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THE IMPACT OF REMITTANCE ON POVERTY AND INEQUALITY: A MICRO-SIMULATION STUDY FOR NEPAL

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ABSTRACT

Using nationally representative panel data from Nepal, we estimate a household consumption function and simulate the impacts of remittance on poverty and inequality. We study how these impacts vary with regional maturity of migration process and country-source of remittance. The results show that remittance has positive impacts on reduction of all the incidence, depth and severity of poverty; the magnitude of impact increases with the depth and severity of poverty and it is larger in the second round of the survey. The region-wise simulations show that the remittance has larger impacts on poverty reduction in the regions that have higher levels of migration. The effect on income equality is adverse but it is smaller in the second round. These findings suggest that the impacts largely depend on the maturity of migration process as well as the participation of lower quintiles of society in the process. For instance, the remittance from India — the oldest and most convenient destination, which is on average much lower than from other countries, has not only the largest impacts on poverty reduction but also has favourable impacts on income equality.

Keywords: Migration, Remittance, Poverty, Inequality, Microsimulation, Nepal

INTRODUCTION

The inflow of international remittance in developing countries (DCs) increased dramatically since 1990s, from US$30 billion in 1990 to US$325 billion in 2010, and it has emerged as a most important source of private capital flows for dozens of these countries (World Bank, 2011). Nepal has also experienced a similar trend, which is considerably larger in magnitude and growth than in other DCs. For instance, the annual work-related emigration to countries other than India has increased by 30 times from about 10 thousand in early 1990s to about 300 thousand in 2010 (Department of Foreign Employment, [DOFE] 2011). The number would be much large if we included migrants who are working in India, with whom there is a reciprocal agreement to enter without a visa. As a result, the contribution of remittance relative to GDP increased sharply from 2 per cent in early 1990s to 23 per cent in 2009. Currently, as a share of GDP, Nepal is among the top five largest remittance recipient countries in the world (World Bank, 2011). Remittance is the largest foreign exchange earner, and it exceeds the sum of tourism, foreign aid and exports earnings in recent years (Shrestha, 2008). Furthermore, due to shortages in the domestic labour market (with at least 30 per cent of the workforce being 'under-utilized'), foreign migration is one of the main employment opportunities for Nepalese people and has greater regional and global importance, as well.

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On the one hand, the poverty declined remarkably from 42 per cent to 31 per cent during late 1990s and early 2000s, despite the modest economic growth and political turbulence (CBS 2006: i-iii). On the other hand, the inequality (measured by Gini coefficient) also increased sharply (from 0.34 to 0.41) during this period (CBS, 2006: iii). The Asian Development Bank (2007) reports an even higher level of inequality (Gini coefficient equal to 0.47), and it concludes that Nepal is the most unequal country in Asia among the 22 member countries it studied. Given these developments, this research addresses the question: How migration and remittance are working as one of the driving forces behind the reduction in poverty and increase in inequality? The previous studies have used two general approaches: (i) remittance as 'exogenous transfer' (see Stark *et al.*, 1986, 1988; Stark, 1991) and (ii) remittance as 'potential substitute' for other household earnings (see Barham and Boucher, 1998; Zhu and Luo, 2010 among others), to assess the impact of remittance on poverty and income distribution. In the context of Nepal, allowing correlation between remittance income and household activities is more relevant economic question rather than considering remittance as mere 'exogenous transfer'. Furthermore, the statistical techniques used to generate counterfactual consumption (income) also affect the results, leading to mixed findings on the magnitude of poverty reduction and whether remittance would be income equalizer or un-equalizer (Brown and Jimenez, 2008). In addition, heterogeneity in the maturity of the migration-remittance process across countries and regions and in the sources of remittances (for example domestic versus foreign, or intra- versus inter-continental), might further widen the variation in results (Taylor *et al.*, 2005). To the best of our knowledge, there are no studies that disaggregate the impacts over time according to the prevalence of migration among regions and source of remittances applying the approach (ii) mentioned above.

As for the econometric method, majority of the previous literature on migration and remittance has used instrumental variables (IV) and Heckman Selection methods to control for the endogeneity of remittance income. In contrast, we use a fixed effect model that allows for correlation between remittance and unobserved time-invariant factors (for example ability), and do not find further evidence of endogeneity after controlling for fixed effects and a large number of control variables. We then carried out simulations at national and regional levels to examine the impact of remittance income on poverty and inequality. We find that all aspects of poverty (that is incidence, depth and severity) would worsen in the absence of remittance income, the largest impact being on the severity of poverty. There is regional variation in the impact of remittance on poverty: the regions that have higher a prevalence of migration/remittance experience larger poverty reduction. Among the remittance sources, the Indian remittance has the largest impact when compared to domestic and other country remittance sources. The overall impact on equality is negative, but the negative effect decreases over time. In contrast with remittance from other parts of Nepal and third countries, Indian remittance works as an income equalizer. These results are consistent with the findings of Stark *et al.* (1986), Taylor *et al.* (2005) and the cumulative theory of migration (see Massey *et al.*, 1994).

MIGRATION, REMITTANCE, POVERTY AND INEQUALITY

The impact of remittance on poverty and income distribution in developing countries has been extensively investigated since 1980s (see Stark *et al.*, 1986, 1988; Adams, 1991) with mixed findings. In general, it is agreed that migration and remittance reduce poverty. However, the magnitude of poverty reduction varies among origin communities, remittance sources, and whether we treat remittance as 'potential substitute' or 'exogenous transfer'. Using household data from 11 Latin American countries, Acosta *et al.* (2007) found that the impact was modest, and it also varied across countries. Considering remittance as 'potential substitute', Brown and Jimenez, (2008) exemplified that Tonga experienced larger impact on poverty due to longer migration history and higher incidence of remittance. However, the impact was smaller when they considered remittance as an 'exogenous transfer'. Considering remittance as an 'exogenous transfer', Wouterse, (2010)

found that remittance from African countries had larger impacts on poverty reduction than that from other continents in case of Burkina Faso.

The impact on income inequality varies among studies, depending on the migration history, setting of migration, and endowment of human capital (Stark *et al.*, 1986). Some studies find that migration and remittance do reduce income disparities (for example Zhu and Luo, (2010) for Hubei province of China and Pfau and Long, (2011) for Vietnam). However, some other studies show that migration and remittance increase inequality (for example Adams (1991) for rural Egypt; Adams *et al.* (2008) for Ghana). Meanwhile, a few other studies show that the direction of impacts depends on the methodology used (Barham and Boucher, 1998), choice of destinations (Wouterse, 2010), setting of migrant communities (Taylor *et al.*, 2005), and maturity of the migration process (Brown and Jimenez, 2008). In Nicaraguan study, Barham and Boucher (1998) found that remittance would work as an income equalizer when they treated it as an 'exogenous transfer', but it would work as a un-equalizer when they treated it as a 'potential substitute' of household earnings. Taylor *et al.* (2005), considering remittance as an 'exogenous transfer' in the study of rural Mexico, found that the impact depends on the incidence of migration in each region; the regions having a higher level of foreign migration have lower inequality and poverty.There are few studies on migration and remittance for Nepal. In general, the existing studies have focused on the evolution process (for example, Yamanaka, 2000; Thieme and Wyss, 2005) and determinants (see Fafchamps and Shilpi, 2008; WFP, 2008) of migration. Although these studies have discussed the increased importance of migration and remittance, there are limited studies that relate the migration-remittance process to welfare. Milligan, (2009) investigated the impacts on child welfare and household consumption and found that the elasticity of consumption from remittance income is far lower than that of non-remittance income for all consumption categories considered.

In addition, Lokshin *et al.* (2007, 2010) used cross-section data and a Full Information Maximum Likelihood (FIML) method with instrumental variables (that is proportion of migrants at ward/district level). They found that increased migration for work contributed about one-fifth of poverty reduction in Nepal during 1995-2004, but it had positive and insignificant impacts on inequality.We relax the assumptions in previous studies by controlling for household fixed effects while at the same time study the regional variation of the impact of remittances and the importance of the remittance sources.

Data

We use two rounds of the Nepal Living Standards Survey (NLSS) conducted by the Central Bureau of Statistics (CBS) of Nepal. The first round (NLSS I) was conducted in 1995/96 (hereafter 1996) while the second round (NLSS II) was carried out in 2003/04 (hereafter 2004). The survey had followed the Living Standard Measurement Survey (LSMS) methodology developed by the World Bank for both rounds. It adopted a two-stage stratified sampling method[3]. In this study, we use a balanced panel of 962 households, out of the 1,232 households that were enumerated in 2004 (CBS 1996, 2004). The survey used similar household and community questionnaires in both rounds. The household questionnaire collects information on household demographic composition, housing, access to facilities, expenditure, land, asset holdings, education, health, employment, farming and livestock, credit and savings, remittance, transfers, etc. The community questionnaire collected information on community, infrastructure, facilities, market and prices both for rural and urban wards. It also collected data on agriculture, migration, school, health facility, etc. for rural wards (CBS 1996, 2004).We constructed the consumption aggregate following Deaton and Zaidi (2002), with the exception that we included health expenditure as consumption expenditure[4]. Household

[3] For further details on the sampling procedure, see CBS (2004).

[4] Other components of the consumption aggregate are expenditure on food, non-food items, housing and flow of services from durables. Weighted food price indices are computed as the proxy for all prices, except rent prices, for

per capita consumption or per capita expenditure equivalence (PCE), the dependent variable, is calculated by dividing household consumption by household size where the household size includes all the members who were either at home at least for 6 months or were born during the survey year.

Due to data limitations, we do not know whether the remittance sender is an absent member of that household, a relative from another household or just a friend. We only know whether a household has an absent member or not and whether it receives remittance but. So, we can neither identify the destination of the migrant member unless it sends remittance nor disentangle the effect of having an absent member from the effect of receiving remittance income from that member. Instead, we merely focus on the remittance effect.The pre-migration household size and its composition exclude the absent members of the household who were out of home for more than 6 months at the time of the survey. The household head is considered as having a migration history if he or she had come from another village, municipality or foreign country except for seasonal migration. A person is 'employed' if he or she worked at least an hour during the last seven days or was on temporary leave. It is 'unemployed' if he or she did not work during that period, but he or she looked for work, was waiting for a new job, did not find work or did not know how to look for work. The major occupation of the household head is the first occupation reported in the questionnaire (CBS, 2004).

EMPIRICAL METHODOLOGY

Econometric approach

As migration involves risks and uncertainties that are difficult to evaluate (Williams and Balaž, 2011), the credit and insurance market rarely finances for it. Instead, the migration-remittance process becomes a self-enforcing and cooperative contract between a migrant and it family that provides coinsurance against risks and uncertainty (Stark 1985, 1991). The household plays the role of both investor and insurer during migration while the migrant altruistically sends remittance (Kang and Sawada, 2003) which in turn provides insurance for household production, consumption and inheritance (Stark 1985, 1991)[5]. Therefore, migration is a household level decision that maximizes welfare (see Bhattacharya, 1985 and Stark, 1991), and hence it is important to allow for correlation between remittance/migration decisions and household activities. Indeed, the literature on migration and remittance argues that the characteristics of migrant households and non-migrant households might be different and thus unobserved factors might determine both migration\remittance decisions and consumption patterns (Borjas, 1987; Barham and Boucher, 1998). Since the pooled OLS estimates might be inconsistent, we use the following unobserved effect model (Wooldridge 2002, Section 10.2):

$$\ln(PCE_{it}) = \alpha + \beta R_{it} + \gamma X_{it} + \delta G_i + \eta E_i + d_t + f_i + \varepsilon_{it} \qquad (1)$$

six statistical regions based on the 'share of food' and other components available in the survey. These price indices are used to compute regional Laspeyres price indices to deflate the household aggregate consumption and adjust for the differences in cost of living across regions. Finally, consumption for NLSS II (2004) is deflated at the constant price of 1996 using the national consumer price index.

[5] Although individual motives such as altruism, exchange, strategic motives, and so on are important for migrants' remittance (for review of extensive theories and empirical studies see Rapport and Docquier 2006), familial incentives such as insurance and investment better explain the remittance process.

where, ln(PCE) is the natural logarithm of per capita consumption (PCE)[6] of a household i, $d_t$is a time dummy, f_i captures time invariant factors for a household i and ε_{it} are idiosyncratic errors that change across t as well as i. (X_{it}, G_i, E_i, R_{it}) are observed regressors. $R_{it}$is a remittance related regressor that represents either a dummy for whether a household received remittance or the actual log remittance income received (log of one plus remittance income, so as to include the households who do not receive remittance). The parameter of our interest, β, captures the gain in household welfare, measured by the log of per capita consumption, due to the migration-remittance decision. X_{it} is a set of household and community characteristics. The household characteristics include household size and its composition, characteristics of household head, per capita pension income, lagged assets and agricultural land holding[7] to control for intra-household resource allocation, economies of scale, earning opportunities of the household and returns from assets holdings. We also use binary indicators ('Upper Caste' (Brahmin/Chhetri), 'Lower Caste' (Dalit), 'Newar', 'Migrating Janajati' and 'Other caste/ethnic group')[8] to control for caste and ethnicity characteristics. We use six regional dummies (G_i) to control for spatial premiums on consumption, and migration costs associated with socio-physical proximities (Fafchamps and Shilpi, 2008). To capture community level externalities on welfare, we use ward level characteristics such as mean household consumption, and proportions of population above 15 years who were illiterate or passed the high school level national exam (SLC), employed or self employed, and in agriculture or non-agriculture occupation[9].

In model (1), if the unobserved effect (f_i) is uncorrelated with all of the explanatory variables, then one could consistently estimate the parameters using a random effects model (Wooldridge, 2002, Section 10.5.4). However, there could be an arbitrary correlation between f_i and observed explanatory variables. For example, unobserved household characteristics might systematically affect migration and remittance (Barham and Boucher, 1998). So, by allowing arbitrary correlation between the time-invariant f_i and remittance (R_{it}) in a fixed effects model (Wooldridge, 2002, Section 10.5.5), we can consistently estimate β.

Construction of counterfactual consumption

Based on the above models of log consumption, we use fixed effects estimates to construct counterfactual consumption patterns under several scenarios for remittance income. At the time of estimating the parameters of equation (1), we did not assume any parametric distribution for ε_{it}. However, for the purpose of simulating mean consumption and poverty/inequality measures, this assumption becomes necessary. We first consider several parametric distributions, in particular normal as well as student t-distribution (with two up to 30 degrees of freedom) with zero mean and

[6] Alternatively, one could implicitly estimate the adult equivalence per capita consumption by estimating the model with total household consumption as the dependent variable while including natural logarithm of household size and dependency ratio as explanatory variables.

[7] Two dummies- asset rich and asset poor were constructed based on the median values of the lagged assets holding index which is the flow of services from durable holdings that were purchased at least one year prior to survey year. Five dummies on agricultural land holding are constructed based on the size of land holding.

[8] 'Migrating Janajati' includes 'Gurung', 'Magar', 'Rai', 'Limbu' and 'Thakali', which are ethnic groups with a long and remarkable practice of work/business related migration.

[9] The sample wards have at least five and at most 16 sample households. All of those sample households in a ward is included to compute these community level variables. For complete list of controls, please see Table 4.

constant variance (homoskedasticity) or varying variance (heteroskedasticity)[10] for the error term (ε_{it}). We chose a student t-distribution with 30 degrees of freedom and heteroskedasticity because it produced predicted values for consumption, poverty and inequality that are closest to the actual values. Thus, for each household we generate 10,000 values of ln(PCE) using the following equation:

$$\ln(PCE_{it}) = \hat{\alpha} + \hat{\beta}R_{it} + \hat{\gamma}X_{it} + \hat{\delta}G_{it} + \hat{f}_i + \hat{\varepsilon}_{it} \qquad (2)$$

where $\hat{\varepsilon}_{it}$ are random draws from the selected distribution and ($\hat{\alpha}, \hat{\beta}, \hat{\gamma}, \hat{\delta}, \hat{f}_i$) are given by the fixed effects estimator. The predicted values of ln(PCE) for these households are used to compute the mean per capita household consumption under different scenarios, as well as, indices of poverty and inequality. By fixing alternative values for $R_{it,}$ we can simulate the impact of remittances on the quantities of interest.

Simulation

We do simulations at the national and regional levels[11] (see Table-4 and Figure-1). We also analyze the impact of the source of remittance (that is domestic, foreign, Indian and other countries) in Table-5. We report simulation results for two counterfactual scenarios: (a) *no household receivesany remittance* and (b) *one per cent increase in the proportion of remittance receiving households* separately using the estimates from both the remittance-dummy model and the remittance-amount model. In the remittance-income model, when we increase the proportion of remittance receiving households by one per cent, these households start to receive remittance equal to the average baseline per capita remittance income among remittance receiving households.Following Foster-Greer-Thorbecke (FGT 1984), we use three main measures of poverty – head count poverty (P0), poverty gap (P1) and poverty gap squared (P2) – to analyze the implications of remittance on incidence, depth and severity of poverty, respectively. P0 is the number of people below the poverty line while P1 measures deficit in aggregate poverty of a poor (Ravallion, 1992). P2 is sensitive to changes in the income distribution among the poor and gives higher weight for poor households who experience extreme poverty[12]. In our analysis, we use two types of poverty lines – the national poverty line that is based on the cost of the basic need (CBN), and is equivalent to 2,114 Kcal per day for 1996 (Nepalese rupees (NPR) 5,089 per year) and 2,144 Kcal per day for 2004 (NPR 5,216 per year at constant price of 1996),[13] and international poverty

[10] In the homoskedastic case, the variance of ε_{it} is estimated as explained in Wooldridge (2002: 271, expression 10.56). In the heteroskedastic case, we first regress the squared value of the fixed effect residuals on all explanatory variables. The predicted values of this regression yield an estimate of

$$E(\varepsilon_{it}^2 \mid R_{it}, X_{it}, G_{it}, E_{it}) = \text{var}(\varepsilon_{it} \mid R_{it}, X_{it}, G_{it}, E_{it}).$$

[11] The six statistical regions are Kathmandu valley (KTM), other urban areas (OTHUR), Rural Western Hills/Mountains (RWH), Rural Eastern Hills/Mountains (REH), Rural Western Terai (RWT) and Rural Eastern Terai (RET).

[12] The FGT index satisfies the property of monotonicity and other transfer axioms for poverty measures (Ravallion 1992).

[13] The difference in the calorie intake between two rounds of the survey was due to change in the household composition during 1995-2004 (for detail, see CBS 2004).

lines - PPP US$1/day and its double[14]. We use the Gini index, a widely used measure, to explore the impacts of remittance on consumption inequality[15].

Limitations

Firstly, it is possible that the effect of remittance on consumption for a particular year does not capture the full impact on household welfare. Remittance income could be invested in durables and other assets holding, or it may be saved for future consumption and/or children's education. Although we are not analyzing its effect on future welfare through investment in assets holding, we tested the hypothesis on whether it has been saved for children's education by including interactions of remittance and dummies for the number of children in the household. All these interactions turned out to be insignificant, with a negative sign for households with one, two or three children and positive sign for households with four or more children, implying that there is no enough evidence to support that remittance is being saved for children's education. Secondly, there may be a concern on attrition as the duration between two rounds of surveys was eight years and attrition seems to be correlated with the attributes that influence migration (Thomas *et al.* 2012). 1,232 households were randomly selected from the 3,313 cross-section sample households of NLSS I for panel data and among these only 962 households were successfully tracked in the second round. Although we have information about the attired 270 households for the first round, we cannot identify these households from the available dataset. So, we compare some observable characteristics such as household size, per capita household consumption and poverty at national level of the households that were used as panel households with other cross-section households for the first round. Although the panel households have smaller household size, lower consumption and lower incidence of poverty, the differences were not statistically significant. So, the attrition is not a serious problem in our data set at least at national level. Thirdly, as mentioned in data section, it is difficult to separate the impact of migration (through absent members) from that of remittance. Finally, this study captures the direct impacts of remittance on consumption of recipient households, but it cannot measure the externalities of massive inflow of remittances or massive emigration on the economy[16].

RESULTS

Descriptive results

Table-1shows the descriptive measures on poverty and consumption in Nepal for each of the two rounds of NLSS. For the sake of comparison, they are calculated using both our panel of 962 households and the full NLSS sample (as reported by CBS 2006: 7-9). Results are similar for National level and rural areas, but these are vastly different for urban areas. It implies that some top quintile households in urban areas could not be tracked in both rounds. Panel C in Table-1 shows how poverty, consumption and household assets holdings vary across regions. For instance, Kathmandu valley has the lowest incidence of poverty (12% and 3% for 1996 and 2004 respectively) and the highest per capita consumption and durables holding. In contrast, Rural

[14] PPP US$1/day at constant price of 1993 is equal to NPR 4,508 per year at constant price of 1996.

[15] The Gini coefficient satisfies the desirable properties for an inequality index such as adherence to the Pigou-Dalton transfer principle, symmetry, independence of scale, homogeneity with respect to population, and decomposability (Taylor *et al.,* 2005).

[16] For example, increase in welfare by reducing unemployment among the non-recipient households through relaxing liquidity constraints of remittance recipient households (Posso, 2012), shortage in labour force supply in a particular village exacerbated by the geographical complexity of the country and most importantly, increased demand/price of goods, and farm and non-farm labours.

Western Terai has the highest incidence of poverty (58%) in 1996, whereas the highest incidence of poverty is found in the group of urban areas that exclude Kathmandu (41%) in 2004.

Table 1: Poverty, consumption and asset holding by sector, regions and remittance sources

	Headcount Poverty		Per Capita Consumption		Durables Holding		Agricultural Land Holding	
	1996	2004	1996	2004	1996	2004	1996	2004
Panel A: Nepal								
Nepal	41	32	7,297	9,590	427	741	0.82	0.77
Nepal$^{\xi}$	42	31	7,235	10,318	-	-	-	-
Panel B: Residency								
Rural	42	32	6,813	9,011	274	517	0.84	0.80
Urban	32	30	16,155	17,474	3,152	4,094	0.36	0.42
Rural$^{\xi}$	43	35	6,694	8,499	-	-	-	-
Urban$^{\xi}$	22	10	14,536	20,633	-	-	-	-
Panel C: Regions								
KTM	12	3	23,185	30,216	4,151	7,035	0.09	0.05
OTHR	45	41	11,500	11,823	2,373	2,353	0.57	0.64
RWH	54	27	5,995	8,484	107	352	0.55	0.77
REH	28	37	7,457	8,430	355	278	0.62	0.73
RWT	58	36	6,908	8,441	257	646	1.43	1.05
RET	35	30	6,888	10,046	356	784	1.00	0.76
Panel D: Remittance Receiving households								
ALL	37	28	7,440	9,389	436	510	0.71	0.74
DOM	35	27	7,631	9,494	553	538	0.86	0.70
FOR	42	29	7,247	9,161	375	530	0.54	0.77
IND	43	36	6,350	7,431	193	282	0.56	0.73
OTHR	29	10	21,166	13,567	3,110	1,246	0.35	0.94

Notes: Per capita consumption and durables are in Nepalese rupees (NPR). The variable durable holding is the annual flow of services from durables held by the households one year prior to the survey. $^{\xi}$ The measures for cross section sample. The regions: KTM, OTHR, RWH, REH, RWT, and RET are Kathmandu Valley, Other urban areas, Rural Western Hills, Rural Eastern Hills, Rural Western Terai, and Rural Eastern Terai respectively. All, DOM, FOR, IND, and OTHR are all types of remittance, remittance from within Nepal, remittance from foreign countries, remittance from India and remittance from other countries (except India) respectively. **Source:** Own calculation using NLSS I and II data.

The incidence of poverty among remittance receiving households is lower (37% in 1996 and 28% in 2004, Table 1, Panel D) than the national average (41% and 32%, respectively, Table 1, Panel A). However, there is substantial variability among remittance-receiving households. For example, the poverty is highest (43% and 36% in 1996 and 2004 respectively), even larger than the national average, among the households that receive remittance from India. It is lower for domestic (that is within Nepal) migrant households (35% and 27% in 1996 and 2004 respectively), and the lowest for other countries migrant households. On the one hand, the lowest poverty level among third country migrant households is not only related to the higher return from migration but also to the higher participation from upper quintiles (Table-2, Panel D). On the other hand, the higher level of poverty among Indian migrant households could be related to the relatively larger participation of lower quintile households in the Nepal-India migration (Table 2, Panel D). The lower levels of durables and land holdings among Indian migrant households (Table 1, Panel D) partially explain

that poor households have inadequate collateral to borrow money for costly migration to Gulf and East Asian countries, and they generally send members to India (WFP, 2008: 47).

Table 2: Proportion of remittance receiving households by sectors and regions, and distribution of remittance among quintiles

	1996					2004				
	All	DOM	FOR	IND	OTHR	All	DOM	FOR	IND	OTHR
A: Proportion of remittance receiving households for Nepal (%)										
	23	12	12	11	1	37	20	18	14	5
B: Proportion of Remittance Receiving Households y Rural-urban (%)										
Rural	24	13	12	12	1	37	21	18	14	4
Urban	15	10	6	4	2	28	9	20	9	11
C: Proportion of remittance receiving households by Regions (%)										
KTM	12	11	1	0	1	10	3	7	0	7
OTHR	18	9	9	7	2	39	12	27	14	13
RWH	34	13	23	21	2	47	21	29	25	5
REH	13	11	3	2	0	30	21	9	4	5
RWT	18	12	6	6	0	28	17	13	8	5
RET	26	13	15	14	0	39	23	19	16	3
D: Distribution of remittance sources among consumption Quintiles (%)										
Q1	18	13	23	24	0	15	15	14	17	3
Q2	15	19	15	14	18	14	12	17	18	13
Q3	20	11	28	30	0	19	19	20	23	11
Q4	22	28	13	13	15	26	24	29	29	30
Q5	25	29	22	19	67	26	29	22	13	45
Total	100	100	100	100	100	100	100	100	100	100

Notes: See Table 1 notes.
Source: Own calculation using NLSS I and II panel data

The prevalence of migration (remittance) according destination (sources) varies across rural-urban residency and regions (Table-2, Panel B-C). The level of domestic and Indian migration (remittance) is higher among rural households while the migration to third countries is high among urban residents (Panel B). Among regions, the Rural Western Mountains/Hills region has the highest propensity to receive remittance (34% in 1996 and 47% in 2004) from any country source. This is reinforced by the relatively longer and well developed foreign migration practice in this region. Households of 'Other urban areas' have experienced a sharp increase in a third country migration possibly due to sufficient collateral holding for costly migration, and the development of better communications and transportation infrastructure.

Econometric results

This sub-section presents the estimation results for the natural logarithm of per capita consumption (PCE) based on the specifications discussed in model section. We consider for pooled ordinary least square (POLS), random effect (RE) and fixed effects (FE) models[17]. The Hausman test suggests that the fixed effect model estimates are to be preferred over those of the random effect model. So, we present the fixed effects estimates in Table-3 for both remittance-dummy and remittance-income models. The standard errors in the estimates are robust to heteroskedasticity and

[17] The summary results for all of these models are reported in Appendix A and available upon request.

intra-individual autocorrelation. Most of the regressors have the expected sign although many are insignificant. The coefficient of remittance dummy is significantly positive (at 10% significance level): the per capita consumption of remittance receiving households is 6.54 per cent (100(exp($\hat{\beta}$ – 0.5V($\hat{\beta}$)) - 1), (Kennedy, 1981)) higher than that of non-recipient households, other things being constant. The remittance elasticity of consumption is 0.015, and it is significant at 1 per cent level. The small elasticity value (similar to that of Milligan 2009) suggests that our estimation might not capture the full welfare effect of remittance.

Table 3: Fixed effect estimation of natural logarithm of per capita consumption

Variables	Remittance-dummy Model		Remittance-income Model	
	Coefficient	Std. Errors	Coefficient	Std. Errors
Remittance dummy	0.064*	(0.036)		
Log of per capita remittance income			0.015***	(0.005)
Household composition				
Log of household size	-0.251***	(0.063)	-0.256***	(0.063)
Share of children (4-7)	0.199	(0.208)	0.225	(0.207)
Share of children (8-15)	0.360**	(0.152)	0.385**	(0.152)
Share of men (16-64)	1.082***	(0.182)	1.087***	(0.181)
Share of women (16-64)	0.846***	(0.204)	0.850***	(0.202)
Share or elderly (64+)	0.616***	(0.204)	0.630***	(0.203)
Married members (#)	-0.029	(0.023)	-0.027	(0.023)
Household head characteristics				
Education dummies (Base: Illiterate)				
Informal education	-0.146	(0.148)	-0.163	(0.143)
Primary education	0.067	(0.053)	0.064	-0.052)
Secondary education	0.038	(0.067)	0.036	(0.067)
Higher education	0.018	(0.126)	0.034	(0.124)
Male	0.068	(0.063)	0.086	(0.063)
Age	0.012	(0.007)	0.012*	(0.007)
Age squared	-0.009	(0.007)	-0.01	(0.007)
Ever migrated	-0.006	(0.070)	-0.001	(0.069)
Employment dummies (Base:Inactive)				
Wage in agriculture	-0.139**	(0.059)	-0.131**	(0.059)
Wage in non agriculture	-0.048	(0.062)	-0.04	(0.062)
Self employment in agriculture	-0.037	(0.044)	-0.035	(0.043)
Self employment in non agriculture	-0.016	(0.069)	-0.006	(0.068)
Unemployed	0.069	(0.065)	0.074	(0.065)
Durable rich (Base: Durable assets poor)	0.173***	(0.064)	0.169***	(0.063)
Agricultural land holding dummies (Base: Landless)				
<0.5 Ha	-0.068	(0.061)	-0.068	(0.061)
0.5-1 Ha	0.011	(0.069)	0.013	(0.068)
1-2 Ha	0.092	(0.071)	0.092	(0.071)
>2 Ha	0.066	(0.092)	0.065	(0.091)

Log of per capita pension income	0.019	(0.013)	0.021	(0.013)
Ethnicity dummies (dropped)				
Regional dummies: Other urban region (KTM, RWH, REH, RWT, RET dropped)	0.013	(0.147)	0.013	(0.142)
Ward level characteristics				
Log of ward level mean household consumption	0.642***	(0.053)	0.640***	(0.053)
Illiterate adult population (%)	0.001	(0.003)	0.001	(0.003)
SLC passed adult population (%)	-0.005	(0.003)	-0.005	(0.003)
Adult population in wage-agriculture (%)	0.001	(0.002)	0.001	(0.002)
Adult population in wage non-agriculture (%)	0.005	(0.004)	0.005	(0.004)
Adult population in self employment in agriculture (%)	-0.001	(0.001)	-0.001	(0.001)
Adult population in self employment in non agriculture (%)	-0.007	(0.004)	-0.006	(0.004)
Unemployed adult population (%)	0.001	(0.003)	0.001	(0.003)
Year 2004 (Base: Year 1996)	0.073	(0.045)	0.067	(0.044)
Constant	1.427**	(0.689)	1.408**	(0.686)
Number of observations [Groups]	1,924 [962]		1,924 [962]	
R^2	0.420		0.424	

Notes: Standard errors are robust to heteroskedasticity and autocorrelation. *, ** and *** indicate 10 per cent, 5 per cent and 1 per cent level of statistical significance respectively.**Source:**Own calculation using NLSS I and II panel data.

Among other regressors, both the household size and its composition have a significant impact on consumption. The PCE decreases with household size, a result that theoretically (Deaton and Paxson, 1998) and empirically (Lokshin*et al.* 2010) agrees with literature. Similar to previous studies, the shares of children (8-15 years old), elderly (more than 64) and most importantly the working age men and women (16-64) have positive and significant impacts on consumption. Importantly, the impact of working age members is much higher than that of dependents. This shows that if a family has a lower dependency ratio, then it experiences higher earnings and higher consumption per capita.In contrast with some previous cross-section studies in Nepal (for example CBS, 2004; Lokshin *et al.*, 2007), none of the characteristics of the household head (that is age and its square, and dummies for education, sex, migration history, employment status and occupation) turned out to have a significant effect on consumption. However, these characteristics turned out to be significant in the pooled OLS and random effects estimations. The households with higher level of assets have significantly higher level of consumption. The agriculture land holding has positive but insignificant effects. Similarly, ward level characteristics such as employment, education and occupation have insignificant effects. Only the ward level average household consumption has a significant and large effect on consumption, implying that in communities with higher level of development and living standards, households also experience higher consumption (Table 3).

The interpretation of a causal relationship between remittance and consumption in the fixed effects estimates depends on whether the assumption that time-variant unobserved heterogeneity is uncorrelated with remittance and consumption pattern holds. This assumption may be violated as fixed effects estimates cannot control for those systematic *time variant* shocks for a particular household. For example, when a government systematically implements welfare improvement

policies targeted to the poor in a particular year, the public transfers might have a negative effect on remittance but a positive one on consumption[18]. To test for this possibility, we will rely on migration network instruments[19]. According to the cumulative theory of migration (Massey *et al.* 1994), the social networks of migrant friends or relatives play an important role on migration decisions by reducing migration costs and risks, creating path dependence, and facilitating the process of sending remittance safely. We believe that these migration networks do not influence consumption directly but only through the effect of remittance income. Following de Braw (2010) and Lokshin*et al.* (2007, 2010), we use the proportion of adults in the ward that were at least 15 years old and living outside their home town for more than six months during the survey year as one of instruments including all sample households in the ward. We also use the proportion of remittance receiving households as another instrument to make the model over identified (for example Taylor *et al.* 2005; Brown and Jimenez, 2008).There may be several concerns regarding the validity of instruments to satisfy the exclusion restriction[20]. For instance, the prevalence of migration in the community may affect consumption directly or through non-remittance channels such as local labour market, market prices. Moreover, there might be several local factors which might be correlated with migration network instruments and remittance or might cause consumption directly. For instance, local geography, proximity from the local market centres, large cities and India, and socio-cultural settings such as castes, ethnicities, local norms and values are generally fixed over time, while people's expectation, access to infrastructure such as roads, communication, and electricity, socio-political changes, and the Maoist insurgency that started in 1995 and was in climax during two rounds of the survey vary over time. So, the major challenge for validity of these instruments rests on the isolation of others channels so that these instruments influence consumption only through remittance channel and control for these local settings in the model. The time-invariant local setting is controlled by fixed effect model. We can deal with time-invariant community level factors which threat the validity of instruments using ward level mean consumption, and proportions of population above 15 years who were illiterate or passed the high school level national exam (SLC), employed or self employed, and in agriculture or non-agriculture occupation as controls in the model. The empirical tests for the validity of the instruments (Anderson-Canon test and Hansen test[21]) using fixed effects instrumental variable generalized methods of moment (FE-IV-GMM)estimator show that the validity of instruments are rejected at 10 per cent significance level when we exclude all community level controls (Appendix A specification (E4) and (E9)) although these instruments are relevant (Schaffer 2010)[22]. However, we completely fail to reject the validity of these instruments while including these community level controls in the estimation of equation (1) (Appendix A specification (E5) and (E10)). The KPLM statistics indicate that the instruments are relevant too.

Moreover, we conduct a Sargan test (Baum *et al.*, 2007) for whether remittance was endogenous. As Sargan test indicates that remittance is exogenous, we obtain more efficient estimates using the fixed effects estimator rather than FE-IV-GMM estimator. Alternatively, we have to note that the confidence intervals of FE and FE-IV-GMM specifications substantially overlap and that the coefficient of the remittance dummy or remittance-income for the FE specification falls within the confidence interval for the FE-IV-GMM specification. The larger robust standard errors and wider confidence intervals for the FE-IV-GMM estimation reveal that FE-IV-GMM estimates are obviously less efficient than the FE counterparts, in line with standard econometric results (for

[18] For example, when a household realizes a consumption shock in a particular year, migrant members can make instantaneous decisions on whether to send remittances and how much to send to their relatives and friends.

[19] For excellent reviews of studies on the role of social network in migration and remittance, see Massey *et al.* 1994 and Munshi 2003; for studies using migration network variables as instruments see McKenzie and Rapport 2007.

[20] For excellent literature on how to deal with validity and relevancy of instruments, see Murray (2006).

[21] See, for example, Baum *et al.* (2003, 2007) for descriptions of these tests.

[22]We use *stata* routine *xtivreg2*, written by Schaffer (2010), to estimate FE-IV-GMM model.

example, see Wooldridge, 2002). So, our FE estimates are robust to concerns over the interpretation of causality and instrumental variable estimates that satisfy exclusion restriction and we use these estimates for simulations in the next subsection.

Simulation results

Table-4 presents the simulation results based on the fixed effects estimates for the remittance-income model. The baseline simulation uses the actual value of all regressors to predict consumption and thereby poverty and inequality measures. We can see that the baseline simulation produces values that are close to the actual ones.

Table 4: Impacts of remittance on consumption, poverty and inequality (Simulation based on remittance-income model)

Measures	1996					2004				
	Actual	Baseline	SCEN A		SCEN B	Actual	Baseline	SCEN A		SCEN B
			C/F	% Δ	% Δ			C/F	% Δ	% Δ
Consumption Per Capita	7,297	7,396	7,227	-2.28	0.10	9,590	9,451	9,108	-3.62	0.10
B: Poverty (National poverty line)										
Head Count (P0)	41.04	42.57	43.97	3.30	-0.14	31.83	30.00	32.28	7.60	-0.21
Poverty Gap (P1)	11.32	12.06	12.66	5.02	-0.22	7.07	7.37	8.14	10.54	-0.28
Poverty Gap Squared (P2)	4.44	4.68	4.98	6.40	-0.28	2.35	2.61	2.93	12.51	-0.34
Panel C: Poverty ($1/day poverty line)										
Head Count (P0)	33.41	35.01	36.37	3.87	-0.17	20.47	21.68	23.71	9.34	-0.25
Poverty Gap (P1)	8.49	9.09	9.61	5.71	-0.25	4.35	4.81	5.39	12.15	-0.33
Poverty Gap Squared (P2)	3.17	3.30	3.54	7.21	-0.31	1.37	1.58	1.80	13.97	-0.38
Panel D: Poverty ($2/day poverty line)										
Head Count (P0)	76.11	74.81	76.04	1.65	-0.07		63.53	63.13	65.52	3.78	-0.10
Poverty Gap (P1)	31.32	31.71	32.62	2.88	-0.13		23.60	23.13	24.56	6.16	-0.17
Poverty Gap Squared (P2)	15.93	16.42	17.04	3.79	-0.16		10.91	10.82	11.67	7.90	-0.21
Panel E: Inequality										
Gini Coefficient	0.349	0.333	0.332	-0.39	0.02		0.399	0.354	0.354	-0.14	0.00

Notes: SCEN A: Scenario of no households receives remittance. SCEN B: Scenario of 1 per cent increase in the proportion of remittance receiving households. Other labels as in Table-5.**Source:** Own calculation using NLSS I and II panel data.

The scenario of no household receives any remittance would make mean consumption decrease by 2.3 per cent in 1996 and 3.6 per cent in 2004 with respect to baseline simulation values (Table 4, Panel A). On the other hand, the scenario *(b), one per cent increase in proportion of remittance receiving households*, would make average consumption increase by 0.1 per cent in both years

(with respect to baseline simulation). The reason for the larger effect in 2004 under scenario (a) is increase in the proportion of remittance receiving households in that year. The simulation results for the remittance-dummy model are similar, but the magnitudes are about 50 per cent smaller than that of remittance-income model, in both scenarios[23].

Impacts of migration and remittance on poverty

First, we simulate the impacts on poverty in two counterfactual scenarios at national level (Table-4, Panel B). Scenario (a) implies that in 1996 and 2004 the incidence of poverty (P0) would increase by 3.3 per cent and 7.6 per cent (respectively), the depth of poverty (P1) would increase by 5 per cent and 10.5 per cent (respectively) and the severity of poverty (P2) by 6.4 per cent and 12.5 per cent. If we used the remittance-dummy model instead, the figures would be smaller: 2.3 per cent and 4.6 per cent increase for P0, 3.4 per cent and 6.4 per cent increase for P1, and 4.3 per cent and 7.5 per cent increase for P2 in 1996 and 2004, respectively (Appendix B, Panel B). The effects on all three FGT measures are more than double in the later year because of the sharp increase in migration and the increase in the proportion of poor households in the migration process. The relative impacts on FGT measures under *scenario* (b): the highest impact observed on the severity and the lowest on the incidence of poverty with smaller effects when using remittance-dummy model.As we can see, remittance has a larger impact on the depth and severity of poverty (P1, P2) than on the incidence of poverty (P0). This might be related to the uneven distribution of poor households who are more likely to credit constrained than rich ones (Halliday, 2006) among migration destinations. Firstly, ultra-poor households migrate to cope with food and employment scarcity to places that are less costly. For instance, small transfers from India contribute to household earnings and food security. Even if these transfers do not bring the poorest households above the poverty line (and so do not affect P0), at least these can help to bring the household nearer to it (improving P1 and P2). Indeed, as shown in Table-1 (Panel D), there is a higher level of poverty among Indian migrant households compared with the national average. Secondly, less poor households can afford to send a member to relatively more costly and risky places. In this case, remittance helps to eradicate poverty (that is to improve P0) rather than just bringing the poor households near the poverty line.

The above findings are robust when we use an international poverty line that is US$1/day in both scenario (a) and (b), and for all FGT measures (Table-4, Panel C) or when we double it (Table-4, Panel D). The estimated impacts on poverty for US$1/day poverty line are slightly larger than those for the national poverty line, while that for US$2/day are about 50 per cent smaller than those for the national poverty line.Next, we calculate the impacts of remittance from different sources by constructing the counterfactual scenario under which no household receives remittances from a particular source country (Table-5). We first distinguish only between domestic versus foreign (India or third countries). The simulations show that the effect of foreign remittance on FGT measures is mostly larger than that of domestic remittance in both years (the results are analogous in remittance-dummy model). The results are mostly similar with the international poverty lines. When we use US$2/day poverty line, domestic remittance has larger effects on incidence, depth and severity of poverty than international remittance while the later one has a larger effect when we use the US$1/day poverty line. This is possibly due to the larger participation of the lower quintiles in Indian migration.

[23]The results for remittance-dummy, analogous to Table-4, are shown in Appendix B (Panel A) and will be available upon request.

Table 5: Impacts of remittance on consumption, poverty and inequality by source of remittance(Simulation based on remittance-income model)

Measures	Baseline	No DOM REM		No FOR REM		No IND REM		No OTHR REM	
		C/F	% Δ	C/F	% Δ	C/F	% Δ	C/F	% Δ
Panel A: Impacts in 1996									
Consumption Per Capita	7,396	7,298	-1.34	7,323	-0.99	7,335	-0.83	7,384	-0.16
Poverty									
Head Count (P0)	42.57	43.32	1.77	43.3	1.71	43.27	1.64	42.59	0.05
Poverty Gap (P1)	12.06	12.34	2.34	12.41	2.89	12.4	2.81	12.07	0.06
Poverty Gap Squared (P2)	4.68	4.81	2.79	4.86	3.86	4.86	3.79	4.68	0.06
Gini Coefficient	0.333	0.332	-0.42	0.334	0.15	0.334	0.39	0.332	-0.21
Panel B: Impacts in 2004									
Consumption Per Capita	9,451	9,286	-1.75	9,260	-2.02	9,346	-1.11	9,359	-0.97
Poverty									
Head Count (P0)	30.00	31.04	3.49	31.34	4.46	31.06	3.56	30.32	1.06
Poverty Gap (P1)	7.37	7.72	4.82	7.83	6.28	7.77	5.43	7.44	1.00
Poverty Gap Squared (P2)	2.61	2.76	5.72	2.80	7.43	2.78	6.65	2.63	0.96
Gini Coefficient	0.354	0.354	-0.14	0.355	0.11	0.357	0.82	0.352	-0.62

Notes: DOM, FOR, IND, and OTHR are remittance from within Nepal, remittance from foreign countries, remittance from India and remittance from other countries (except India), respectively. C/F is the scenario under which no household receives remittances from a particular destination: DOM, FOR, IND or OTHR. For instance, in the counterfactual scenario for DOM remittance, the households that received remittance from Nepal in baseline scenario do not receive any remittance from Nepal. Similarly, in the counterfactual scenario of IND remittance, the households that received remittance from India in baseline scenario do not get such remittance, and so on. National poverty line is used.
Source: Own calculation using NLSS I and II panel data.

So, we further disaggregate foreign remittance into India and other countries. Although average per capita remittance earning of Indian migrants is far lower than that of third country migrants, Table-5 shows that Indian remittance contributes at least 80 per cent (90% in 1996) of the impact of overall foreign remittance on poverty reduction. The impact of Indian remittances increases sharply when we use US$1/day poverty line, but it decreases for US$2/day poverty line in both years while remittance from third countries has nearly the same impact for all three poverty lines. The larger impact of Indian remittance[24] on poverty reduction than third country remittance is due to the considerably larger participation of ultra-poor households in Indian migration in comparison to larger participation of less poor (or richer) households in the third country migrants. This is consistent with the descriptive statistics (Table-1, Panel D and Table-2, Panel D).Finally, Figure-1 shows the impact of remittance on poverty across six regions for scenario (a) using the national poverty line. It shows that the regions that have higher levels of migration (for example Rural Western Hills/Mountains (RWH) and Rural Eastern Terai (RET)) would experience a larger

[24] The domestic and Indian remittances have almost equal share (23%) of total remittance receipts among all households of Nepal and remaining 53% remittance is received from the rest of the other countries (CBS 2004).

poverty reduction than the regions which have lower migration. This result is stronger in 2004 (Part B and D) than in 1996 (Part A and C). Our results are similar to Taylor *et al.* (2005) who also found a correlation between the magnitude of poverty reduction and incidence of migration.

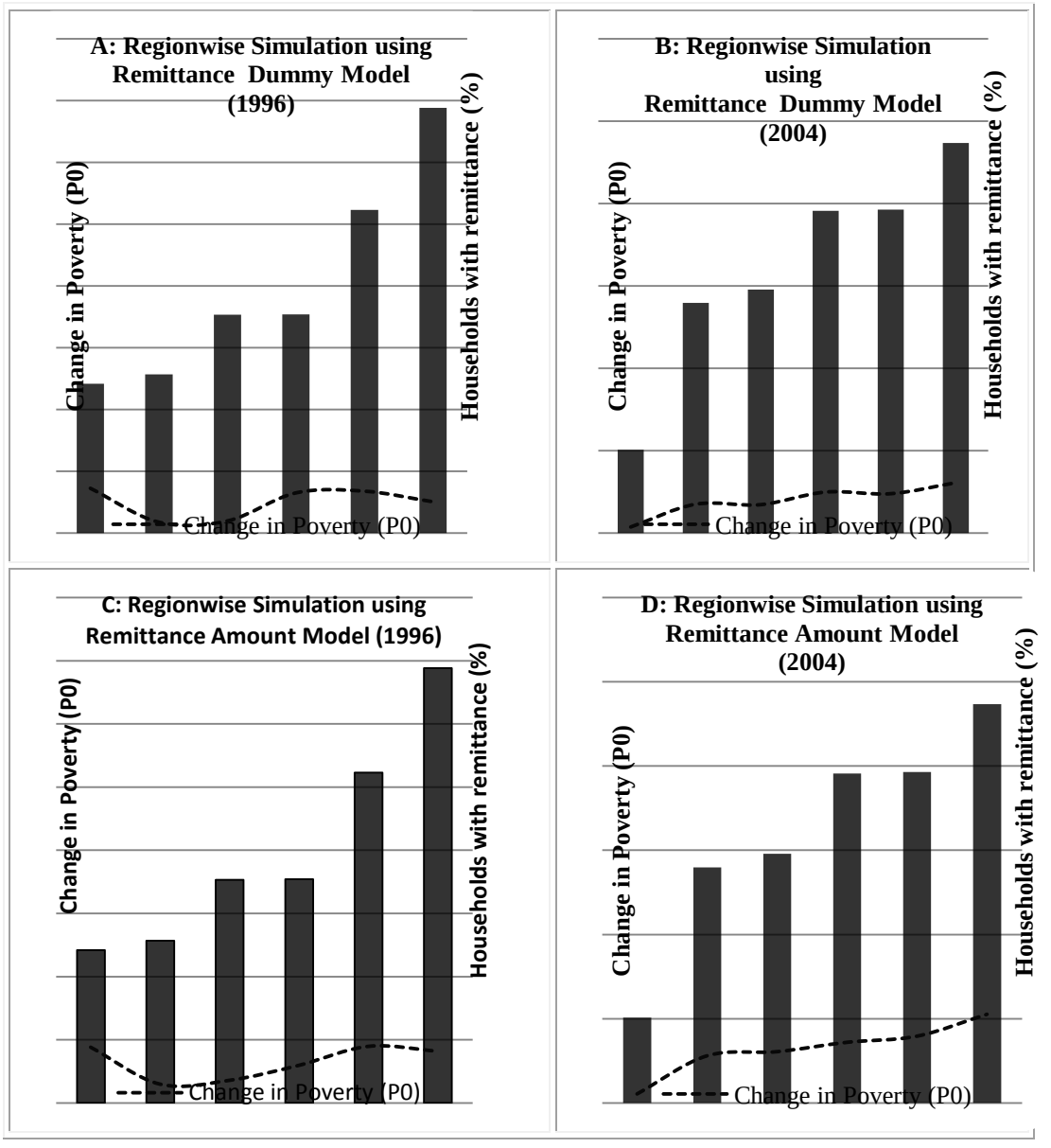

Figure 1: Simulation for change in head count poverty (P0) across regions in counterfactual scenario of no households received remittance

Notes: The regions: KTM, OTHR, RWH, REH, RWT, and RET are Kathmandu Valley, Other Urban areas, Rural Western Hills, Rural Eastern Hills, Rural Western Terai, and Rural Eastern Terai respectively. Data labels are for change in head count poverty (P0).**Source:** Authors' calculation using NLSS I and II panel data.

Impacts of migration and remittance on inequality

Table 4 (Panel E) shows the effects of remittance on income inequality at the national level. The inequality decreases unequivocally in both years, but decreases less in 2004 in *scenario (a)* with respect to the baseline simulation. Similar results hold also for *scenario (b).* When we use the remittance-dummy model (Appendix B) the inequality decreases marginally in 1996 and decreases by even a smaller amount in 2004 in *scenario (a).* Hence, results indicate that remittance increases inequality, but less so in the second round of the survey. Although this finding does not agree with the study from Nepal (Lokshin *et al.*, 2007), it is consistent with increasing maturity of the migration process in Nepal which may have reduced the associated costs and risks of migration and encouraged the participation of bottom quintile. This is consistent with the results of Stark *et al.* (1986) in the case of Mexico. However, remittances from different sources have diverse impact on inequality (Table 5). In the absence of domestic remittance (*scenario (a)*), the inequality would decrease in 1996 but not in 2004. In the absence of foreign (that is Indian and others) remittance, inequality would increase in both years. When we split foreign remittance into Indian and other countries, the Indian remittance is found to be income equalizer in both years, while the opposite is true for other country remittances.

CONCLUSION AND FUTURE RESERACH

We consistently and efficiently estimate the determinants of consumption using a fixed effect model and including sufficient household and community level controls to address the endogeneity of remittances in present study. Econometric results show that the consumption is higher for remittance receiving households, and it increases with remittance income, other things being the same. The simulation results show that if none of the households received remittances, the incidence of poverty (P0), measured by the national poverty line, would have increased by at least 2.3 per cent and at most 3.3 per cent in 1996 and at least 4.6 per cent and at most 7.6 per cent in 2004 (the lower bounds correspond to the remittance-dummy model while the upper bounds to the remittance-amount model). Impacts on the depth (P1) and severity of poverty (P2) are even larger. The regional simulations show a strong correlation between the incidence of remittance and the magnitude of poverty reduction, implying variation of impacts among regions. The destination is another important factor determining the impact of remittance on poverty. Although the remittance from a third country migration is more than seven times higher than that from India, Indian migration is a necessity for the poorest households that experience severe credit limitations (WFP 2008). So, it has a far larger impact on poverty reduction in comparison with domestic and other countries' remittance. In this way, although remittance from India acts as an income equalizer, remittance from other countries has the adverse effect. The overall effect of remittances on income equality is negative, but this adverse effect has decreased over time. These stylized facts are consistent with Stark *et al.* (1986) and Taylor *et al.* (2005).

As the large role of Indian remittances arose from the larger share of migrants to India from poor households rather than larger return of Indian migration, Nepal would witness a sharp drop in poverty and income inequality if the government implemented policies that enabled poor households to send their migrants to developed countries instead of India. These policies which facilitate this switch of destinations might include providing more credit opportunities and also education to acquire the skills required for third country migration. Although policy makers face the challenge of designing effective skill development programs for less educated people, these programs might have a high return because skilled (even low-skilled) migrant workers might have a better opportunity of obtaining a safe and high-earning job in third countries. The other measures for the bottom quintile might include programs to disseminate migration/remittance-related information and strengthen the legal status of contracts among potential migrants, manpower companies and foreign employers. These would also be appropriate anti-poverty strategies on their own right.

Future research might look at the role of migration and remittance on reducing vulnerability to rural production shocks in a general equilibrium environment. Moreover, we would like to understand how migration and remittances affect physical/human capital investments, local labour productivity and the intergenerational transmission of poverty and inequality.

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