)	(0.0143)	(0.0208)	(0.0208)
Head age 25-59	-0.0523	-0.0239	-0.0542	-0.0694
	(0.0493)	(0.0510)	(0.0764)	(0.0758)
Dummy for old	-0.0180	-0.00759	-0.0859	-0.0447
	(0.0358)	(0.0403)	(0.0650)	(0.0616)
Dummy for infant	0.185***	0.0787	0.111	0.115*
	(0.0279)	(0.0560)	(0.0673)	(0.0488)
Urban	-0.114**	-0.113	-0.193	-0.109
	(0.0369)	(0.0583)	(0.100)	(0.0874)
Belongs to Ethnic Caste	-0.00112	-0.0211	-0.0626	0.00269
	(0.0389)	(0.0437)	(0.0805)	(0.0668)
Dummy for primary school	-0.0803*	-0.0993	-0.0889	0.00533
	(0.0360)	(0.0584)	(0.0681)	(0.0744)
Dummy for secondary school	-0.176***	-0.131**	-0.181**	-0.114*
	(0.0297)	(0.0406)	(0.0574)	(0.0549)
Dummy for advance education	-0.280***	-0.226**	-0.219	-0.159
	(0.0734)	(0.0821)	(0.132)	(0.118)
Duration (2-5 years)	0.0235	0.0225	0.0812	0.0455
	(0.0652)	(0.0704)	(0.0866)	(0.0604)
Duration (more than 5 years)	0.209	0.136	0.205	0.139
	(0.142)	(0.156)	(0.189)	(0.147)
Dummy for Absentee	0.122	0.00464	0.0392	0.163
	(0.0974)	(0.147)	(0.218)	(0.207)
λ_0	-0.128	0.354	-0.0709	-0.151
	(0.257)	(1.053)	(1.013)	(0.817)
λ_1	1.109**	0.514*	1.285	0.819
	(0.359)	(0.234)	(0.753)	(0.630)
λ_2	-0.0114	0.0470	-0.0572	-0.144
	(0.475)	(0.586)	(0.224)	(0.852)
λ_3	0.474	0.969	0.938	0.167
	(0.784)	(1.791)	(1.341)	(0.258)
Constant	0.669**	-0.0607	0.816	-0.107
	(0.211)	(0.599)	(0.920)	(0.463)

Table 3.10: Probability estimates using Probit and Selection Correction method at means

	No remittances	Domestic	International	Both
Probit	0.165	0.114	0.128	0.128
Selection Corrected	0.217	0.149	0.184	0.164

CHAPTER 4

IMPACT OF THE POVERTY ALLEVIATION FUND PROGRAM ON MIGRATION AND REMITTANCES IN NEPAL

4.1 Introduction

Migration is a global occurrence. Migration from developing countries is increasing with individuals aspiring to move abroad. It is mostly common in economies that have traditionally been agricultural. The agricultural sector in developing countries acts as a reservoir for excess unskilled or semi-skilled labor. In the absence of industrial and service sectors, the excess unskilled and semi-skilled labor are encouraged to seek opportunities in the global labor market that provide substantially higher wages for their skills. A recent Gallup poll finds 40 percent of adults from the poorest quartile of the countries want to migrate permanently (Clemens, 2011). The common factors that are driving migration from the developing world to the developed world are conflicts, the absence of work opportunities, and higher wages in developed countries for similar skills.

Migration is one of the most challenging questions facing countries in the 21st century. Developed countries are facing the challenging question of whether to allow migrants or not because of the fear of migrants taking away local jobs, receiving social benefits without contributing to the system, among others. On the other hand, developing countries are facing the challenge of not being able to retain their workforce, which may be due to conflicts, lack of

better work opportunities, and low wage for the skill. The issue of migration is not unique to conflict-affected countries but to most developing countries, which do not have enough resources and capacity to increase opportunities for the semi-skilled and low skilled workforce.

Migration is a costly process and has both financial and non-financial components that can influence decisions. Financial components include the cost associated with job search, travel, foregone income due to migration, as well as income earned and remitted back by migrant workers. Non-financial components are the disutility of being away from home, and physical and emotional stress to both family members and migrants at the destination. The presence of conflicts, work opportunities, job search costs, and ease of travel requirements can affect both financial and non-financial components associated with migration. Most households decide to send migrants based on the cost-benefit of migration with information available. The major benefits to the migrant-sending households in the literature are remittances. Remittances are one of the major financial transfers migrants send to their families. Remittances from developed countries have become higher than foreign direct investment (FDI) and development aid received by the developing countries (Ratha, Mohapatra, and Silwal, 2010). However, no consensus on the role of remittances on household welfare because most of labor-related migration is short term, and remittances, if not invested in capital formation, can only facilitate short-term household consumption. For the semi-skilled and unskilled labor force in agriculture, lack of local opportunities to utilize their labor coupled with higher wages in destination countries can be thought of as the major reasons to migrate. Migration is not only affected by financial constraints; rather it is determined by various other factors such as family

and cultural ties, better work and wage opportunities, and desires to migrate for better living conditions, among others.

Most of the previous studies have found that relaxation of financial constraints has increased domestic migration (Bryan, Chowdhury, and Mobarak, 2014) and international migration (Oliver, 2009; Angelucci, 2013). The studies have looked at the effect of a transfer to ease financial constraints that would facilitate migration. A recent paper by Bazzi (2014) shows positive income shocks triggered by price shocks and positive rainfall increase migration among small landholders. The relaxation of financial constraints is likely to increase migration when individuals do not have local opportunities to work and earn a living.

Instead of sending individuals abroad for income opportunities, what is the effect of bringing opportunities to people at their origin? Is there a similar effect on migration with increase in income-generating opportunities locally? The answer to the question would require a policy intervention to affect not only the financial constraint but also the existing work-related opportunities.

This paper addresses two important questions related to development programs and their effects on migration and remittances. What is the effect of an anti-poverty program that affects both financial constraints and opportunity costs of households on migration? This question is not addressed in the literature because relevant policy experiments are not easily available. I address this important question using randomly phased-in program data from the Nepal Poverty Alleviation Fund (henceforth PAF). The main goal of the program is to provide sustainable income-generating activities to house-

holds in rural and poor communities in Nepal, which were brewing grounds for the civil conflict that lasted from 1996 to 2006. The income-generating activities are livestock transfers, better seeds for agriculture, and in some cases vocational training, which are intended to affect the household budget constraints by providing work opportunities. In addition to relaxing the budget constraints, the program also affects the opportunity cost of migration for individuals. The program provides an ideal policy experiment to understand the effect of relaxed financial constraints and increased opportunity cost of migration. The randomized phased-in program design provides an ideal setup to understand the role of income-generating activities on migration. The income-generating activities increase the opportunity cost of migration, unlike conditional cash transfer programs that only affect the financial constraints. Understanding the impact of anti-poverty programs on migration is useful because most of the countries where such programs are implemented happen to have a long tradition of international labor migration (Angelucci, 2013). As most of the migrants from developing countries tend to be from rural and agricultural households, the impact of the income-generating activities, implemented in rural and marginalized communities, on migration can provide good insight into policies related to migration in developing countries.

The second question is the effect of the anti-poverty programs on private transfers of households. Cox and Jimenez (1990) show that private transfers account for a sizable share of household income and expenditures in developing countries. The income-generating activities can have a direct impact on economic outcomes of the recipients by creating sustainable employment opportunities locally. The improvement in income can affect the existing

private transfers of the program recipient households. As clearly stated by Cox (1987), from a theoretical perspective, various reasons to expect public transfers to affect private transfers. However, from an empirical point of view, it is difficult to assess the presence of the effect due to the absence of appropriate counterfactual groups (Albarran and Attanasio, 2002). Using the randomized phased-in design of the program, I assess the effect of the program on remittances received by the households.

In addition to the indirect effects of the program, this paper analyzes direct impacts of the program on welfare outcomes such as per capita consumption, per capita food consumption, and a food security measure at various quantiles. The welfare outcomes are the intended effect of the anti-poverty program. The increase in direct welfare measure resulting from the program should provide evidence that the income-generating activities are affecting the opportunity cost of migration for treated households.

I address these questions using data from the Nepal PAF program. PAF is a social fund program, which provides income-generating activities to marginalized communities in Nepal. Social fund programs mainly focus on a community-driven development approach to identify and implement the most feasible income-generating activities for the poor and marginalized population. The main objectives of these income-generating activities are to increase earning potential, improve food security, provide public support and create social harmony. Most of these income-generating activities have short turnover rates that tend to show results faster than human capital investments and adoption of new technology that requires learning. The improvement in household income due to the income-generating activities can

relax financial constraints for labor migration. Also, remittances from individuals abroad can facilitate migration. I use the panel data from 6 program districts of Nepal collected in 2007 and 2010. The data have several advantages. Nepal has a different socio-cultural and migration setting than other developing countries. Most of the micro-studies performed to date (24 studies) have used cross-sectional data and 10 of the 24 studies use data from Mexico (Clemens, 2014). Nepalese labor migration is different from Mexico's case as international migrant workers are documented and recorded with the Department of Labor of the Nepalese Government before they travel for work.[1] Although Nepalese nationals are allowed to work and travel to India without restriction, the opportunity to work in a third country that can have better wages has attracted Nepalese workers to choose these destinations. The dataset provides a unique setting to understand labor migration in the presence of multiple work-related and migration opportunities. Besides, the dataset contains information on both randomly selected treatment and control groups providing us an ideal setting to understand the effect of the program on migration and remittances.

I have the following main findings. First, I find an increase in domestic migration by 11 percent. However, no change in international migration, which is similar to Stecklov, Winters, Stampini, and Davis (2005) findings.[2] The increase in opportunity among treatment villages has negated the relaxed financial constraints on international migration. To confirm the results, I estimate the impacts of the program distinguishing labor-specific migration,

[1]The international migration referred to in this paper would be to a third country that requires a passport and travel documents.

[2]Labor related migration did not increase in contrast to the results in Angelucci (2013)

and other types of migration. [3] The result suggests that the program has a statistically significant and positive effect on non-labor-specific migration, but not on labor-specific migration. The reason behind the result can be attributed to lower costs and lower risk of domestic migration compared to international migration. Furthermore, individuals receiving the anti-poverty program may postpone the relatively risky decision of international migration with the expectation of returns from the programs. The program also affects migration by increasing the opportunity cost to a program recipient. Second, I find a decrease in remittances among program recipients compared to non-recipients. The results show a decrease of Rs. 6,000, accounting for six percent of total household consumption, which is consistent with the hypothesis that public transfers crowd out private transfers and aligns with Jensen (2004) in a pension context. The results show the program is crowding out remittances, which could relax financial constraints needed by households for migration. We can infer that households receiving program benefits have fewer remittances, suggesting the possible substitution effect of remittances from the household budget set by income-generated from the program. Third, the evidence suggests that the program induced an increase in welfare measures such as per capita consumption, per capita food consumption and food-secure months per year. Assessing the program effect at various quantiles shows positive effects of the program at all the distribution levels.

This paper contributes to the literature in several ways. First, the paper studies the effects of an anti-poverty program, which not only relaxes the financial constraints but also increases the opportunity cost of migration using

[3] Other types of migration include migration due to marriage, education, family reasons, and other

data from an experimental setup. The paper finds no significant increase in work-related migration when work-related opportunities are increased in the poor and rural communities in developing countries unlike previous research that shows an increase in international migration. The results suggest individuals may not choose to migrate if work-related opportunities are available locally. Second, the paper tests the hypothesis that PAF, an anti-poverty program, affects existing private transfers such as remittances in the context of Nepal. As mentioned earlier, the challenge to assess the effect of the public transfers on the private transfers is difficult empirically due to the lack of a proper comparison group. The presence of comparable treatment and control groups in this dataset provides an ideal setting for causal inference. Also, the remittances result suggests the program has a positive effect on income as it crowds out transfers from migrants abroad. Third, the paper contributes to the effect of the program on actual household welfare measures such as per capita consumption (food and overall) and food-secure months suggesting the program increases the household welfare of treatment group.

4.2 Background Context and Establishment of PAF

Nepal is the poorest developing country in South Asia. The population of Nepal is approximately 30 million. Nepal's economy has been highly dependent on agriculture, which is the major sector of the economy with 70 percent of the workforce involved in the sector. Seventy percent of land area in Nepal consists of hills and high mountains. Fifty percent of the countrys population lives in these areas and practices subsistence agriculture (Sharma, 2006). The dependence on subsistence agriculture and decreasing agricultural productiv-

ity has caused poverty to rise in Nepal in the early 1990s. The condition in rural Nepal is more severe regarding poverty than in urban Nepal. Rural Nepal is more deprived of government services and infrastructure (Deraniyagala, 2005). According to the Nepal Living Standard Survey (NLSS I), 40 percent of the households were below the poverty line in 1996. The relative deprivation and poverty in the agricultural communities can have following outcomes: (1) civil conflict to have control over limited resources (Sharma, 2006; Deraniyagala, 2005; Williams, 2013) and (2) out-migration due to lower opportunity cost to staying (Angelucci, 2013; Bhandari, 2004).

According to the census of 2011, one in every four households reported at least one member of their household is absent or living out of the country. Approximately 2 million individuals are reported to be absent. About 45 percent of absent population is from the age group 15-24 years. Migration among young adults (aged 18-40) is increasing. There is a large number of Nepalese immigrants in countries like Saudi Arabia, UAE, Qatar, Kuwait, and Malaysia. The majority of Nepalese migrant workers employed in these countries are either unskilled or semi-skilled laborers, mostly working in construction, manufacturing or domestic jobs. The increasing trend in migration has led to increased remittances as demonstrated by Figure 4.1. The role of remittances has become extremely important for the socio-economic development of the country as it constitutes 30 percent of national GDP and biggest source of foreign exchange.

The escalation of civil conflict was possible due to the pro-poor revolutionary agendas, which attracted poor and marginalized communities. The government responded to address the issues of poor and marginalized com-

munities along with the support of donor agencies by establishing the PAF in 2003 that was at the peak of the civil war. PAF is a specially-targeted program to improve the economic situation of the lower strata of the society with particular attention to groups that have been traditionally excluded from development works due to reasons of gender, ethnicity, caste, and location. It is an autonomous, professional organization of the government of Nepal. Initially established through "Poverty Alleviation Fund Ordinance 2004", PAF has been governed by the Poverty Alleviation Fund Act since 2006. The Act allows it to implement special and targeted program to bring poor and marginalized groups into development efforts (The Poverty Alleviation Fund, 2013). PAF focuses on enhancing an area's potential strength by direct community involvement. It uses local NGOs, and other private-sector organizations (Partner Organizations (POs)) to facilitate poor and vulnerable groups in communities to implement the program components. PAF has partnered with various organizations that are working at the village, district, and national levels to ensure holistic development intervention to create a visible impact on poverty reduction. The main interventions implemented by PAF are (i) income-generating activities (IGA), and (ii) small-scale village and community infrastructure (The Poverty Alleviation Fund, 2014).

PAF is a social fund program that has been providing various income-generating activities to marginalized communities of Nepal. Social Fund programs are designed to place less stress on government line agencies by using community actors to plan decisions and invest resources. The programs are approaches adopted by several governments and development agencies in conflict-affected developing nations(The World Bank, 2006; Wong, 2012). [4]

[4]Afghanistan National Solidarity Program, Angola Social Action Fund, Colombia

In Nepal, the PAF was established towards the later years of the civil conflict. The PAF programs mainly focus on community-driven development approaches to identify and implement feasible income-generating activities to poor and marginalized populations with a goal of increasing earning potential, providing public support, and creating social harmony.

There are a large number of districts with rural and poor communities for the government to provide development assistance programs. However, these income-generating programs are very expensive programs to implement in all the districts and communities at once. The limited resources, in a particular year have allowed the government to randomize the program placement. The major donor agencies of the PAF program are International Development Association (IDA) of the World Bank and International Fund for Agricultural Development (IFAD) (The Poverty Alleviation Fund, 2014).

4.3 Randomization Design and Data

A pure randomized control trial (RCT) is difficult to implement because the program is targeted to poor and excluded communities. The budget restrictions for any particular year and implementation capacity constraints of particular NGOs allow for a randomized phase-in design, which assigns certain communities for early phase-in. A two-stage stratified sampling is adopted. First, six districts representing different geographical regions are randomly selected from 25 PAF-targeted districts. Second, the sampling

Peace and Development Project, Indonesia Program Nasional Pemberdayaan Masyarakat, Kosovo Community Development Fund II Project, Rwanda Decentralization and Community Development Project, Nepal Poverty Alleviation Fund are few examples of such programs.

frame consists of those wards/villages (Primary Sampling Units (PSUs)) in six selected districts that are not yet included but represent a potential pool to be included in the future because of their poverty ranking (Parajuli, Acharya, Chaudhury, and Thapa, 2012). Of approximately 1000 potential villages in six districts, 200 villages are randomly selected for the program. Initially, 100 villages are randomly assigned to the treatment group while the remaining 100 villages are randomly assigned to the control group. The program allocation across each district is based on the district size (number of wards). The randomization is stratified by district to maintain equal proportions of treatment and control primary sampling units (PSUs) in each district. The decision to select one village over another for early phase-in cannot be enforced by lottery alone as implementation readiness of the community organizations (COs), geography, socio-economic conditions and other factors contribute towards inability to comply with random selection. Hence, the most ready are phased in first.

Potential pitfalls to the complete compliance with the perfect randomization may be possible. Potential selection issues can happen at three different levels: selection of the district, selection of village (PSU), and selection of households. The districts that are selected for the programs have been identified so as to target poor and excluded communities. The PAF program was planned by the government of Nepal along with the donor agencies citing the need to include poor and excluded communities in development mainstream to meet the millennium development goals (The Poverty Alleviation Fund, 2013). There may be systematic targeting rule to target the poor and excluded communities. With regards to the selection of the villages, the implementation capacity of NGOs involved may have an effect on exogenous

variation, which is true with any development programs. The third level of selection can be at the household level. Some households would not like to participate in the program and some may not be selected by the local CO's due to various factors not observable to the researchers. The presence of imperfect compliance can lead to potential biases in estimates. However, given migration and remittances are the unintended effect of the program objective, the paper uses exogenous variation of the program at the village level to identify the effects.

The PAF intervention is implemented as follows: PAF chooses a partner organization (PO) -local NGO- in a village in the targeted district.[5] The PO's village-selection depends on qualitative and quantitative assessments based on need and feasibility. In the selected village, the PO carries out community mobilization on possible PAF interventions by inviting households to form a CO consisting of 25 to 30 households as CO members. The CO proposes income-generating activities for each household in the CO. PAF evaluates the income-generating activities proposal, which, if endorsed, is funded through a grant to the community. Communities establish and regulate a revolving fund from which households can borrow for their income-generating activities (The Poverty Alleviation Fund, 2014). Member households implement the approved income-generating activities. On average, PAF provides 20,000 rupees (US$ 185) per income-generating activities per household.

The data for this study came from PAF and were collected by Center for Economic Development and Administration (CEDA) of the Tribhuwan

[5]The details of the program evaluation design are adopted from the World Bank policy working paper Parajuli, Acharya, Chaudhury, and Thapa (2012)

University. The baseline survey of this longitudinal data was conducted in 2007. The baseline involved conducting a census of all households in 200 selected villages, followed by administration of a multi-module detailed household survey to 15 randomly-sampled households in each village. Overall 3,000 households were surveyed in six districts. The six districts are Rautahat, Rolpa, Dailekh, Doti, Humla and Jumla. The survey questionnaire was adapted from the Nepal Living Standard Survey (NLSS) and included detailed information on consumption and income, socio-economic and demographic issues including education, health and nutrition, physical assets, migration and remittances, employment, social employment, community relationship, voice, and participation. For comparability with the national household survey-based welfare measures, the PAF survey included a similar consumption module and followed the same aggregation method. A follow-up survey was performed in 2010, more than two years after the baseline, which included the same questionnaires from the baseline survey. In addition, the follow-up survey gathered information on the actual treatment status (PAF intervention) and non-treatment (control) at both household and the village/PSU level. Twenty-five villages, in which only one household received the treatment, are dropped from the analysis. In two districts Humla and Jumla, all the villages received the treatment. Pooling these districts with the remaining four districts is not appropriate as these districts have limited or no access to roads. Table 4.1 presents summary statistics and p-values for mean differences between treatment and control groups of important variables used in the analysis for the remaining four districts.

4.4 Identification Strategy

The program is randomly placed in six districts out of 25 PAF targeted districts representing different geographic regions. I take advantage of the random program placement to understand the impact of program intervention on remittances and migration in four of the six districts. If migration was only driven by the financial constraints then increased income from income-generating activities and transfers from remittances can relax the financial constraints. The relaxation of financial constraints could result in households in treatment villages receiving more income, which provides additional resources to buy food and other household needs or to finance migration compared to the control households. One of the identifying assumptions is that in the absence of the program, the households in treatment villages and control villages would not have significant differences in welfare measures, remittances, and migration. However, if we see decreases in remittances in treatment group that would imply the households view the costs of migration to be greater than the benefits.

To assess the impact of the program, I perform difference-in-differences estimates using various outcome variables. To test for the absence of differences in the baseline, I perform balance tests on remittance recipient status, migrant status, remittance amount, total consumption, and per capita income among treatment and control villages. Table 4.1 shows the balancing test for major variables used in the analysis. Proportion of migrants, proportion of migrants for work, number of adult females, proportion of international migrant, asset index and total consumption are variables that do not satisfy the balancing test at 10 percent significance level. Alternatively, a Bonferroni

multiple comparison correction for 14 independent test requires a significant threshold $\alpha = 0.004$ for each test to recover overall significance of 0.05. Using this criterion, only the number of adult females would be statistically different. The t-test for number of adult females in treatment and control group shows statistically significant difference with p-value of 0.004. Additionally, the difference-in-differences method controls for the different levels in the estimation. Figure 4.2 shows the distribution of remittances among treatment and control group. The remittances distribution is more spread for control villages in 2010 while the distribution for treatment villages shows similar distribution as 2007. Figure 4.3 shows the proportion of migrants between treatment and control villages across time is increasing comparatively more in the control villages. The proportion of households receiving remittances is higher for the control villages as compared to treatment villages. Figure 4.4 demonstrates the proportion.

$$Y_{ijt} = \mu + \gamma D_j + \pi T_t + \beta D_j T_t + \theta X_{ijt} + e_{ijt} \tag{4.1}$$

where i- household, j- village, t-time.

Equation 4.1 shows the difference-in-differences regression where β is the variable of interest -the program effect. Next, I estimate the effect of program on the welfare measures of households receiving the program. To assess the impact of the program on per capita consumption, food-secure month, and per capita food consumption I perform two-stage-least squares estimates. 2SLS can be defined as follows:

First stage equation

$$Treatment_{jt} = \theta Assignment_{jt} + \pi X_{ijt} + \omega_{ijt} \tag{4.2}$$

$$Y_{ijt} = \delta \hat{Treatment}_{jt} + \beta X_{it} + \epsilon_{ijt} \tag{4.3}$$

The anti-poverty program can have differential effect across households. In order to assess the distributional impact, I perform a quantile instrumental variable approach at (5, 25, 50, 75, 95)th quantile using ivqte in STATA (Frlich and Melly, 2010). I apply the Abadie, Angrist and Imbens approach in the quantile estimation approach (Abadie, Angrist, and Imbens, 2002). Two districts Humla and Jumla in the mountainous region of the country have only treatment villages; I therefore perform before-after treatment to access the impact of the program [6].

4.5 Results

This section quantifies the impact of the PAF program on the amount of remittances, whether the household receives remittances, and whether the household has a migrant. In addition to these indirect effect of the program, this section also estimates the distributional effect of the program on welfare measures. The primary outcome variables used in the analyses are the amount of remittances, household receiving remittances, and whether a household member migrated. I employ clustered standard errors at the primary sampling unit following Bertrand, Duflo, and Mullainathan (2004).

[6] These two districts have very limited access to transportation. The limited access to roads can have an affect on prices of goods and services, which can further affect the disposable income of the households.

I estimate the impact of the program by employing difference-in-differences estimates. I perform the balance test, reported in Table 4.1, on the aggregate sample to perform the difference-in-differences estimate. Since two of the six districts do not have control groups, I perform balance tests for remaining four districts. Balance tests are valid for amount of remittances, remittances recipient status, and household migrant status as shown in Table 4.1.

The estimates in Table 4.2 presents two specifications. Column 1 is the base specification without demographic controls . Column 2 reports the result for specification with the demographic controls. The demographic controls used in the analyses are number of adult males, number of adult females, number of children, household size, and duration of time in months a migrant has been away. In both specifications, the program decreases remittances by approximately 6000 rupees a year among program participants. The result shows public transfers crowd out private transfers similar to the findings in the previous literature. The amount of crowd out is equal to six percent of total household consumption on average. To understand the impact of the program on domestic and international remittances, I perform the difference-in-differences by separating the remittances into both domestic and international remittances. Due to the presence of higher wage differentials in international labor markets, I would expect higher international remittances than domestic remittances. There is a statistically significant decrease in international remittances but no difference in domestic remittances as shown in Table 4.3.

Table 4.4 shows the effect of program on households receiving remittances. The program effect is significant at 0.05 level for the specification with no

demographic controls. There is a six percent decrease in the probability of household receiving remittances. However, after including the demographic controls (specification in column 2 of Table 4.4), the program causes a decrease in the probability that a household will receive remittances by 4.8 percent, although the estimate is not statistically significant. Table 4.5 presents the effect of the program on the proportion of migrants in the household. Column 1 shows the decrease in migrants due to the program effect but it is not statistically different from zero. Including demographic controls in the specification (Column 2) shows the change in sign but the estimates are not statistically different from zero. In addition to the difference-in-differences, I also perform the two stage least square (2SLS) estimate of the program on amount of remittances, household with migrants, and household receiving remittances. Table 4.6 presents the 2SLS effect of the program. 2SLS estimates for amount of remittances, household receiving remittances, and household with migrants are not statistically significant showing that there is no effect of the program on compliers. The 2SLS results indicate that the always-takers or never-takers are driving the difference-in-differences results at least for the amount of remittances received. The difference-in-differences results are relevant considering it shows an average effect for the whole sample rather than 2SLS estimate, which only focuses on the compliers.

To explore the breakdown by type of migration, I separate the migrants into domestic and international categories. Domestic migration can be considered less costly than international migration both emotionally and monetarily. To avoid potential endogeneity, I perform IV estimation of the program effects on international and domestic migration. The 2SLS estimate in Table 4.7 shows an 11.1 percent increase in domestic migrants while the

probability that the household has at least one international migrants decreases, but is not statistically significant. The result can be the short-run effect of the program as shown by Stecklov, Winters, Stampini, and Davis (2005) in case of Mexico. Angelucci (2013) using the data from the same program shows the Stecklov, Winters, Stampini, and Davis (2005) result might result from treating both labor related and non-labor migration as same. To address the pooling issue, I further divide the migration into labor-related and non-labor related migration and perform the 2SLS estimate. Table 4.8 shows that migration for other reasons besides labor increases by 8 percent while impact on the labor related migration is not statistically significant[7]. The result is consistent with the notion that the increase in the income level of an extremely poor household helps it to finance job search for the domestic labor market. Finding work in domestic labor market tends to be relatively cheaper than finding a job in another country's labor market. Over time the domestic labor migration may allow a household to finance international migration in presence wage differentials in domestic and international labor market for similar skills. Even for those households that are not extremely poor, international migration in the context of Nepal is a costly process . Considering the cost difference of domestic and international migration, the increase in domestic migration can be associated with households postponing the costly decision of international migration in the presence of income-generating activities of PAF.

Next, I assess the average treatment effect of the program on welfare measures, I perform the intent-to-treat effect of the program on the log of real per

[7]Migration other includes migration due to education, health, social reasons such as wedding.

capita consumption, food sufficiency in months, and log of per capita food consumption. The program has a positive and statistically significant effect on welfare measures of the households as shown in the first row of Table 4.9. Column 1 of Table 4.9 presents the effect of the program on log of per capita consumption. The program results in a 31 percent increase in per capita consumption. Column 2 shows the effect of program on food-secure months. The program increases the number of food-secure months by 1.29 months. In case of per capita food consumption, the program causes an 11.9 percent increase as shown in column 3. To assess the average treatment effect of the program on the welfare measures, I perform the difference-in-differences estimates. The estimates in Table 4.10 shows the effect of the program on welfare. The program has positive and significant effect on food-secure months while no significant effect on per capita consumption. The dependent variables do not satisfy the balancing requirement for the difference in differences analysis. Considering the anti-poverty program to have a distributional effect, I assess treatment effects at the 5, 25, 50, 75 and 95 quantiles of log of real per capita consumption, food sufficiency in months, and log of per capita food consumption. The results of the analyses are presented in Tables 4.11, 4.12, and 4.13.

Table 4.11 shows significant positive effects of the program on real per capita consumption ranging from 27 percent to 38 percent. The result is statistically significant at 25, 50, 75 and 95 quantile of the log of real per capita consumption distribution. The number of children significantly decreases the per capita consumption by 10 to 15 percent in the 25 to 95 quantile of consumption distribution. Table 4.12 shows that food-secure months are only significant at the 25 and 50 quantiles. The program increases the number of

food-secure month by 1.4 to 2.3 months per year. The demographic controls are not statistically significant at all the distribution of food-secure months. For real per capita food consumption, I find positively significant effects at the 25, 50, and 75 quantiles of food consumption distribution. The per capita food consumption increases by 11 to 14 percent as shown in Table 4.13. The number of children decreases the per capita food consumption between 8.6 to 9 percent at all the points of the food consumption distribution. The results shows the statistically significant welfare effect at the middle of the consumption distribution and not at the tails of the distribution. The results shows that the program may not have effects especially at the lower quantile.

For the two remaining districts, Humla and Jumla, I perform before and after analysis to access the effect of the program because all the villages in the districts are treatment villages. Table 4.14 shows the before and after effect of the program on all the variables that were studied in the remaining four districts. The trend in these districts shows the outcome variables are increasing except for log of real per capita food consumption. Table 4.14 column 3 shows p values for before and after comparison of variables. Remittances, household receiving remittances recipient and per capita consumptions are statistically different in means before and after treatment. The results in these districts are different from the remaining four districts because these two districts have limited access to roads, are more remote, and have limited information on international migration than remaining four districts. The number of migrants in the districts before and after treatment are not significantly different. There is increase in remittances but not at the same level as the time trend in remaining four districts.

4.6 Conclusion and Discussion

This paper analyzes the role of an anti-poverty program on migration, private transfers, and welfare measures. The findings show the crowd out of private transfers in the presence of public transfers. The program causes an increase in domestic migration and no change in international migration unlike the existing trend of increased international migration in Nepal. The program has a positive effect on per capita consumption, and food security measures. The effect is significant at the middle of the welfare distribution. The program may not have effect especially at the lowest quantile of the consumption distribution.

This study fills the gap in the literature by investigating the causal impact of income-generating activities on remittances and migration. Remittances and migration have vital roles in developing economies. The paper provides results consistent with short-run behavior as shown by Stecklov, Winters, Stampini, and Davis (2005) in the case of Mexico. Findings from this paper can help policymakers understand the role of community-driven development programs for issues such as youth migration and remittances (distinct from primary goals such as poverty and nutritional outcomes). It provides future direction on the research related to migration suggesting the opportunity story as one of the potential reasons for individuals migration choice.

Most of these programs are placed in conflict-affected countries. The countries are traditionally agricultural economies with mostly semi-skilled and unskilled labor force. Such income-generating interventions can create economic growth at a local level. Economic growth in the least developing

countries is likely to increase emigration, as increased income allows people to afford migration. Increased income also allows households to invest in the better education of youth. Educated youth are more likely to migrate to places with better working conditions and higher pay for the same skill-set of jobs.

Anecdotal evidence from Nepali migrants abroad suggest that international migration is often a risky process. The issues related to violence against migrants at destination countries, unsafe living and working conditions, breach of initial contracts related to wage and duties, risk of being incarcerated trying to break the contracts, and loss of the right to return to the home country without employers' consent put added risks that can cause potential migrants to become discouraged from attempting international migration. One of the factors that drives international labor migration is wage differentials and aspiration to better life. Having public information about the risk of migration to popular destination countries can discourage the potential migrants with regards to international migration, especially among households with relaxed financial constraints, until credible information concerning jobs are obtained. The presence of a large number of recruitment agencies in the major cities of Nepal can motivate potential migrants to move domestically from the rural villages to obtain information on international migration. Results in this paper showing the increase in domestic non-labor related migration support the fact. The time-frame used in the paper can be considered as a short-run effect of the anti-poverty program. The results are consistent with a postponement of the risky international migration decision in the expectation of credible information and factoring in the cost-benefit effect of international migration at the household level.

Youth involvement is important to the success of most features of community-driven programs. One of the implications of this analysis is that potential migrants, if given appropriate income-generating activities, will stay at home. However, this may be a short-term effect. In the longer run, the programs can lead to increases in international migration due to wage differentials. The impact of such programs provides a new direction for employment creation and entrepreneurship at the village level in developing countries. Programs like PAF can make the households self-sufficient and hence fulfill the main goal of sustainable poverty alleviation and empowerment of marginalized communities.

4.7 Tables and Figures

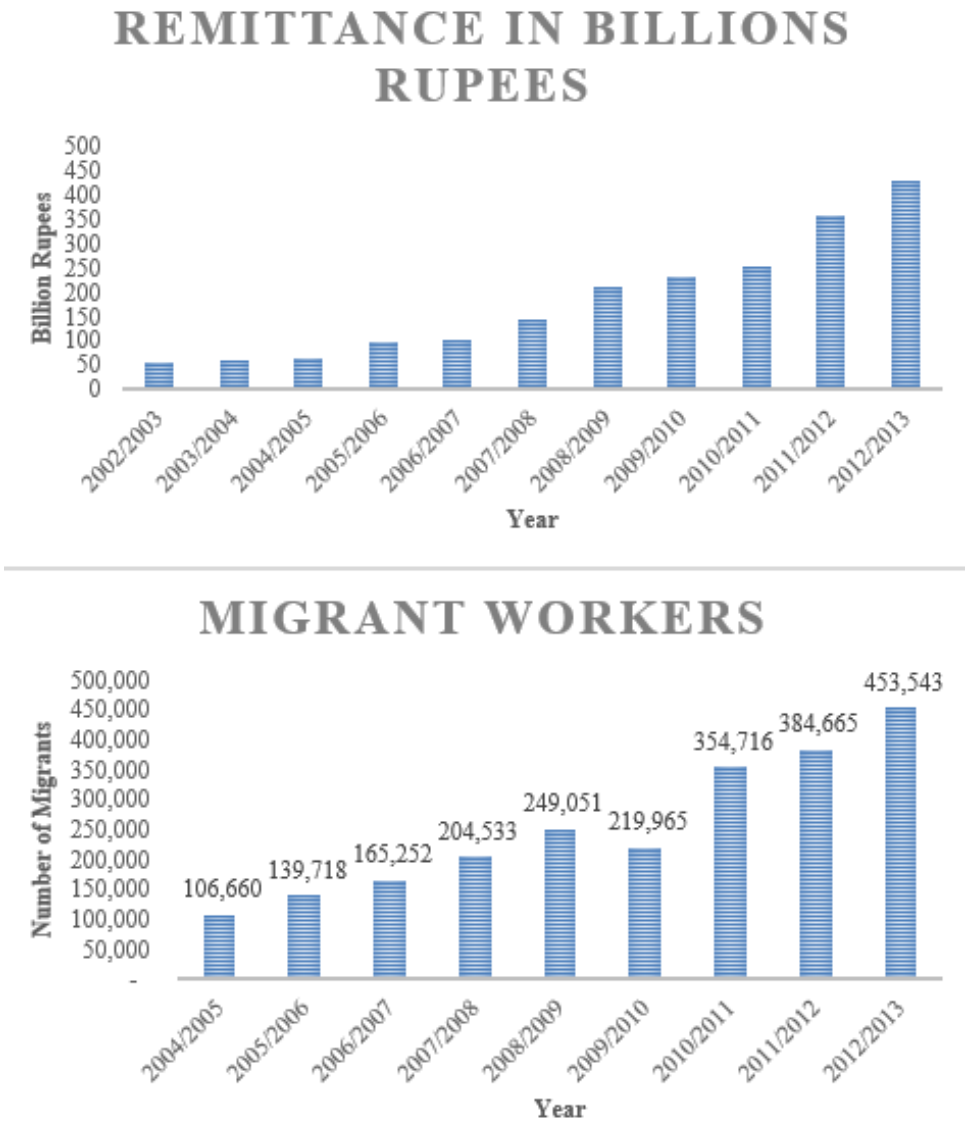

Figure 4.1: Remittances and migration trend according to Ministry of Finance of Nepal

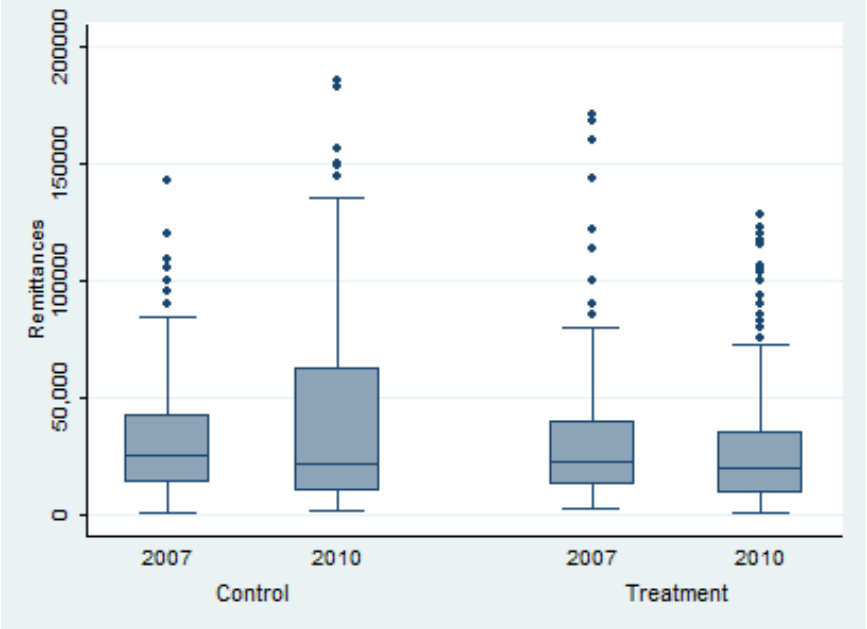

Figure 4.2: Remittances distribution in 2007 and 2010

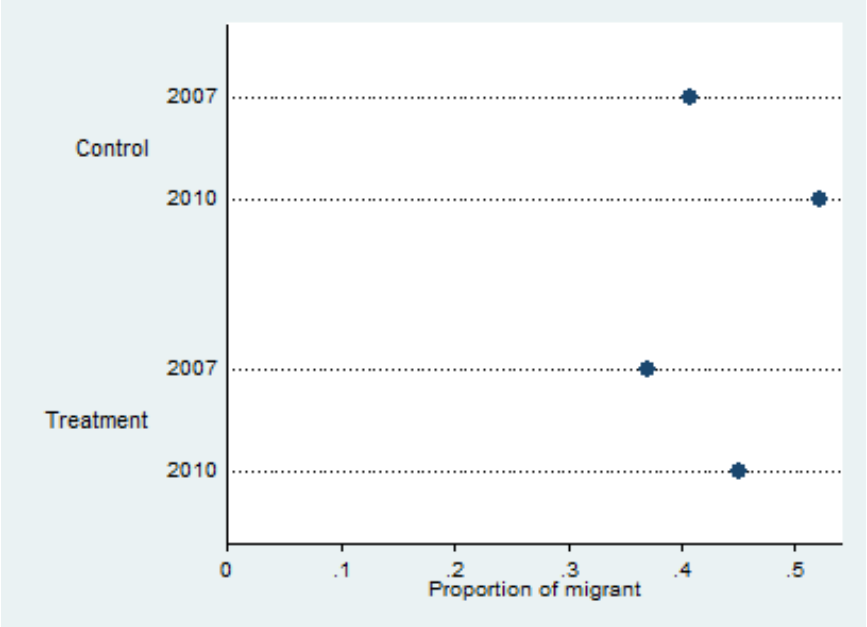

Figure 4.3: Migrants proportion in 2007 and 2010

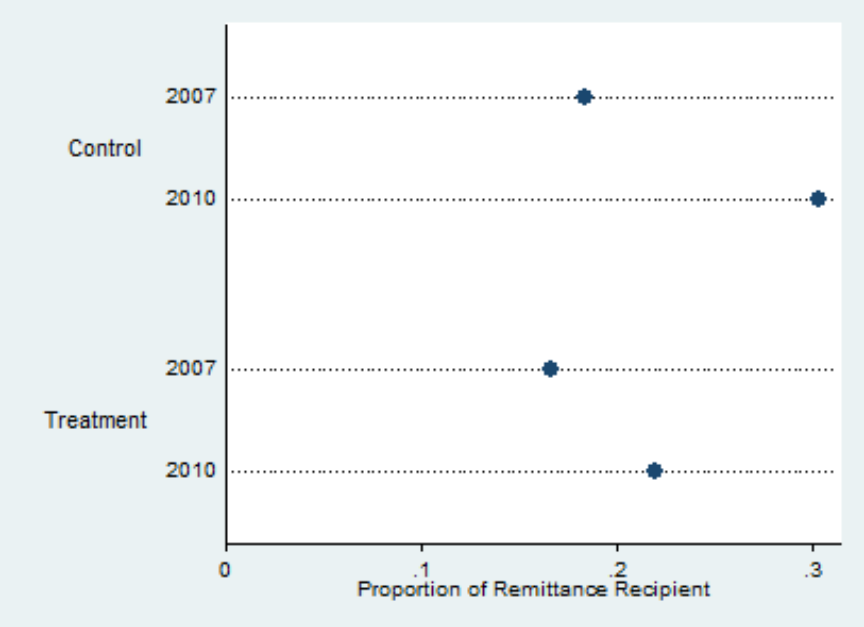

Figure 4.4: Remittances recipient proportion in 2007 and 2010

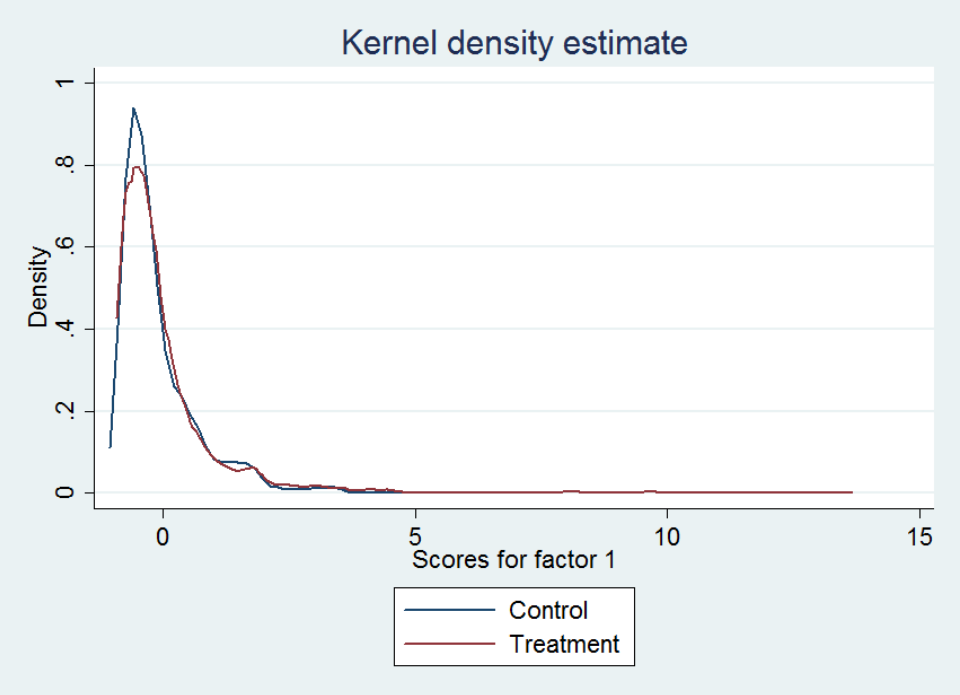

Figure 4.5: Distribution of asset index

Table 4.1: Balancing test of variables in baseline in four districts:
Treatment Implementation

	(1) (Mean Control)	(2) (Mean Treatment)	(3) (P-value for difference)
Remittances	6433.84	5244.48	0.15
	(688.01)	(493.96)	
Remittances Recipient	0.18	0.166	0.295
	(0.013)	(0.011)	
Migrants	0.41	0.37	0.085
	(0.017)	(0.014)	
Migration for Work	0.36	0.32	0.075
	(0.017)	(0.013)	
Migration for Other	0.08	0.09	0.358
	(0.009)	(0.008)	
No. Adult Males	1.97	1.90	0.14
	(0.04)	(0.03)	
No. Adult Females	1.90	1.77	0.004
	(0.04)	(0.03)	
No. Children	2.53	2.59	0.39
	(0.06)	(0.05)	
Household Size	5.92	5.80	0.2714
	(0.088)	(0.073)	
Asset Index	-0.089	-0.001	0.059
	(0.029)	(0.033)	
Domestic Migrant	0.12	0.13	0.489
	(0.011)	(0.01)	
International Migrant	0.31	0.27	0.051
	(0.016)	(0.013)	
Per cap Income	10294.17	10135.75	0.663
	(276.6496)	(230.7192)	
Total Consumption	75320.01	78891	0.046
	(1296.117)	(1184.881)	

Standard errors in parentheses

Humla and Jumla districts are excluded as all sample villages in the districts were treated.

Asset Index is calculated using data on housing characteristics and land holdings.

Table 4.2: Difference-in-Differences results on amount of remittances

	(1) Amount of Remittances	(2) Amount of Remittances
Time variable	8278.9***	6542.2***
	(1813.8)	(1712.7)
Treatment	-1188.1	-797.0
	(1014.6)	(967.9)
Time X Treatment	-6700.5***	-6039.3**
	(2017.6)	(1958.7)
Demographic controls	No	Yes
Observations	4109	4109

Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Controls include : no. of adult males, no. of adult females, no. of children, household size, duration.

Table 4.3: Breakdown of Remittances into international and domestic

	(1) International Remittances	(2) Domestic Remittances
Diff in diffs	-6650.7***	-103.3
	(1703.8)	(360.2)
Demographic controls	Yes	Yes
Observations	4109	4109

Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Controls include : no. of adult males, no. of adult females, no. of children, household size, duration.

Table 4.4: Difference-in-Differences results on household receives remittances

	(1)	(2)
	Household Receives remittances	Household Receives remittances
Time variable	0.120***	0.0833***
	(0.0231)	(0.0209)
Treatment	-0.0178	-0.0152
	(0.0214)	(0.0194)
Time X Treatment	-0.0661*	-0.0481
	(0.0286)	(0.0256)
Demographic controls	No	Yes
Observations	4109	4109

Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Controls include : no. of adult males, no. of adult females, no. of children, household size, duration.

Table 4.5: Difference-in-Differences results on household having migrant

	(1)	(2)
	Household with migrant	Household with migrant
Time variable	0.114***	0.0475*
	(0.0285)	(0.0194)
Treatment	-0.0377	-0.0365*
	(0.0277)	(0.0185)
Time X Treatment	-0.0347	0.00315
	(0.0345)	(0.0232)
Demographic controls	No	Yes
Observations	4109	4109

Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Controls include : no. of adult males, no. of adult females, no. of children, household size, duration.

Table 4.6: Two Stage estimator for amount of remittances, household with migrants, and household receiving remittances

	(1)	(2)	(3)
	Amount of Remittances	Household Receives remittances	Household with migrant
Treatment Status	-2195.3	-0.0435	0.0333
	(2659.9)	(0.0388)	(0.0454)
No. Adult Males	4100.1***	0.0792***	0.154***
	(450.7)	(0.00658)	(0.00769)
No. Adult Females	2275.8***	0.0197**	0.014
	(507.8)	(0.00741)	(0.00866)
No. Children	207.7	0.00622	-0.00343
	(258.6)	(0.00377)	(0.00441)
Constant	-3743.1	0.0293	0.0903**
	(1969.2)	(0.0287)	(0.0336)
Observations	4108	4108	4108
First Stage F-Stat	482.94	482.94	482.94

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Village initial assignment as instrument for treatment

Table 4.7: Two Stage Least Square Estimates

	(1) International migrant(0,1)	(2) Domestic migrant(0,1)
Treatment Status	-0.0363	0.111**
	(0.0436)	(0.0348)
No. Adult Males	0.111***	0.0778***
	(0.00739)	(0.00589)
No. Adult Females	0.00264	0.0265***
	(0.00833)	(0.00664)
No. Children	0.00809	-0.0139***
	(0.00424)	(0.00338)
Constant	0.0881**	-0.0750**
	(0.0323)	(0.0257)
Observations	4108	4108
First Stage F-Stat	482.94	482.94

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Village initial assignment as instrument for treatment

Table 4.8: Two Stage Least Square Estimates

	(1) Migration Labor(0,1)	(2) Migration Other(0,1)
Treatment Status	-0.028	0.08**
	(0.0446)	(0.0297)
No. Adult Males	0.14***	0.06***
	(0.00756)	(0.005)
No. Adult Females	0.01***	0.04***
	(0.009)	(0.01)
No. Children	0.01***	-0.013***
	(0.004)	(0.003)
Constant	0.08**	-0.08**
	(0.03)	(0.02)
Observations	4108	4108
First Stage F-Stat	482.94	482.94

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Village initial assignment as instrument for treatment

Table 4.9: Two Stage Least Square Estimates

	(1)	(2)	(3)
	Log per capita consumption	Food secure months	Log per capita food consumption
Treatment	0.311***	1.296***	0.119***
	(0.0649)	(0.347)	(0.0356)
No. of Adult Males	0.0656***	0.305***	0.0290***
	(0.0110)	(0.0588)	(0.00604)
No. of Adult Females	0.00725	0.373***	-0.0151*
	(0.0124)	(0.0662)	(0.00681)
No. of Children	-0.115***	-0.0802*	-0.0887***
	(0.00631)	(0.0337)	(0.00347)
Constant	8.573***	6.128***	6.745***
	(0.0481)	(0.257)	(0.0264)
Observations	4108	4108	4108
First Stage F-Stat	482.94	482.94	482.94

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Village initial assignment as instrument for treatment

Table 4.10: Difference in Difference estimate for welfare measures

	(1)	(2)	(3)
	Log per capita consumption	Food Secure months	Log per capita food consumption
Time variable	0.0461	-0.436	-0.0660*
	(0.0405)	(0.288)	(0.0265)
Treatment	0.162**	-0.750**	0.0489
	(0.0573)	(0.274)	(0.0386)
Time X Treatment	-0.0332	0.906**	-0.0485
	(0.0560)	(0.340)	(0.0363)
Demographic controls	Yes	Yes	Yes
Observations	4109	4109	4109

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.11: Quantile instrumental variable estimator for log of per capita consumption

	(Q5) log pc cons	(Q25) log pc cons	(Q50) log pc cons	(Q75) log pc cons	(Q95) log pc cons
Treatment	0.226	0.274***	0.327***	0.372***	0.386*
	(0.119)	(0.0748)	(0.0769)	(0.0939)	(0.156)
No. Adult Males	0.0234	0.0487	0.0630	0.0919*	0.114
	(0.0466)	(0.0423)	(0.0394)	(0.0432)	(0.0837)
No. Adult Females	-0.0275	-0.0304	-0.00649	0.0165	0.00816
	(0.0593)	(0.0471)	(0.0447)	(0.0379)	(0.0893)
No. of Children	-0.0835	-0.100***	-0.109***	-0.125***	-0.149***
	(0.0444)	(0.0253)	(0.0232)	(0.0270)	(0.0267)
Constant	7.883***	8.327***	8.620***	9.024***	9.904***
	(0.162)	(0.113)	(0.0995)	(0.0900)	(0.212)
Observations	4108	4108	4108	4108	4108

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.12: Quantile instrumental variable estimator for food security

	(Q5)	(Q25)	(Q50)	(Q75)	(Q95)
	Food secure months	Food secure months	Food secure months	Food secure months	Food secure months
Treatment	1	1.417*	2.333***	1.000	-3.98e-15
	(0.901)	(0.604)	(0.545)	(0.917)	(0.0985)
No. of Adult Males	0.352	0.333	0.333	3.61e-16	-4.44e-16
	(0.451)	(0.350)	(0.216)	(0.0886)	(0.0526)
No. of Adult Females	0.0370	0.333	0.333	-9.95e-17	1.44e-15
	(0.383)	(0.356)	(0.252)	(0.101)	(0.0537)
No. of Children	0.130	0.0833	4.02e-16	-8.95e-16	-1.55e-15
	(0.291)	(0.171)	(0.152)	(0.0492)	(0.0323)
Constant	0.481	3.500***	6.000***	11***	12***
	(1.077)	(0.881)	(0.681)	(0.935)	(0.142)
Observations	4108	4108	4108	4108	4108

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.13: Quantile instrumental variable estimator for log of per capita food consumption

	(Q5)	(Q25)	(Q50)	(Q75)	(Q95)
	log pc food cons	log pc food cons	log pc food cons	log pc food cons	log pc food cons
Treatment	0.0804	0.105*	0.118**	0.135**	0.112
	(0.0742)	(0.0449)	(0.0450)	(0.0491)	(0.0801)
No. of Adult Males	0.0138	0.0119	0.0286	0.0253	0.0647
	(0.0339)	(0.0200)	(0.0215)	(0.0280)	(0.0543)
No. of Adult Females	-0.0326	-0.0167	-0.0220	-0.0224	-0.0374
	(0.0496)	(0.0257)	(0.0216)	(0.0289)	(0.0550)
No. of Children	-0.0912***	-0.0898***	-0.0887***	-0.0872***	-0.0865**
	(0.0263)	(0.0144)	(0.0160)	(0.0169)	(0.0296)
Constant	6.294***	6.583***	6.784***	7.014***	7.342***
	(0.0921)	(0.0661)	(0.0631)	(0.0756)	(0.116)
Observations	4108	4108	4108	4108	4108

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.14: Before-After analysis for Jumla and Humla Districts

	(1) (Mean Before Treatment)	(2) (Mean After Treatment)	(3) (p values for difference)
Remittances(Rs)	408.25	1707.90	0.01
	(122.56)	(495.31)	
Remittances Recipient	0.026	0.06	0.005
	(0.007)	(0.01)	
Migrants	0.244	0.286	0.11
	(0.018)	(0.019)	
Per capita cons. (log)	8.56	8.88	0.00
	(0.024)	(0.028)	
Food secure(months)	8.11	8.20	0.56
	(0.12)	(0.11)	
Per capita food cons. (log)	6.91	6.87	0.20
	(0.017)	(0.02)	

Standard errors in parentheses

APPENDIX A

SUPPLEMENTAL MATERIALS FOR CHAPTER 2

The maximization problem shown in equation 1 subject to 2, 3 and 4 are as follows:

$\max U(C, Tm - hm, Tf - hf; A)$ subject to

$$C = pQ(Lm, Lf, z; F) - p_z z + w_m M_m + w_f M_f + Y + V(N_m, N_f; K)$$

FOC: $\frac{\partial U_c}{\partial C} = \lambda$

$$\frac{\partial U_{L_i}}{\partial L_i} = \lambda p \frac{\partial Q}{\partial L_i}$$

$$MPL \equiv \frac{\frac{\partial U_{L_i}}{\partial L_i}}{\frac{\partial U_c}{\partial C}} = p\frac{\partial Q}{\partial L_i} \equiv w_i^*$$

APPENDIX B

SUPPLEMENTAL MATERIALS FOR CHAPTER 3

Table B.1: Second stage expenditure estimates for Household receiving no remittances

	(1) food	(2) housing	(3) durable	(4) other	(5) education	(6) health
log of total expenditure	-0.178***	0.258***	-0.027***	-0.011***	-0.035***	-0.007
	(0.010)	(0.010)	(0.004)	(0.003)	(0.003)	
No. of HH member	-0.000	-0.023***	0.001	0.009***	0.012***	0.001
	(0.005)	(0.005)	(0.003)	(0.003)	(0.002)	
Head age 25-59	-0.030	0.002	-0.007	0.025*	0.024**	-0.014
	(0.022)	(0.019)	(0.013)	(0.011)	(0.009)	
Dummy for old	-0.012	0.019	-0.025**	0.016	-0.007	0.009
	(0.021)	(0.019)	(0.010)	(0.011)	(0.008)	
Dummy for infant	0.042*	0.029	0.008	-0.037***	-0.057***	0.015
	(0.020)	(0.016)	(0.011)	(0.010)	(0.007)	
Urban	-0.089*	0.007	0.042	0.039	0.051**	-0.05
	(0.036)	(0.041)	(0.025)	(0.020)	(0.016)	
Belongs to Ethnic Caste	-0.017	0.028	-0.013	0.009	-0.012	0.005
	(0.016)	(0.015)	(0.010)	(0.009)	(0.007)	
Dummy for primary school	0.021	-0.016	0.026	0.008	-0.057	0.018
	(0.046)	(0.080)	(0.044)	(0.028)	(0.044)	
Dummy for secondary school	0.002	-0.060	0.053	0.045	-0.045	0.005
	(0.047)	(0.076)	(0.043)	(0.027)	(0.043)	
Dummy for advance education	0.000	-0.145	0.081	0.049	0.000	0.015
	(0.048)	(0.076)	(0.042)	(0.027)	(0.043)	
Duration (1-5years)	0.020	-0.017	-0.019	0.024	-0.005	-0.003
	(0.054)	(0.062)	(0.030)	(0.025)	(0.016)	
Duration (more than 5 years)	0.083	-0.022	-0.047*	0.005	-0.014	-0.005
	(0.048)	(0.049)	(0.024)	(0.026)	(0.018)	
Dummy for Absentee	0.031	0.055	-0.015	-0.029	-0.055**	0.013
	(0.039)	(0.039)	(0.023)	(0.025)	(0.018)	
λ_0	-0.099	0.042	0.011	0.018	0.022	0.006
	(0.069)	(0.102)	(0.037)	(0.035)	(0.023)	
λ_1	0.266*	-0.169	-0.055	-0.050	-0.020	0.028
	(0.122)	(0.135)	(0.061)	(0.058)	(0.043)	
λ_2	-0.092	0.200	0.002	-0.042	-0.069	0.001
	(0.128)	(0.144)	(0.071)	(0.077)	(0.044)	
λ_3	0.025	0.071	-0.120	-0.054	-0.004	0.082
	(0.203)	(0.202)	(0.109)	(0.083)	(0.064)	
Constant	2.593***	-2.533***	0.309***	0.116*	0.382***	0.133
	(0.114)	(0.149)	(0.062)	(0.049)	(0.059)	

Standard errors in parentheses with 100 bootstrapped repetitions
Regional dummies, variables over expenditures are not included in the table
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B.2: Second stage expenditure estimates for Household receiving domestic remittances

	(1) food	(2) housing	(3) durable	(4) other	(5) edu	(6) health
log of total expenditure	-0.210***	0.291***	-0.038***	-0.007	-0.029***	-0.007
	(0.014)	(0.014)	(0.005)	(0.006)	(0.004)	
No. of HH	0.008	-0.026***	0.004	0.011**	0.001	0.002
	(0.006)	(0.006)	(0.003)	(0.004)	(0.003)	
Head age 25-59	-0.022	0.033	0.015	-0.009	-0.015	-0.002
	(0.027)	(0.024)	(0.013)	(0.022)	(0.014)	
Dummy for Old	0.026	0.057*	-0.023	-0.042*	-0.024	0.006
	(0.026)	(0.027)	(0.014)	(0.018)	(0.013)	
Dummy for infant	-0.016	0.064*	0.014	-0.031	-0.015	-0.016
	(0.032)	(0.028)	(0.013)	(0.017)	(0.013)	
Urban	0.003	-0.102**	0.024	-0.052	0.015	0.112
	(0.059)	(0.035)	(0.027)	(0.045)	(0.033)	
Belongs to Ethnic caste	-0.019	0.052*	-0.010	-0.025	-0.026**	0.028
	(0.024)	(0.023)	(0.014)	(0.015)	(0.009)	
Dummy for primary school	-0.064	0.000	0.015	0.000	0.000	0.049
	(0.056)	(0.037)	(0.022)	(0.020)	(0.020)	
Dummy for secondary school	-0.064	-0.069	0.038	0.036	0.024	0.035
	(0.061)	(0.044)	(0.023)	(0.024)	(0.023)	
Dummy for advance education	-0.060	-0.127**	0.054*	0.046	0.064**	0.023
	(0.053)	(0.042)	(0.021)	(0.026)	(0.020)	
Duration (1-5years)	0.036	0.031	-0.016	-0.013	-0.014	-0.024
	(0.040)	(0.037)	(0.023)	(0.020)	(0.011)	
Duration (more than 5 years)	-0.040	-0.039	0.000	0.050	0.001	0.028
	(0.049)	(0.038)	(0.031)	(0.033)	(0.017)	
Dummy for Absentee	-0.070	0.064	0.017	0.045	-0.042	-0.014
	(0.064)	(0.040)	(0.031)	(0.040)	(0.025)	
λ_0	0.231	0.091	-0.126	-0.155	0.047	-0.088
	(0.165)	(0.111)	(0.118)	(0.094)	(0.065)	
λ_1	0.018	-0.038	-0.029	0.048	0.022	-0.021
	(0.050)	(0.043)	(0.024)	(0.031)	(0.026)	
λ_2	-0.087	0.176	0.009	-0.032	-0.071	0.005
	(0.163)	(0.111)	(0.087)	(0.126)	(0.070)	
λ_3	0.144	-0.017	-0.125	0.065	0.048	-0.115
	(0.179)	(0.122)	(0.139)	(0.123)	(0.086)	
Constant	2.980***	-2.762***	0.401***	0.071	0.378***	-0.068
	(0.205)	(0.148)	(0.096)	(0.115)	(0.074)	

Standard errors in parentheses with 100 bootstrapped repetitions
Regional dummies, variables over expenditures are not included in the table
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B.3: Second stage expenditure estimates for Household receiving international remittances

	(1) food	(2) housing	(3) durable	(4) other	(5) edu	(6) health
log of total expenditure	-0.209***	0.291***	-0.034***	-0.011	-0.029***	-0.008
	(0.013)	(0.012)	(0.004)	(0.009)	(0.005)	
No. of HH	0.014*	-0.026***	0.002	0.012*	-0.000	-0.002
	(0.006)	(0.006)	(0.005)	(0.005)	(0.004)	
Head age 25-59	-0.001	0.016	-0.026	0.003	0.007	0.001
	(0.035)	(0.033)	(0.020)	(0.025)	(0.022)	
Dummy for old	0.034	-0.007	-0.022	0.006	-0.013	0.002
	(0.032)	(0.029)	(0.018)	(0.020)	(0.014)	
Dummy for infant	0.014	0.031	0.009	-0.047*	-0.011	0.004
	(0.028)	(0.026)	(0.021)	(0.022)	(0.012)	
Urban	-0.005	-0.120**	0.071*	0.033	-0.005	0.026
	(0.062)	(0.037)	(0.031)	(0.039)	(0.037)	
Belongs to Ethnic Caste	-0.032	0.019	0.040*	-0.008	-0.020	0.001
	(0.029)	(0.026)	(0.019)	(0.024)	(0.016)	
Dummy for primary school	0.080	0.104	-0.050	-0.067	0.030	-0.097
	(0.058)	(0.078)	(0.030)	(0.052)	(0.047)	
Dummy for secondary school	0.009	0.108	-0.022	-0.043	0.055	-0.107
	(0.056)	(0.080)	(0.030)	(0.050)	(0.047)	
Dummy for advance education	0.000	0.000	0.000	0.000	0.089	-0.089
	(0.048)	(0.076)	(0.029)	(0.050)	(0.047)	
Duration (1-5 years)	0.015	0.013	0.013	-0.041*	-0.010	0.01
	(0.029)	(0.020)	(0.017)	(0.018)	(0.014)	
Duration (more than 5 years)	0.108*	-0.013	-0.016	-0.062*	-0.009	-0.008
	(0.044)	(0.033)	(0.022)	(0.024)	(0.020)	
Dummy for Absentee	-0.038	-0.118	0.030	0.085	0.008	0.033
	(0.076)	(0.064)	(0.049)	(0.047)	(0.042)	
λ_0	-0.333*	0.020	0.028	0.089	0.154	0.042
	(0.157)	(0.135)	(0.130)	(0.107)	(0.080)	
λ_1	0.100	-0.097	-0.081	-0.048	0.136	-0.01
	(0.154)	(0.126)	(0.086)	(0.098)	(0.073)	
λ_2	-0.116	-0.117*	0.063	0.086*	0.042	0.042
	(0.060)	(0.048)	(0.034)	(0.040)	(0.040)	
λ_3	0.006	-0.039	-0.106	-0.011	0.088	0.062
	(0.156)	(0.138)	(0.120)	(0.118)	(0.094)	
Constant	2.686***	-2.775***	0.305*	0.158	0.447***	0.179
	(0.212)	(0.217)	(0.144)	(0.145)	(0.127)	

Standard errors in parentheses with 100 bootstrapped repetitions
Regional dummies, variables over expenditures are not included in the table
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B.4: Second stage expenditure estimates for Household receiving both internal and international remittances

	(1) food	(2) housing	(3) durable	(4) other	(5) edu	(6) health
log of total expenditure	-0.187***	0.303***	-0.049***	-0.023*	-0.031***	-0.013
	(0.023)	(0.024)	(0.008)	(0.010)	(0.009)	
No. of HH member	0.009	-0.021	0.000	0.009	0.002	0.001
	(0.011)	(0.012)	(0.005)	(0.009)	(0.006)	
Head age 25-59	-0.059	0.021	0.025	-0.029	0.019	0.023
	(0.058)	(0.056)	(0.027)	(0.039)	(0.038)	
Dummy for old	-0.003	0.026	-0.014	-0.017	-0.016	0.024
	(0.054)	(0.053)	(0.025)	(0.041)	(0.033)	
Dummy for infant	0.038	0.038	0.012	-0.055	-0.029	-0.004
	(0.058)	(0.051)	(0.026)	(0.030)	(0.026)	
Urban	0.108	-0.196*	0.110	-0.006	0.132*	-0.148
	(0.134)	(0.082)	(0.056)	(0.056)	(0.067)	
Belongs to Ethnic Caste	-0.039	0.050	0.016	-0.063	0.029	0.007
	(0.055)	(0.062)	(0.029)	(0.039)	(0.037)	
Dummy for primary school	0.074	0.074	0.000	-0.021	0.000	-0.127
	(0.072)	(0.082)	(0.040)	(0.044)	(0.041)	
Dummy for secondary school	0.026	0.054	0.061	-0.009	-0.009	-0.123
	(0.079)	(0.078)	(0.047)	(0.044)	(0.037)	
Dummy for advance education	0.010	0.000	0.090	0.000	0.035	-0.135
	(0.082)	(0.077)	(0.047)	(0.050)	(0.041)	
Duration (1-5 years)	0.020	-0.011	-0.010	0.025	-0.013	-0.011
	(0.042)	(0.047)	(0.024)	(0.034)	(0.027)	
Duration (more than 5 years)	0.017	-0.022	-0.003	0.043	0.006	-0.041
	(0.073)	(0.058)	(0.033)	(0.048)	(0.029)	
Dummy for absentee	-0.019	0.011	-0.070	0.074	-0.061	0.065
	(0.135)	(0.103)	(0.061)	(0.081)	(0.077)	
λ_0	-0.014	0.154	-0.027	-0.093	-0.061	0.041
	(0.307)	(0.264)	(0.152)	(0.231)	(0.209)	
λ_1	0.144	-0.164	0.131	0.022	-0.098	-0.035
	(0.268)	(0.188)	(0.117)	(0.136)	(0.130)	
λ_2	-0.404	0.249	-0.010	0.020	0.044	0.101
	(0.304)	(0.233)	(0.135)	(0.197)	(0.180)	
λ_3	0.180	-0.045	-0.086	0.045	-0.085	-0.009
	(0.113)	(0.086)	(0.047)	(0.068)	(0.059)	
Constant	2.080***	-2.889***	0.716***	0.303	0.500**	0.29
	(0.377)	(0.356)	(0.174)	(0.197)	(0.191)	

Standard errors in parentheses with 100 bootstrapped repetitions
Regional dummies, variables over expenditures are not included in the table
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B.5: OLS expenditure estimates for households with no remittances

	(1) food	(2) housing	(3) durable	(4) other	(5) edu	(6) health
log of total expenditure	-0.178***	0.253***	-0.025***	-0.011***	-0.034***	-0.005
	(0.009)	(0.008)	(0.004)	(0.003)	(0.003)	
No. of HH member	0.003	-0.024***	0.001	0.008***	0.011***	0.001
	(0.003)	(0.004)	(0.002)	(0.002)	(0.002)	
Head age 25-59	0.015	-0.033*	-0.003	0.013	0.019**	-0.011
	(0.014)	(0.015)	(0.009)	(0.010)	(0.007)	
Dummy for old	0.030*	-0.024	-0.016*	0.006	-0.008	0.012
	(0.012)	(0.013)	(0.007)	(0.008)	(0.006)	
Dummy for infant	0.038**	0.026	0.007	-0.033***	-0.053***	0.015
	(0.014)	(0.015)	(0.009)	(0.008)	(0.007)	
Urban	-0.063**	-0.030	0.039**	0.010	0.033**	0.011
	(0.023)	(0.024)	(0.015)	(0.017)	(0.012)	
Belongs to Ethnic Caste	0.011	-0.004	-0.010	0.005	-0.008	0.006
	(0.010)	(0.011)	(0.007)	(0.006)	(0.006)	
Dummy for primary school	-0.029	-0.044	0.038**	0.003	0.027**	0.005
	(0.029)	(0.026)	(0.013)	(0.016)	(0.008)	
Dummy for secondary school	-0.066*	-0.081**	0.068***	0.042*	0.042***	-0.005
	(0.027)	(0.025)	(0.013)	(0.017)	(0.009)	
Dummy for advance education	-0.061*	-0.168***	0.090***	0.044*	0.086***	0.009
	(0.029)	(0.028)	(0.015)	(0.018)	(0.010)	
Duration (1-5 years)	0.003	-0.019	-0.011	0.031	0.000	-0.004
	(0.027)	(0.028)	(0.017)	(0.022)	(0.016)	
Duration (more than 5 years)	-0.013	0.024	-0.023	0.021	-0.002	-0.007
	(0.023)	(0.025)	(0.012)	(0.015)	(0.011)	
Dummy for Absentee	0.012	-0.007	0.012	0.001	-0.020**	0.002
	(0.015)	(0.015)	(0.011)	(0.010)	(0.007)	
Constant	2.387***	-2.298***	0.294***	0.201***	0.333***	0.083
	(0.086)	(0.082)	(0.040)	(0.036)	(0.029)	

Standard errors in parentheses with 100 bootstrapped repetitions
Regional dummies, variables over expenditures are not included in the table
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B.6: OLS expenditure estimates for households with domestic remittances

	(1) food	(2) housing	(3) durable	(4) other	(5) edu	(6) health
log of total expenditure	-0.201***	0.275***	-0.034***	-0.006	-0.027***	-0.007
	(0.011)	(0.011)	(0.004)	(0.005)	(0.003)	
No. of HH member	0.004	-0.026***	0.005	0.013***	0.001	0.003
	(0.005)	(0.005)	(0.003)	(0.003)	(0.002)	
Head age 25-59	-0.015	-0.013	0.028**	0.013	-0.013	0.00
	(0.019)	(0.018)	(0.009)	(0.012)	(0.009)	
Dummy for old	0.044**	0.001	-0.007	-0.026*	-0.019**	0.007
	(0.017)	(0.018)	(0.009)	(0.011)	(0.007)	
Dummy for infant	-0.001	0.056*	0.011	-0.037**	-0.011	-0.018
	(0.022)	(0.022)	(0.012)	(0.012)	(0.009)	
Urban	-0.019	-0.167***	0.035*	0.043**	0.091***	0.017
	(0.030)	(0.026)	(0.018)	(0.015)	(0.020)	
Belongs to Ethnic Caste	0.011	-0.001	-0.009	-0.010	-0.014	0.023
	(0.015)	(0.015)	(0.009)	(0.010)	(0.007)	
Dummy for primary school	-0.048	-0.063*	0.039*	0.015	0.028**	0.029
	(0.035)	(0.031)	(0.016)	(0.020)	(0.010)	
Dummy for secondary school	-0.040	-0.119***	0.060***	0.040	0.050***	0.009
	(0.034)	(0.032)	(0.015)	(0.021)	(0.012)	
Dummy for advance education	-0.031	-0.187***	0.074***	0.056**	0.094***	-0.006
	(0.033)	(0.031)	(0.015)	(0.021)	(0.013)	
Duration (1-5 years)	0.046	0.033	-0.018	-0.026	-0.010	-0.025
	(0.030)	(0.033)	(0.014)	(0.014)	(0.009)	
Duration (more than 5 years)	-0.022	0.007	-0.004	0.001	-0.007	0.025
	(0.022)	(0.023)	(0.012)	(0.014)	(0.008)	
Dummy for absentee	0.001	0.018	0.004	0.009	-0.012	-0.02
	(0.018)	(0.019)	(0.012)	(0.013)	(0.008)	
Constant	2.702***	-2.538***	0.365***	0.090	0.293***	0.088
	(0.114)	(0.106)	(0.044)	(0.050)	(0.037)	

Standard errors in parentheses with 100 bootstrapped repetitions
Regional dummies, variables over expenditures are not included in the table
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B.7: OLS expenditure estimates for households with international remittances

	(1) food	(2) housing	(3) durable	(4) other	(5) edu	(6) health
log of total expenditure	-0.211***	0.286***	-0.029***	-0.008	-0.027***	-0.011
	(0.013)	(0.011)	(0.005)	(0.007)	(0.004)	
No. of HH member	0.015**	-0.029***	0.003	0.013**	-0.001	-0.001
	(0.006)	(0.005)	(0.003)	(0.005)	(0.002)	
Head age 25-59	0.032	-0.026	-0.025*	0.004	0.010	0.005
	(0.021)	(0.024)	(0.012)	(0.017)	(0.011)	
Dummy for old	0.061**	-0.043*	-0.018	0.007	-0.012	0.005
	(0.021)	(0.022)	(0.011)	(0.015)	(0.010)	
Dummy for infant	0.018	0.044	0.004	-0.055**	-0.008	-0.003
	(0.022)	(0.023)	(0.014)	(0.018)	(0.009)	
Urban	0.002	-0.118***	0.066***	0.027	0.028	-0.005
	(0.030)	(0.030)	(0.017)	(0.025)	(0.017)	
Belongs to Ethnic Caste	-0.005	0.025	0.021	-0.027	-0.013	-0.001
	(0.018)	(0.018)	(0.012)	(0.016)	(0.010)	
Dummy for primary school	0.023	-0.096**	0.011	0.028	0.034**	0.00
	(0.036)	(0.033)	(0.017)	(0.019)	(0.010)	
Dummy for secondary school	-0.059	-0.083**	0.038*	0.054**	0.056***	-0.006
	(0.033)	(0.032)	(0.017)	(0.019)	(0.011)	
Dummy for advance education	-0.058	-0.192***	0.056**	0.092***	0.093***	0.009
	(0.034)	(0.036)	(0.019)	(0.025)	(0.014)	
Duration (1-5 years)	-0.005	0.018	0.018	-0.038**	-0.001	0.008
	(0.022)	(0.020)	(0.012)	(0.015)	(0.009)	
Duration (more than 5 years)	0.021	-0.008	0.014	-0.027	-0.005	0.005
	(0.021)	(0.022)	(0.012)	(0.017)	(0.010)	
Dummy for Absentee	-0.017	-0.019	-0.001	0.027	0.010	0.000
	(0.022)	(0.021)	(0.014)	(0.017)	(0.011)	
Constant	2.671***	-2.647***	0.350***	0.168*	0.294***	0.164
	(0.140)	(0.114)	(0.052)	(0.075)	(0.043)	

Standard errors in parentheses with 100 bootstrapped repetitions
Regional dummies, variables over expenditures are not included in the table
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B.8: OLS expenditure estimates for households with domestic and international remittances

	(1) food	(2) housing	(3) durable	(4) other	(5) edu	(6) health
log of total expenditure	-0.186***	0.297***	-0.047***	-0.021**	-0.029***	-0.014
	(0.017)	(0.020)	(0.006)	(0.008)	(0.006)	
No. of HH member	0.004	-0.019*	0.001	0.009	0.003	0.002
	(0.008)	(0.009)	(0.004)	(0.008)	(0.003)	
Head age 25-59	-0.018	-0.020	0.010	0.005	0.009	0.014
	(0.035)	(0.032)	(0.016)	(0.024)	(0.017)	
Dummy for old	0.017	-0.014	-0.010	0.007	-0.018	0.018
	(0.037)	(0.035)	(0.014)	(0.029)	(0.014)	
Dummy for infant	0.049	0.021	0.019	-0.058*	-0.027*	-0.004
	(0.032)	(0.036)	(0.016)	(0.024)	(0.013)	
Urban	-0.039	-0.217***	0.128***	-0.031	0.139***	0.02
	(0.056)	(0.047)	(0.031)	(0.043)	(0.032)	
Belongs to Ethnic Caste	0.042	-0.018	0.013	-0.044	0.008	-0.001
	(0.026)	(0.029)	(0.013)	(0.023)	(0.013)	
Dummy for primary school	0.031	-0.072	0.025	0.002	0.038*	-0.024
	(0.057)	(0.058)	(0.022)	(0.042)	(0.019)	
Dummy for secondary school	0.002	-0.091	0.063**	0.022	0.022	-0.018
	(0.050)	(0.050)	(0.020)	(0.040)	(0.016)	
Dummy for advance education	0.008	-0.164***	0.089***	0.037	0.058**	-0.028
	(0.047)	(0.047)	(0.021)	(0.042)	(0.018)	
Duration (1-5 years)	-0.013	0.005	0.011	0.008	-0.001	-0.01
	(0.028)	(0.032)	(0.016)	(0.025)	(0.011)	
Duration (more than 5 years)	-0.050	0.043	-0.019	0.026	0.023	-0.023
	(0.029)	(0.034)	(0.015)	(0.024)	(0.014)	
Dummy for absentee	-0.050	-0.026	0.027	0.015	-0.016	0.05
	(0.039)	(0.031)	(0.024)	(0.028)	(0.018)	
Constant	2.467***	-2.749***	0.447***	0.375***	0.310***	0.15
	(0.190)	(0.204)	(0.069)	(0.093)	(0.071)	

Standard errors in parentheses with 100 bootstrapped repetitions
Regional dummies, variables over expenditures are not included in the table
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

APPENDIX C

SUPPLEMENTAL MATERIALS FOR CHAPTER 4

The asset index in this paper is constructed using the principle component approach using the assets owned by the households. Figure 4.5 shows the distribution of constructed asset index used in the analysis. I follow Vyas and Kumaranayake (2006); McKenzie (2005); Houweling, Kunst, and Mackenbach (2003); Filmer and Pritchett (2001, 1999) approach to create socio-economic status variable in the absence of accurate income data in the surveys. Filmer and Pritchett (1999) shows that asset index helps predict socio-economic difference in the context of Indonesia, India, Pakistan, Nepal, and Argentina. To construct the asset index I characterize the household assets in the survey into five different categories: Basic, Medium, Professional, Expensive, and Agricultural assets. I use the count of assets in these categories to construct the asset index. Filmer and Pritchett (2001) used mostly binary variables to construct the asset index. However, non-binary variables can also be included in the analysis (McKenzie, 2005). Basic categories of assets include bed, chair, table, watch, fan, telephone, radio, closet. Medium assets include television, VCR, refrigerator, bicycle, camera, rice cooker. Professional assets include sewing machine, carts, carpet weaving machine, bullock cart, bicycle rickshaw, horse carts. Expensive assets include motorbike, tractor, car, bus, and solar panel. Agricultural assets include water pump, stone grinder, and modern plough.

C.1 Maps

Figure C.1: Physical Map of Nepal

Figure C.2: District Map of Nepal

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