

The Impact of Large-Scale Migration on Poverty, Expenditures, and Labor Market Outcomes in Nepal

Maheshwor Shrestha



WORLD BANK GROUP

Social Protection and Labor Global Practice Group

October 2017

Abstract

This paper studies the impact of migration on poverty, expenditures, and labor market outcomes in Nepal. Between 2001 and 2011, the share of male working age population abroad more than doubled, mostly due to young men leaving to work in Malaysia and the Persian Gulf countries. The paper studies the impact using instrumental variables as well as difference-in-difference methods. The findings show that increases in migration to Gulf-Malaysia explain 40 percent of the decline in poverty between 2001 and 2011. The estimates of the marginal propensity of consumption show that a \$1 increase in remittance income increases consumption by \$0.5, with the largest share going

to expenditures on food. The paper also finds that migration increases school enrollment of children, particularly of girls. Furthermore, the findings show that large-scale migration in villages improves labor market outcomes for households without a migrant. An increase in village migration rates of 10 percentage points increases wages by 25 percent, and labor force participation by 4 percentage points. The participation effects are driven by increases in female participation in non-farm sectors, and increased male participation in agriculture. The wage effects are driven by higher agricultural wages for all, and higher non-farm wages for females.

This paper is a product of the Social Protection and Labor Global Practice Group. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The author may be contacted at mshrestha1@worldbank.org.

The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

The impact of large-scale migration on poverty, expenditures, and labor market outcomes in Nepal

Maheshwor Shrestha*

JEL codes: F22, F24, J22, I30

Keywords: Migration, Poverty, Labor Force Participation, Nepal

*The World Bank. Email: mshrestha1@worldbank.org. This paper was produced as a background paper to the Systematic Country Diagnostics of Nepal. I would like to thank Ruth Hill for her comments and suggestions, and Sailesh Tiwari for providing me access to the Small Area Estimates of poverty and per-capita consumption for Nepal. The view expressed here do not necessarily represent the views of The World Bank. All errors are my own.

1 Introduction

Large earnings disparity persists across locations, particularly across countries, and international migration is probably the most effective way out of poverty for the poor (Clemens, 2011; Clemens, Montenegro, and Pritchett, 2008). Encouraging migration, particularly international, is also found to be more effective than alternative labor market policies in improving the jobs outcome of those in poorer countries (McKenzie, 2017). As many host countries could be hesitant to let foreigners come in permanently, temporary or circular migration programs have provided a pathway for workers, particularly low-skilled, from poor countries to migrate for work in richer countries. The number of such temporary migrants has been increasing in the recent years. Two countries, Bangladesh and Nepal, alone send over 1 million workers each year to work abroad in countries like Malaysia and those in the Persian Gulf. In the case of Nepal, this has led to concerns among policy makers about extreme labor scarcity in the origin communities (see, for instance Adhikari and Hobley, 2013).

In this paper, I examine the impact of large-scale migration on outcomes related to poverty and labor force outcomes. To estimate the impact on poverty and consumption, I use two different empirical strategies. First, I use data on the migration rates and the small-area estimates of poverty for each village unit (*illaka*) for the census years of 2001 and 2011. Using a difference-in-difference strategy in this data, I find that a 10 percentage points increase in the share of households with a migrant in Gulf-Malaysia reduces poverty rates by 7 percentage points and increases per-capita consumption by 11 percent. These estimates suggests that migration rates to Gulf-Malaysia alone explains 40 percent of the actual decline in poverty between 2001 and 2011. Second, I use richer data on household level measures of consumption and poverty from the 2010 Nepal Living Standards Survey. Using migration rates in 2001 as an instrument for a household having a current migrant, I find that increasing the probability that a household has a Gulf-Malaysia migrant by 10 percentage points lowers poverty by 8 percentage points and increases per-capita household consumption by over 15%. These estimates are remarkably similar to the village level estimates.

The positive impact of migration on the living standards and incomes of households are broadly echoed in the literature as well. Rigorous evaluations of temporary international migration programs from the Pacific Islands to New Zealand have found large increases in incomes and consumption of the households in the origin communities (McKenzie, Stillman, and Gibson, 2010; Gibson and McKenzie, 2014).

A related concern in the context of Nepal is how the income remitted by the migrant is being used by the households. In a similar empirical strategy, I instrument remittance income with village level migration rates in 2001 to estimate the elasticity of consumption of remittance income. I find an elasticity of 0.16 and a marginal propensity to consume (MPC) out of remittance income of 50 cents per dollar for an household with average consumption and remittance receipt level. The MPC is slightly lower for rural households at 40 cents per dollar. I find that increased remittance receipt increases consumption in food, durables, non-durables, and on education, particularly for the urban households. This marginal propensity to consume is lower than what would be expected of a

permanent income shock, but higher than what would be expected of a temporary income shock.¹ Given that remittance income is not unanticipated (most literature identifies MPC through unanticipated shocks) and that it comes at a cost of foregone labor income of the migrant at home, these estimates can be considered relatively low.

I then examine the impact of migration of a family member on the schooling outcomes of the children in the household using the same empirical strategy. I find that having a Gulf-Malaysia migrant in the household increases the probability of a child being in school and the completed level of schooling. The effects are completely driven by impact on girls. Having a migrant in the household increases girls' schooling by over 2 years, about a 100 percent of the average schooling for the age-group. However, this effect is only marginally significant. The effects for boys are much smaller in magnitude and are statistically insignificant. Theoretically, migration of a household member could impact a child's education in either direction. Having remittance income can ease liquidity constraints and make education more affordable, whereas lack of parental supervision and inputs may hamper child education. Furthermore, expectations about returns to education on the future labor market prospects (domestically, or abroad) could affect educational investment in either direction. Researchers have found positive impacts, both in the short-run (Yang, 2008) or the long-run (Dinkelman and Mariotti, 2016), as well as negative impacts (de Brauw and Giles, 2016; McKenzie and Rapoport, 2011), or differential impacts by gender (Antman, 2012).

I further examine the impact of large-scale migration in the local labor markets (villages) on the labor force participation. I use a difference-in-difference strategy to estimate the impact of migration rates at the village level on the labor force participation decision of the working age population. Large-scale out-migration acts as a negative supply shock to individuals in households without a migrant which increases wages, and, if job opportunities are scarce, encourages participation. A rise of 1 percentage points in the share of migrants in the population increases wages by 2.3 percent and labor force participation by 0.4 percentage points. However, for households with a current migrant, remittance income may increase their reservation wages, thereby muting the effect on participation. Consequently, among households with a migrant, the participation effect is almost the half of that of households without a migrant (and hence, remittances). The participation effect is primarily driven by increased male participation in agriculture, and an increased female participation in non-agricultural employment. The wage effects are driven by high agricultural wages for all, and higher wages for females in non-agricultural sectors as well.

These findings are also consistent with the literature on the labor market impact of migration. A randomized evaluation of a large-scale migration incentive scheme in rural Bangladesh also finds that agricultural wages go up in the origin communities, benefiting even those who do not migrate (Bryan, Chowdhury, and Mobarak, 2014; Akram and Mobarak, 2016). A related concern is what

¹Well identified empirical estimates of income shocks are incredibly hard to find (Please see Jappelli and Pistaferri, 2010, for a review and difficulties in estimation). Paxson (1993) finds an MPC of 0.7 for permanent income shocks and about 0.3 for unanticipated temporary income shocks. In a rare randomized trial of an unconditional transitory transfer of \$400 in rural Kenya, Haushofer and Shapiro (2016) find an MPC of 0.2. Their measures does not include housing costs as expenses. Adjusting for that, the estimate in the case of Nepal is about 0.4.

will happen when the migration out-flow stops and the migrants start returning back to their origin communities. In a study of large-scale migration of male workers from Malawi to the gold mines in South Africa, [Dinkelman, Kumchulesi, and Mariotti \(2017\)](#) finds that higher remittance incomes lead to employment diversification away from low-productivity agriculture towards more productive non-farm service sector. Even decades after the migrants returned, they find communities with higher migration rates are wealthier, and have accumulated more non-farm physical capital and human capital.

A closely related question is how having a migrant in the household affects their labor force participation choices. Two studies have investigated this in the context of Nepal using broadly similar empirical strategies. [Lokshin and Glinskaya \(2009\)](#) uses the 2003/04 Nepal Living Standards Survey and instruments household migration status with 2001 migration rates in the village. The study finds that female labor force participation in wage-employment falls for households with a migrant. [Phadera \(2016\)](#) also uses the village level migration rates in 2001 as an instrument, but examines the impact at a later period using the 2010 Nepal Living Standards Survey. This study finds similar reduction in wage employment for women but finds an increase in participation in self-employment activities, particularly in agriculture. The results for men are also similar to those of women, but of slightly lower magnitude and estimated imprecisely. It is important to note that the results of these studies are not directly comparable to those of this paper. These studies compare labor market outcomes for individuals in households with a migrant to those without a migrant, whereas this paper compares participation of individuals in households with a migrant across villages with different overall migration rates.

This paper is organized as follows: Section 2 discusses the context of international migration from Nepal, Section 3 discusses the data and empirical strategy used in the paper, Section 4 discusses the results on poverty and consumption (4.1), education (4.2), and labor force participation (4.3), and Section 5 concludes.

2 Context

International migration of workers from Nepal, to destinations other than India, is a relatively new phenomenon. Before 2001, almost all out-migration from Nepal was to India (Figure 1). Migration to other destination increased drastically when Nepal allowed private recruitment of workers to a set of countries in the late 1990s. Consequently, out-migration from Nepal increased from about 3 percent in 2001 to about 7 percent in 2011.

The increase in migration has been driven by the migration of primarily male, low-skilled migrants to Malaysia and the Persian Gulf countries. By 2011, almost a million Nepali workers worked in Gulf-Malaysia. The out-migration has continued to surge in recent years with the estimated stock of over 2 million Nepali workers by 2015 (Figure 2).² This has led to a massive surge

²The migrant outflow declined considerably in 2015 and 2016 owing to a recession in Saudi Arabia and lack of demand for Nepali workers from Malaysia. Consequently, the remittances, and the stock of migrants abroad are expected to decline in 2016 and subsequent years.

in remittances received by the country. In 2015, Nepal received over US\$6 billion in remittances, which is about a third of the national GDP. Between 2005 and 2015, GDP per-capita grew by 3.2 percent per year, but GNI per-capita (with net remittance receipt included) grew by 4.8 percent annually. This shows how earnings abroad are more attractive to Nepali workers relative to the opportunities available domestically.

However, the process of finding a job abroad in Gulf-Malaysia is heavily intermediated and informal. Local agents typically connect potential migrants with recruitment companies in the cities, especially in the Kathmandu valley. In addition to connecting to another layer of intermediaries, these agents also help the potential migrants with the legwork associated with the migration processes and related paperwork. The recruitment companies, known as ‘manpower companies’, connect the workers with employers (or intermediaries) abroad. Typically, these agencies are responsible for obtaining an employment contract, a working visa, and make travel arrangements. Most jobs abroad require potential migrants to obtain a medical clearance and all individuals going abroad for work are required to obtain a labor permit from the Department of Foreign Employment, in Kathmandu. Both the local agents, and the manpower companies, are paid by the potential migrant before they migrate, often with money borrowed from family, friends, and local money-lenders.³

Due to the nature of the recruitment market, the cost of migration to these destinations is quite high. Migrants to Malaysia typically pay \$1,600 to migrate and expect to earn \$440 per month for an employment contract of about 2.5 years. Migrants to the Gulf countries typically expect to pay \$1,000 to migrate and can expect to earn \$420 per month.⁴ Under typical interest rates and reasonable earnings abroad, migrants are still able to consume and remit money to be used for their family.⁵ For the migrants who can finance migration without a loan, typically those that are wealthier, or former migrants with some savings, greater share of migrant income, obviously, goes towards other non-repayment uses.

The extent of male out-migration in Nepal is high, not just in terms of the contribution to the economy, but also in terms of employment shares. In 2001, only 8 percent of the male working age population (10 percent of the male labor-force) were employed abroad. By 2011, the number more than doubled to 16 percent of the the working age population (22 percent of the male labor-force). Particularly for the relatively young males aged 15-44 from rural areas, the number of individuals working abroad is higher than then number of individuals employed in wage-work domestically, and only slightly smaller than the number of individuals employed by domestic agriculture.⁶ The

³Please see [The World Bank \(2011\)](#) and [Shrestha \(2017b,a,c\)](#) for more details on the migration process in the context of Nepal.

⁴These data are collected as a part of the experiment studied in [Shrestha \(2017b\)](#). The earnings estimates are expectations of those who have prior migration experience, and are likely to be higher than actual earnings. These individuals actually earned \$350-\$400 per month in their past migration episode.

⁵For instance, with monthly earnings of \$300 for two years, and a migration cost of \$1,000 borrowed at a monthly interest rate of 3%, migrants would still make over \$200 a month for non-repayment uses, more than twice the minimum wage in the formal sector in Nepal. Lodging and boarding, while abroad, are typically factored into the earnings, or are heavily subsidized, for most migrant workers in these destinations.

⁶Author’s estimates using Housing and Population Census of 2001 and 2011.

geographic reach of migration to Gulf-Malaysia has also been quite impressive in these periods. In 2001, about half of the villages (lowest level of administrative units) had no migrants in countries outside India, whereas by 2011, only about 5 percent of the villages had no migrants outside India (Figure 3). This paper exploits the variation in different migration rates over time and across different villages to identify the impact of migration.

3 Data and empirical strategy

3.1 Data

The migration and outcomes data used in this analysis come from two types of sources which I describe in detail below.

Housing and Population Census 2001 and 2011

The Housing and Population Censuses are conducted by the Central Bureau of Statistics (CBS) of Nepal every 10 years. I use the public-use microdata for tenth and eleventh rounds of the national census, conducted in June of 2001, and 2011 for this analysis. The public-use micro-data of 2001 covers over 95% of all the villages (rural villages (VDCs) and urban municipalities) in the country and has data on the 11% random sample of all households. The 2011 data covers all the villages and has data on 8-100% of the households.⁷ In both the datasets, I use sampling weights to adjust for the sampling procedure used to develop the micro-data.

The census collects information on the basic demographics, education, and labor supply characteristics of household members, as well as basic information on the household ‘members’ that are currently abroad. I use this measure to capture international migration. Though households cannot be tracked across the two censuses, villages can be identified and tracked across these rounds. The large sample size within the village allow for precise measurement of outcomes as well as the aggregate migration rate in the village. The large sample size of the census comes at a cost of not having detailed information on the individuals and households such as earnings, consumption, and expenditure. Furthermore, the information on labor supply is limited to information about the ‘usual’ status in the past 12 months, and misses the richness typical of labor force and living standards surveys.

However, following the estimation strategy developed by [Elbers, Lanjouw, and Lanjouw \(2003\)](#), statistical offices worldwide, with the support of the World Bank, have begun to estimate poverty and consumption measures at granular geographic level by combining census data with the richness of the living standards surveys. In case of Nepal as well, the 2003/2004 Nepal Living Standards Survey (NLSS-II) was used to prepare small area estimates of poverty and consumption for village units (*illakas*) in 2001, and the 2010 round of the Nepal Living Standards Survey (NLSS-III) was used to prepare estimates for the village units in 2011. Due to the smaller sample size of the 2001

⁷For an average rural village, the microdata cover 13 percent of the households, and for the average urban municipality, the data cover about 20% of the households.

census, poverty estimates were not produced for each of the villages, but only for the 976 village units (*illakas*). I use the *illaka* level estimates of poverty and per-capita consumption for analyzing the impact of migration on poverty.

Nepal Living Standards Survey 2010 (NLSS-III)

The second data-source I use for the analysis is the 2010 Nepal Living Standards Survey (NLSS-III), also conducted by the CBS. This cross-sectional survey collects information from about 6,000 households designed to be representative at the national, as well as sub-national level.⁸ The survey is the premier poverty monitoring tool for the Government of Nepal and has a rich collection of outcomes including consumption, expenditure, education, labor supply, as well as on absent members of the households (migrants) and remittance receipts.

3.2 Empirical strategy

The correlation between outcomes (say, consumption of, or labor supply) and migration (household level, or village level) cannot be interpreted as a causal impact of migration. One of the key problems is that the households that choose to migrate are very different from households that do not choose to migrate, and these differences are not fully accounted by the observable characteristics of the household. The same problem arises when analyzing the impact of the aggregate level of migration in the village. The villages with higher prevalence of migration are typically different from those where migration is a relatively rare phenomenon. I use two strategies, described in detail below, to partially ameliorate these concerns.

Instrumental variable estimates

One of the strategies that I use is to instrument the household level migration with the migration rates of the same villages observed in 2001. The key insight behind this instrument is that households in villages that had prior migration networks are more likely to migrate subsequently. The role of migration networks in influencing future migration has been well established in the literature (see [Munshi, 2003](#), for a seminal example). Historic migration rates have been widely used as an instrument for household migration propensity in other contexts (for instance, [McKenzie and Rapoport, 2007](#)) as well as in the context of Nepal ([Phadera, 2016](#); [Lokshin and Glinskaya, 2009](#)). I use this strategy in the NLSS-III data to study the impact of migration or remittance receipt on, primarily, household consumption, expenditures, poverty, and wages.

Specifically, in this context, I estimate the following system of equations using a 2-SLS estima-

⁸The survey is designed to be representative at the 14 strata, which is a combination of 3 urban strata (Kathmandu, other hills, terai), and 11 rural strata. The rural strata are a combination of development regions and ecological belts.

tion:

$$\begin{aligned} M_{hv} &= \alpha_1 + \gamma M_{v,2001} + \delta X_{hv} + \nu_{hv} \\ y_{hv} &= \alpha_2 + \beta M_{hv} + \delta' X_{hv} + \varepsilon_{hv} \end{aligned} \tag{1}$$

where y_{hv} is the outcome for household h in village v , M_{hv} is a dummy of whether the has a migrant in Gulf-Malaysia, $M_{v,2001}$ is the share of households with Gulf-Malaysia migrants in 2001, X_{hv} are controls, and ν_v and ε_{hv} are uncorrelated errors assumed to be clustered at the village level. The controls in these specification include household size, ethnicity of the household head, fixed effects for survey strata, and the logarithm of distance from Kathmandu. I estimate the system of equations in (1) with 2-SLS with the predicted migration rate of the household from the first-stage as an instrument for the actual migration status of the household. To estimate the marginal propensity to consume, I estimate a similar specification with the migration status of the household replaced by the logarithm or remittances the household received.

To interpret the estimate as a causal impact of migration on the outcomes, the 2001 migration rates must be uncorrelated with the outcomes in 2011, except through its influence on current migration. This assumption is plausible if current migration is influenced by the social network of the previous migrants. Even in this case, the estimate will be the causal impact of migration on the migrants induced by the prior social networks to migrate. That is, this identifies the local-average-treatment-effect (LATE) in the language of [Imbens and Angrist \(1994\)](#).

However, a frequent criticism of this approach is that the village level characteristics could be correlated with migration rates in 2001, migration rates in 2011, as well as the outcomes in 2011. For instances, villages with higher degree of entrepreneurial individuals may have migrated early (in 2001), and also have better outcomes in 2011 (not necessarily due to the impact of migration). Or, alternatively, villages that consistently have low labor demand (due to the rough geography, or local political institutions) could have resulted in higher early migration as well as the labor outcomes in 2011. To address these concerns, I use a second empirical strategy, a difference-in-difference method, that is immune to the village specific characteristics that influences the outcomes. For the outcomes that I can use both empirical strategies, the estimates from both specifications yield similar results, which is very comforting.

Difference-in-difference estimates

As discussed earlier, villages that have high migration rates could be very different from villages which have lower migration rates. These differences might reflect several observable and unobservable characteristics that also affect the outcomes. Similarly, there could be national trends in certain outcomes. The most relevant in this context is the demand for Nepali workers from Gulf-Malaysia, which has drastically increased in recent years. To the extent that village specific characteristics are time-invariant, and the trends in outcomes do not differ by villages, a difference-in-difference model produces the causal estimate of migration on the outcomes.

I use the difference in difference method to analyze the impact of village migration rates on outcomes in the census data. The estimating equation is:

$$y_{ivt} = \beta M_{vt} + \mu_t + \gamma_v + \varepsilon_{ivt} \quad (2)$$

where y_{ivt} represents the outcome of individual i of village v at time t . M_{vt} is the share of individuals from the village v that are in Gulf-Malaysia at time t . μ_t represents the time fixed effects to capture national trends in migration and also in the outcome variables. γ_v is the village fixed effects that captures all time-invariant characteristics of the village. ε_{ivt} represents idiosyncratic error term. I allow the errors to be correlated across individuals of the same village across time.

The identification assumption of Equation (2) is that the trends in labor market characteristics in villages with different migration rates are the same. Village specific inherent factors that could affect the levels of migration as well as the levels of outcomes are subsumed by the specification and are not problematic for identification. Neither is the national trend in outcomes as well as the migration patterns. The variation that identifies Equation (2) arises from the difference in migration rates in the same village across time after taking into account the national (or regional) trend in migration rates and outcomes.⁹ Figure 3 shows the distribution of village level migration rates in 2001 and 2011, separately for India and non-India migration. The wide variation in the rates, both within each year and between each year help identify the parameters.

Since the impact of migration is likely to be different for individuals based on whether they have a current migrant in the household or not, I estimate Equation (2) by interacting all the explanatory variables with a dummy indicating whether the household has a migrant in Gulf-Malaysia. This is numerically same as estimating Equation (2) separately for those living in a household with, and without a migrant. I present the fully interacted specification for compactness.

4 Results and discussion

In this section, I present simple theoretical frameworks on the impact of migration on poverty, consumption, expenditures, schooling, and labor market outcomes. Then I discuss the results of estimating Equations (1) and (2) in light of the frameworks.

4.1 Impact on poverty and expenditures

4.1.1 Framework

If migrants have proper information, then migration typically results in welfare gain for the migrants. This could mean higher earnings and/or better amenities upon migration. In the context of migration from Nepal to Gulf-Malaysia, the amenities while abroad are probably not a pull

⁹The key results do not change if I allow regions to have their own time trends in outcomes. The results are omitted for compactness, but are available upon request.

factor.¹⁰ Given that many Nepali migrants choose to migrate multiple times, one could expect positive impact on poverty reduction and increases in per-capita consumption for them and their families.

There is an increasing debate, particularly in the context of Nepal, on how the remittance gets used. The debate hinges on what is the ‘right’ marginal propensity to consume (MPC) out of remittance income. Permanent income hypothesis provides a guideline for this. Individuals (households) should consume a large share of changes in their permanent income and save or invest larger shares of incomes from transitory sources. Paxson (1993) estimates an MPC of about \$0.7 per dollar of increases in permanent income and MPC of about \$0.3 per dollar increase in transitory income in the context of Thailand. The remittance income, however, cannot be clearly classified as a permanent, or a transitory increase in their lifetime earnings. They are not permanent in the sense that the migration itself is transitory and most individuals will not become a migrant worker for the entirety of their working lives. However, with multiple episodes of migration in their lifetimes, many workers end up spending considerable proportion of their working lives abroad as a migrant workers. Furthermore, since migration is a part of the plan of migrants’ labor supply decisions, remittance income cannot be thought of as an windfall for them, or for their households. Haushofer and Shapiro (2016) provides another useful empirical benchmark, potentially for the lower bound on the expected MPC. Rural Kenyan households were randomly selected to receive a one-time unconditional transfer of \$400. The MPC in that setting is \$0.20 per dollar of transfer.¹¹ Hence, a ‘reasonable’ MPC in the context for Nepal would be somewhere between 0.2 and 0.7.

4.1.2 Results

Between 2001 and 2011, the *illakas* that saw a greater rise in migration rates to Gulf-Malaysia, also saw a corresponding fall in poverty rates (Figure 4). However, increases in migration rates to India is not related with changes in poverty rates. These graphical results translate to the estimates of Equation (2) on the census data of 2001 and 2011. A 10 percentage points increase in the share of households with a migrant in Gulf-Malaysia reduces poverty rates by 7 percentage points and increases per-capita consumption by 11 percent (Table 1). This estimate suggests that migration rates to Gulf-Malaysia alone explains 40 percent of the actual decline in poverty between 2001 and 2011. Both rural and urban areas benefit from migration, with the effect being slightly larger for urban areas. On the contrary, an increase in migration rates to India has no impact on poverty rates or the average level of consumption in the *illakas*.

These findings are echoed in the instrumental variables estimates of Equation (1) on the NLSS-III data. The instrumental variable estimates show that for households with a migrant in Gulf-Malaysia, migration reduces the likelihood of poverty by 78 percentage points, and increases consumption by 153% (Table 2). These estimates are only slightly higher than the estimates in Table

¹⁰Typically, Nepali workers work in menial jobs, live in shared housing or ‘labor-camps’, and often work in environments different from Nepal, and in addition, are separated from their families for elongated period.

¹¹Author’s calculations from the published tables and replication data.

1.¹² This is quite comforting that the estimates from two different empirical strategies and datasets yield similar results. Here as well, migration to India has no impact on poverty or consumption.

To estimate the MPC of remittance income, I estimate Equation (1) with (logarithm of) remittance income as the dependent endogenous variable. An increase in remittance income of 1 percent increases household consumption by 0.16 percent (Table 3). The implied MPC of remittance income is \$0.49 for an additional dollar in remittances.¹³ The associated increase in food consumption is \$0.18, on durable consumption is \$0.09, and on non-durable consumption is \$0.10. Educational expenditure increases only slightly and is statistically insignificant. The MPC of remittance income is slightly lower for rural households with only \$0.40 increases in consumption, but the share that goes to food consumption is much higher at \$0.20. Given that the rural households are poorer, it is reasonable to expect higher shares of the consumption going to food. The MPC for urban areas are high, with an estimate of \$0.72, which much of the increases going to non-food items, including education. A \$1 increase in remittance income increases educational expenditures of urban households by \$0.17, on durable goods by \$0.18, and on non-durables by \$0.20. It appears that, at least in urban areas, increase in remittance has spurred local demand for non-food consumption as well as education whereas in rural areas, the increase in consumption is mostly concentrated in food items. As expected, the MPC of remittance income is higher than that of a random increase in transitory income, but lower compared to typical estimates of MPC of permanent increases in income.

4.2 Impact on education

4.2.1 Framework

Though many migrants state that their children education is one of the drivers of their migration decision, the impact of adult migration in child schooling outcome is theoretically ambiguous. If schooling is a normal good, then an increase in household income through migration and remittances will increase child schooling. The increase will be even higher if liquidity constraints were preventing some children from obtaining the optimal or desired level of schooling. However, not having a parent in the household may hamper child education negatively if parental supervision is a key input to child success in school. In addition, the increasing availability of migration opportunities for younger workers may affect the incentives to get educated. For instance, if (perceived) returns schooling in domestic market is low, and the returns to migration are very high, then child might optimally choose to invest in increasing their migration prospects rather than on schooling. In the context of Nepal, this is likely to affect incentives for boys, but not necessarily for girls. Hence, the overall impact of migration on child education is an empirical question, and the literature, briefly mentioned above, finds different effects in different contexts.

¹²A 10 percentage point increases in likelihood of migration reduces poverty by 7.8 percentage points.

¹³The MPC is estimated with a bootstrap standard error of 0.19.

4.2.2 Results

I estimate Equation (1) on NLSS-III data to assess the impact of migration of a family member on the schooling outcomes of the children aged 5-14. A rise of 10 percentage points in the probability of a household having a migrant in Gulf-Malaysia increases child school enrollment by 4 percentage points (Table 4). The impact is slightly larger for urban areas compared to rural areas, but the effects are unlikely to be statistically different. The effects are almost completely driven by the impact on girls. A 10 percentage points in the probability of the household having a migrant in Gulf-Malaysia increases school attendance of girls by 9 percentage points. The effect for boys are much smaller (1 percentage points) and are statistically insignificant. The impact on completed years of schooling follows a similar pattern, but the estimates are much noisier to be statistically significant at conventional levels. For girls, where the results are marginally significant (at 10 percent significance), an increase in 10 percentage points in the probability of migration increases girls schooling by a 0.26 years. Many of the channels noted above could be at play here resulting in the estimates being imprecise as well as heterogeneous by gender.

4.3 Impact on domestic labor market outcomes

4.3.1 Framework

There are several ways in which migration affects the labor supply decision of individuals. First, for individuals in a household with a migrant, there is a direct impact of migration. The increased income through remittances could increase the consumption of leisure reducing their labor supply in domestic markets. This channel has been explored in the context of Nepal in Phadera (2016) and Lokshin and Glinskaya (2009), and will not be explored in this paper.

Second, large-scale migration as in the case of Nepal, is a reduction in the total male labor supply in the domestic market. A reduction in the total amount of labor can have different implications for different genders. For males, male out-migration is a negative supply shock which would lead to higher wages for the non-migrants. This could also induce more men to participate in the labor market, which might offset some of the increases in wages. For females, the impact of male out-migration depends upon whether female labor supply is a complement, or a substitute to male labor supply. In the extreme case of them being perfect complements, male out-migration reduces the demand for female labor and lowers their wages. The opposite would be true if male and female labor are perfectly substitutable with each other. In reality, the degree of substitutability potentially differs by the sectors as well. In Appendix A, I present a very simple model to formally articulate the intuition described here. The more substitutable male and female labor supply are, female wages and participation will respond more positively to increased male out-migration.

Third, large-scale migration could mean more liquidity and greater availability of credit in the local labor market. If individuals are credit constrained to open new businesses, then migration could ease these constraints, increasing self-employment and business creation. Migration could also increase business creation through a transfer of ideas and technologies from abroad. Similarly,

increased migration and remittances in the local economy could boost the demand for local goods and services, further increasing employment and wages for all.

Furthermore, large out-migration also means large social networks of migrants in destination countries that might find jobs abroad, or provide relevant information on jobs abroad. This could create an incentive for the non-migrants, especially male, to invest in finding out more about the labor markets abroad and make related investments, which could come at a cost of labor supplied in the domestic market. This impact is likely to be stronger for members with a migrant in the household as they have better access to the migrant network abroad, as well as have the resources to make related investments and finance migration.

The net impact of migration depends upon the relative contribution of these channels in the local labor markets. Various channels are likely to have stronger impacts in different segments of the population.

4.3.2 Results

To examine the impact of village level migration rate on wages, I estimate Equation (1) on NLSS-III data, and to estimate the impact on labor supply, I estimate Equation (2) on the census data.¹⁴

A one-percentage point increase in the village level migration rate increases wages by 2.3 percent (Table 5). Between 2001 and 2011, migration rates to Gulf-Malaysia increased by 3.5 percentage points which increased the wages by 8 percent. This overall effect is driven by increases in wages in the agricultural sector, and for women. The change in average level of migration between 2001 and 2011 increased agricultural wages by 14 percent. For females, the change in migration rates between 2001 and 2011 increased average wages by 14 percent, agricultural wages by 15 percent, and casual wages by 12 percent. The effects are qualitatively similar in both rural in urban areas, with the effect on non-agricultural wages higher in rural areas and the effect on casual wages higher in urban areas (Appendix Tables B.1 and B.2). This suggests that even in agriculture, where male and female labor inputs are traditionally considered as being complementary to each other, reduction in male labor supply actually increases female wages. In light of the model described in Appendix A, this would mean that the elasticity of substitution between male and female labor is sufficiently high.

The impact on labor force participation (extensive margin) echoes and complements the results on wages. A one-percentage point increase in village level migration rates increases overall LFP by 0.4 percentage points for individuals from non-migrant households (Table 6). The impact for households with a migrant is lower at 0.2 percentage points. This means that the increase in migration rates between 2001 and 2011, increased LFP by 1.2 percentage points for individuals in non-migrant households, and by 0.7 percentage points for individuals in migrant households. Though these effects are small in magnitude (around 1-2 percent of the LFP rates in 2011), they

¹⁴Census data does not have information on wages or labor earnings, and hence cannot be used to look at the impact on wages. The NLSS-III data has only about 15 households surveyed per village, and does not provide enough sample to examine the aggregated impact, separated by whether households have a migrant or not.

are economically meaningful in the sense that aggregate LFP has actually been *falling* between 2001 and 2011. Migration causes LFP to increase despite a trend to the contrary.¹⁵

Migration increases male participation in agriculture, but fails to elicit female participation (Table 6). Putting this together with the wage results suggests that increased male out-migration either increases the price of labor, or induces greater participation, or both. It is entirely plausible that some of the increases in agricultural wages are offset by increases in participation, particularly for male workers. For females, the lack of response in the extensive margin is compensated by an increase in the price of female labor in agriculture.

For individuals in non-migrant households, migration increases labor force participation in non-agricultural sectors. This effect is almost completely driven by the impact on females. Large male out-migration increases female participation in both wage and self-employment outside agriculture. In light of the model in Appendix A, this suggests that the elasticity of substitution between male and female labor is also relatively high in non-farm sectors. For males, the impact on participation is much lower and statistically insignificant.

Conditional on participation in the labor market, higher migration rates in the villages increases the probability that a worker is an employer. An one-percentage point increase in village level migration rates increases the probability of being an employer by 0.13 percentage points for individuals in non-migrant households. Given the relatively low incidence of employers in the labor market (2 percent in 2011), the change in migration rates between 2001 and 2011 increased the probability of being an employer by 22 percent. The effect is strong for both genders, and for individuals from both migrant and non-migrant households. This effect is consistent with high degree of migration and remittances in the village easing liquidity and credit constraints for enterprising individuals to expand and hire other workers.

However, large male-out migration lowers participation of males from migrant households in non-farm activities. For males from non-migrant households as well, the (positive) impact on non-farm activities are muted and statistically insignificant, particularly in rural areas. This is consistent with male workers taking advantage of large social network of migrants from their villages to look for opportunities abroad. This could come at a cost of reduced labor supply in non-farm activities. The muted response from those in non-migrant households could be a combined effect of a shock to the local labor supply (which induces participation), increased network to look for jobs abroad (which reduces participation locally), and greater liquidity constraints to finance migration and related investments. For those from migrant households, increased income from remittances offsets some of the effects from a shock to local labor supply by increasing their reservation wages, and enhances job search abroad by relieving the liquidity constraints to finance job search abroad and related investments. The fact that the effect on male non-farm participation is stronger in rural areas, where non-farm labor demand is lower and liquidity constraints more binding, is also consistent with this explanation.¹⁶ However, due to data constraints, I am unable to investigate this channel

¹⁵There is some differences between rural and urban areas, with most of the effects being driven by rural areas (Appendix Tables B.3 and B.4).

¹⁶Though the magnitudes of the impacts are slightly larger for the urban areas, the impacts are more precise and

in greater depth.

The implications of large scale out-migration on the labor force can be varied and multifaceted. In the context of Nepal, most of the effects seem to indicate that migration acts as a negative shock to the labor supply, increasing wages and/or participation of both males and females non-migrants. Migration also helps small businesses expand which suggests that many businesses might be credit constrained which migration and the resulting remittance can ease. Migration has some negative impact on male participation in non-farm activities for those from households with a current migrant. This could stem from increased access to social network that is abroad, which could increase investments and time put towards finding a job abroad. However, it is comforting to see that male non-farm wages are moderately increased in response to migration, particularly in the rural areas.

5 Conclusion

Constraints to international labor mobility have often been dubbed as the single biggest distortion in the global economy (Clemens, 2011). Temporary labor migration, such as that of South Asian workers to Malaysia, and the Persian Gulf countries provides a pathway to alleviate some of the distortion without imposing a social assistance costs to the host countries. Taking advantage of opportunities in Gulf-Malaysia, almost a quarter of the male labor force from Nepal has temporarily migrated to these countries for work. The scale of migration has led to increased concerns among policy makers on the impact of migration on, among other things, consumption and domestic labor markets. In this paper, I provide evidence on the impact of migration on consumption, expenditures, and domestic labor markets using a combination of instrumental variables and difference-in-difference strategies.¹⁷

I find that Gulf-Malaysia migration has led to large increases in the living standards of individuals and reductions in poverty. The increase in the Gulf-Malaysia migration rate between 2001 and 2011 explains about 40 percent of the actual decline in poverty during this period.

The estimated marginal propensity of consumption out of remittance income is also within reasonable range. Remittance receiving households spend \$0.50 out of every dollar increase in remittance income, most of it going towards increases in food consumption, particularly in rural areas. In urban areas, remittance income also increases non-food consumption, including on education. It does not appear that remittances are spurring a rampant rise in spending by household members. The estimates of MPC is higher than that of an unexpected transitory income shock,

proportionally larger for rural areas where non-farm participation rate is much lower (see Appendix Tables B.3 and B.4 for the impacts). For reference the non-farm male employment rate in rural areas is 31 percent, and in urban areas is 57 percent.

¹⁷The impact of migration on societal structures, family dynamics, intra-household bargaining, female empowerment, political preferences, and appreciation of the real exchange rate are also extremely interesting and policy relevant in the context of Nepal and are part of the greater policy debate surrounding migration. Similarly, the nature of the recruitment market and the risks faced by workers abroad entice passionate policy debates and should be a part of the broader discussions on the impact of migration in the context of Nepal. But these topics and impacts are beyond the scope of this paper.

but lower than what would be expected of a permanent increases in income as it is supposed to be.

I find positive, but modest impact of migration of household members on child education. While the impact on girls is strong and positive, the impact on boys is statistically indistinguishable from zero. It appears that, at least for boys, the increase in demand for education due to increases in income is at least partly offset by increases in returns to low-education through low-skilled migration abroad.

I also find largely positive impacts of migration on wages and labor force participation. The increase in the Gulf-Malaysia migration rate between 2001 and 2011 has increased overall wages by 8 percent (14 percent for females), and agricultural wages by 14 percent. The increase in migration during this period also increased labor force participation, both for individuals from households with and without a current migrant. This effect is remarkable, particularly in light of the *falling* LFP during this period. The effect in participation is driven by increases in male participation in farming, and female participation in non-farm activities. Taken together, migration benefits both male and female workforce, especially those without a current migrant in their households, either through increases in wages and/or increases in participation. High migration rates in a village reduce participation in non-farm activities of men from migrant-households, plausibly because of their access to better job-search options abroad. This reduction is accompanied by increases in male non-farm wages, particularly in rural areas.

These findings broadly echo the findings in the literature on the impacts of migration and can be used to inform the policy discussion on the impact of migration, particularly, in the context of Nepal.

References

- ADHIKARI, J., AND M. HOBLEY (2013): *Everyone is leaving, who will sow our fields?: The effects of migration from the Khotang district to the Gulf and Malaysia*. Nepal Institute of Development Studies.
- AKRAM, A. A., AND A. M. MOBARAK (2016): “Seasonal migration to increase incomes of poor households in Bangladesh,” *Working Paper*.
- ANTMAN, F. M. (2012): “Gender, educational attainment, and the impact of parental migration on children left behind,” *Journal of Population Economics*, 25(4), 1187–1214.
- BRYAN, G., S. CHOWDHURY, AND A. M. MOBARAK (2014): “Underinvestment in a profitable technology: The case of seasonal migration in Bangladesh,” *Econometrica*, 82(5), 1671–1748.
- CLEMENS, M. A. (2011): “Economics and emigration: Trillion-dollar bills on the sidewalk?,” *The Journal of Economic Perspectives*, pp. 83–106.
- CLEMENS, M. A., C. E. MONTENEGRO, AND L. PRITCHETT (2008): “The place premium: Wage differences for identical workers across the US border,” *Center for Global Development Working Paper 148*.

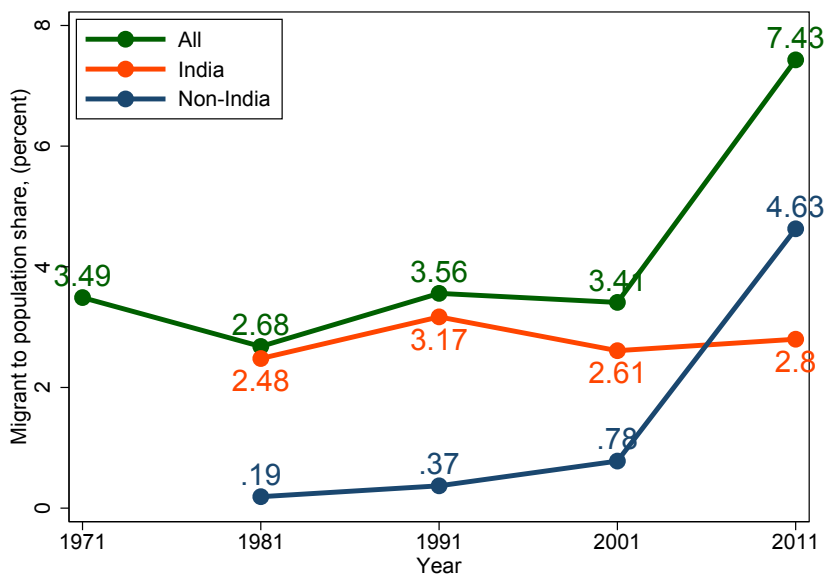
- DE BRAUW, A., AND J. GILES (2016): “Migrant opportunity and the educational attainment of youth in rural China,” *Journal of Human Resources*.
- DINKELMAN, T., G. KUMCHULESI, AND M. MARIOTTI (2017): “Labor migration, capital accumulation, and the structure of rural labor markets,” *Working Paper*.
- DINKELMAN, T., AND M. MARIOTTI (2016): “The long-run effects of labor migration on human capital formation in communities of origin,” *American Economic Journal: Applied Economics*, 8(4), 1–35.
- ELBERS, C., J. O. LANJOUW, AND P. LANJOUW (2003): “Micro-level estimation of poverty and inequality,” *Econometrica*, 71(1), 355–364.
- GIBSON, J., AND D. MCKENZIE (2014): “The development impact of a best practice seasonal worker policy,” *Review of Economics and Statistics*, 96(2), 229–243.
- HAUSHOFER, J., AND J. SHAPIRO (2016): “The short-term impact of unconditional cash transfers to the poor: Experimental evidence from Kenya,” *The Quarterly Journal of Economics*, 131(4), 1973–2042.
- IMBENS, G. W., AND J. D. ANGRIST (1994): “Identification and Estimation of Local Average Treatment Effects,” *Econometrica*, 62(2), 467–475.
- JAPPELLI, T., AND L. PISTAFERRI (2010): “The consumption response to income changes,” *Annu. Rev. Econ.*, 2(1), 479–506.
- LOKSHIN, M., AND E. GLINSKAYA (2009): “The effect of male migration on employment patterns of women in Nepal,” *The World Bank Economic Review*, 23(3), 481–507.
- MCKENZIE, D. (2017): “How effective are active labor market policies in developing countries? a critical review of recent evidence,” *The World Bank Research Observer*.
- MCKENZIE, D., AND H. RAPOPORT (2007): “Network effects and the dynamics of migration and inequality: Theory and evidence from Mexico,” *Journal of development Economics*, 84(1), 1–24.
- (2011): “Can migration reduce educational attainment? Evidence from Mexico,” *Journal of Population Economics*, 24(4), 1331–1358.
- MCKENZIE, D., S. STILLMAN, AND J. GIBSON (2010): “How important is selection? Experimental vs non-experimental measures of the income gains from migration,” *Journal of the European Economic Association*, 8(4), 913–945.
- MUNSHI, K. (2003): “Networks in the modern economy: Mexican migrants in the US labor market,” *The Quarterly Journal of Economics*, 118(2), 549–599.
- PAXSON, C. H. (1993): “Consumption and income seasonality in Thailand,” *Journal of political Economy*, 101(1), 39–72.
- PHADERA, L. (2016): “International migration and its effect on labor supply of the left-behind household members: Evidence from Nepal,” *Working Paper*.
- SHRESTHA, M. (2017a): “Death scares: How potential work-migrants infer mortality rates from migrant deaths,” World Bank Policy Research Working Paper Series WPS7946, The World Bank.

- (2017b): “Get rich or die tryin’: Perceived earnings, perceived mortality rate and the value of a statistical life of potential work-migrants from Nepal,” World Bank Policy Research Working Paper Series WPS7945, The World Bank.
- (2017c): “Push and pull : A study of international migration from Nepal,” World Bank Policy Research Working Paper Series WPS7965, The World Bank.
- THE WORLD BANK, . (2011): “Large-scale migration and remittance in Nepal: Issues, challenges and opportunities,” Discussion Paper 55390-NP, The World Bank, Poverty Reduction and Economic Management Sector Unit, South Asia Region.
- (2017): “World Development Indicators,” .
- YANG, D. (2008): “International migration, remittances and household investment: Evidence from Philippine migrants’ exchange rate shocks*,” *The Economic Journal*, 118(528), 591–630.

Figures and Tables

Figures

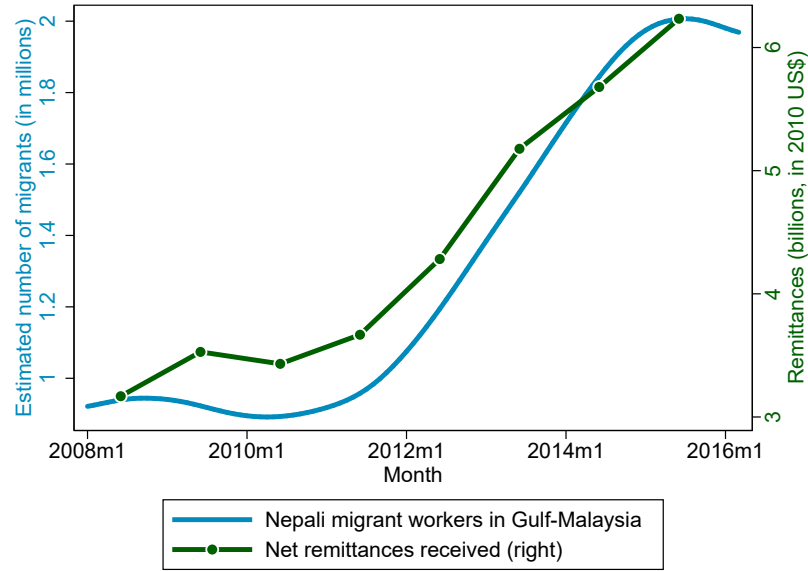
Figure 1: International migration from Nepal



Source: Census data for various years.

Note: This figure shows the migrant to population ratio for each of the census years. Destination breakdown was not available for 1971.

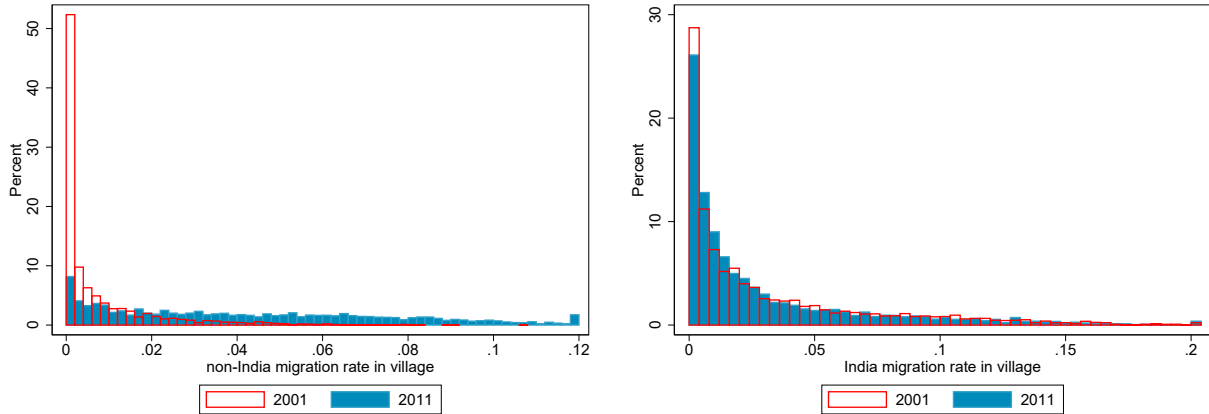
Figure 2: Migrants in Gulf-Malaysia, and net remittance receipt



Source: Census 2011, DoFE database on migrant permit, and The World Development Indicators ([The World Bank, 2017](#))

Note: Stock of migrants estimated from the stock in June 2011 from the census and migrant permit database at the Department of Foreign Employment. Each migrant is estimated to remain in the destination for 2 years in case of the Gulf countries, and 2.5 years in case of Malaysia.

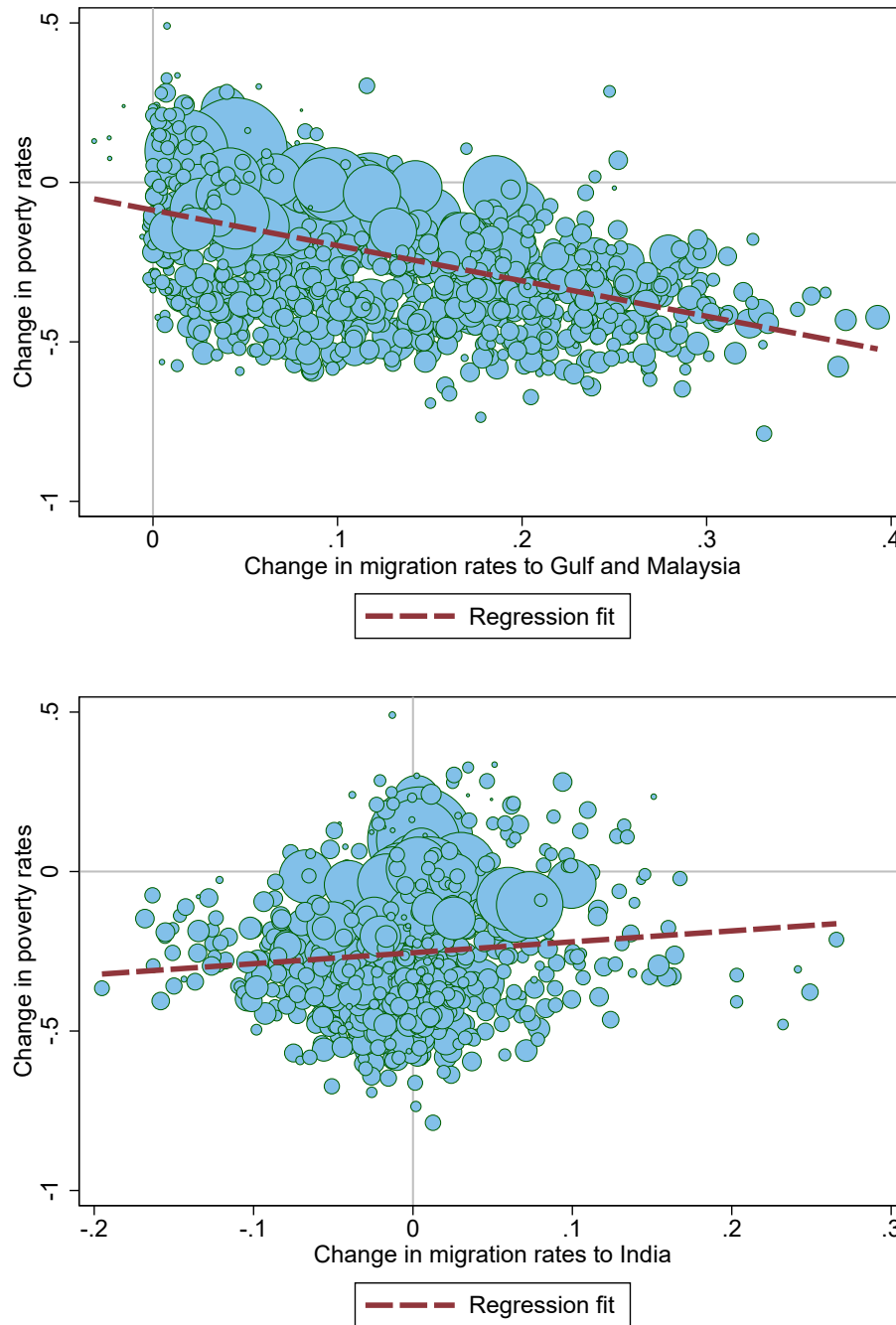
Figure 3: Distribution of migration rates by villages



Source: Author's calculations from the 2001 and 2011 Census.

Note: This figure shows the distribution of migration rates for each of the villages in 2001 and 2011, for India and non-India migrants.

Figure 4: Changes in poverty rates and migration



Source: Author's calculations from the 2001 and 2011 Census and Small Area Estimates of poverty.

Note: This figure shows how changes in *illaka* level migration rates is associated with changes in *illaka* level poverty rates. The top panel plots the changes in Gulf-Malaysia migration rates and the bottom panel plots changes in India migration rates in the horizontal axes. Each point represents an *illaka* with the area proportional to the population in 2001. The line shows linear regression estimate of the relationship.

Tables

Table 1: Impact of migration on poverty at Village level

	All		Rural		Urban	
	Log (PC-		Log (PC-		Log (PC-	
	p0	cons)	p0	cons)	p0	cons)
	(1)	(2)	(3)	(4)	(5)	(6)
Migration rates to Gulf-Malaysia						
to Gulf-Malaysia	-0.659*** (0.097)	1.071*** (0.332)	-0.574*** (0.087)	0.594*** (0.123)	-1.387*** (0.506)	5.142** (2.554)
Observations	1922	1922	1808	1808	114	114
Adj R-squared	0.814	0.883	0.788	0.941	0.801	0.708
Migration rates to India						
to India	0.203 (0.147)	-0.125 (0.303)	0.187 (0.147)	-0.142 (0.198)	0.379 (0.759)	0.072 (3.069)
Observations	1922	1922	1808	1808	114	114
Adj R-squared	0.790	0.874	0.765	0.938	0.724	0.606

Source: Author's estimates using the Census 2001 and 2011 data, and small area poverty estimates for *illakas*.

Note: This table shows the impact of *illaka* level migration rates on *illaka* level estimates of poverty and per-capital consumption. Reported coefficients are the estimates of β from Equation (2). The column headings indicate the outcome variables and sample restrictions. Migration rates at the *illaka* level is the dependent variables. The top panel shows the impact of migration to Gulf-Malaysia and the bottom panel shows the impact of migration to India. Standard errors, clustered at the *illaka* level, are reported in parentheses. *** : $p < 0.01$; ** : $p < 0.05$; * : $p < 0.1$

Table 2: Impact of migration on poverty at Household level

	All		Rural		Urban	
	Log (PC-		Log (PC-		Log (PC-	
	p0	cons)	p0	cons)	p0	cons)
	(1)	(2)	(3)	(4)	(5)	(6)
Household has a migrant in Gulf-Malaysia						
in Gulf-Malaysia	-0.777*** (0.188)	1.534*** (0.433)	-0.649*** (0.182)	0.809*** (0.276)	-1.527* (0.803)	5.286 (3.237)
First stage F-stat	32.0	32.0	34.7	34.7	4.4	4.4
Observations	5988	5988	3900	3900	2088	2088
Household has a migrant in India						
in India	0.049 (0.179)	-0.260 (0.213)	0.049 (0.187)	-0.208 (0.222)	0.031 (0.324)	-0.975 (0.760)
First-Stage F-stat	34.2	34.2	30.2	30.2	5.9	5.9
Observations	3004	3004	2186	2186	818	818

Source: Author's estimates using the NLSS-III data.

Note: This table shows the impact of household migration status on poverty and consumption. Reported coefficients are the estimates of β from Equation (1). The column headings indicate the outcome variables and sample restrictions. Dependent variable is an indicator of whether the household has a current migrant in Gulf-Malaysia (top panel) or India (bottom panel), and is instrumented with the village level migration rates in 2001. Standard errors, clustered at the ward level, are reported in parentheses. *** : $p < 0.01$; ** : $p < 0.05$; * : $p < 0.1$

Table 3: Impact of remittances on consumption

	Log(cons) (1)	Breakdown of Log(consumption)			
		food (2)	durable (3)	non-durables (4)	education (5)
All Households					
Log(remittances)	0.164*** (0.046)	0.103*** (0.031)	0.618*** (0.187)	0.179*** (0.052)	0.171 (0.130)
implied MPC	0.494	0.178	0.088	0.104	0.036
First-stage F-stat	17.83				
Observations	5988	5988	5988	5988	5988
Rural Households					
Log(remittances)	0.146** (0.064)	0.120** (0.052)	0.634** (0.319)	0.120* (0.072)	-0.078 (0.223)
implied MPC	0.399	0.205	0.064	0.060	-0.013
First-stage F-stat	5.58				
Observations	3900	3900	3900	3900	3900
Urban Households					
Log(remittances)	0.168*** (0.056)	0.082** (0.034)	0.538*** (0.182)	0.210*** (0.064)	0.367** (0.148)
implied MPC	0.718	0.149	0.184	0.201	0.167
First-stage F-stat	20.89				
Observations	2088	2088	2088	2088	2088

Source: Author's estimates using the NLSS-III data.

Note: This table shows the impact of remittances on consumption and expenditures. Reported coefficients are the estimates of β from Equation (1), and the corresponding estimates of the marginal propensity to consume (MPC). The column headings indicate the outcome variables. Dependent variable is the natural logarithm of remittance received by the household, and is instrumented with the village level migration rates to Gulf-Malaysia in 2001. The MPC is computed for the average household. Standard errors, clustered at the ward level, are reported in parentheses.

*** : $p < 0.01$; ** : $p < 0.05$; * : $p < 0.1$

Table 4: Impact of migration on children's education

	Currently attends school			Completed years of schooling		
	All	Rural	Urban	All	Rural	Urban
	(1)	(2)	(3)	(4)	(5)	(6)
Children aged (5-14)						
has Gulf-Malaysia migrant	0.422** (0.168)	0.377** (0.190)	0.539* (0.322)	1.072 (0.811)	0.762 (0.907)	2.032 (2.042)
First-stage F-stat	14.72	10.69	3.90	14.72	10.69	3.90
Observations	7194	5322	1872	7194	5322	1872
Male children aged (5-14)						
has Gulf-Malaysia migrant	0.128 (0.138)	0.060 (0.134)	1.482 (2.055)	0.135 (0.846)	0.116 (0.830)	-1.020 (7.371)
First-stage F-stat	14.40	14.58	0.65	14.40	14.58	0.65
Observations	3558	2626	932	3558	2626	932
Female children aged (5-14)						
has Gulf-Malaysia migrant	0.866*** (0.324)	1.131* (0.611)	0.354* (0.188)	2.614* (1.526)	2.377 (2.415)	2.898* (1.683)
First-stage F-stat	7.53	3.47	5.59	7.53	3.47	5.59
Observations	3636	2696	940	3636	2696	940

Source: Author's estimates using the NLSS-III data.

Note: This table shows the impact of household migration on educational outcomes of children aged 5-14. Reported coefficients are the estimates of β from Equation (1). The column headings indicate the outcome variables and sample restriction. Dependent variable is an indicator of whether the household has a migrant in Gulf-Malaysia, and is instrumented with the village level migration rates to Gulf-Malaysia in 2001. Standard errors, clustered at the ward level, are reported in parentheses. *** : $p < 0.01$; ** : $p < 0.05$; * : $p < 0.1$

Table 5: Impact of migration on wages

	Log(wage) (1)	Log(agric wage) (2)	Log(non-agric wage) (3)	Log(casual wage) (4)
Working age (15-64)				
Gulf-Malaysia migration rate	2.338** (0.961)	4.073*** (1.375)	2.025* (1.085)	2.297** (1.005)
First-stage F-stat	308.61	119.94	363.79	175.11
Observations	5316	1729	3992	3077
Male sub-sample				
Gulf-Malaysia migration rate	1.671* (1.011)	3.492** (1.713)	1.258 (1.091)	1.547 (1.109)
First-stage F-stat	307.97	88.87	327.50	164.83
Observations	3297	723	2880	1738
Female sub-sample				
Gulf-Malaysia migration rate	3.879*** (1.496)	4.426*** (1.469)	3.978 (2.600)	3.537*** (1.170)
First-stage F-stat	251.92	123.41	274.20	159.28
Observations	2019	1006	1112	1339

Source: Author's estimates using the NLSS-III data.

Note: This table shows the impact of village migration rates on wages. Reported coefficients are the estimates of β from Equation (1). The column headings indicate the outcome variables. Dependent variable is the migration rates in the village in 2011, and is instrumented with the village level migration rates to Gulf-Malaysia in 2001. Standard errors, clustered at the ward level, are reported in parentheses. *** : $p < 0.01$; ** : $p < 0.05$; * : $p < 0.1$

Table 6: Impact of migration on labor force characteristics

	LFP	Agric- ulture	Participation in non-agriculture			emplo- yer
	(1)	(2)	All (3)	Wage (4)	self (5)	(6)
Working age (15-64)						
Village migration rate						
x migrant in HH	0.192** (0.095)	0.400*** (0.087)	-0.207*** (0.075)	-0.126** (0.058)	-0.081** (0.032)	0.076** (0.039)
x no migrant in HH	0.353*** (0.085)	0.112 (0.100)	0.241*** (0.065)	0.144*** (0.053)	0.097*** (0.028)	0.134*** (0.043)
Observations	3881384	3881384	3881384	3881384	3881384	2270376
Adj R-squared	0.053	0.199	0.087	0.054	0.036	0.024
Male sub-sample						
Village migration rate						
x migrant in HH	-0.060 (0.095)	0.641*** (0.101)	-0.701*** (0.115)	-0.532*** (0.097)	-0.168*** (0.047)	0.117*** (0.043)
x no migrant in HH	0.443*** (0.068)	0.369*** (0.113)	0.074 (0.104)	0.010 (0.086)	0.065 (0.043)	0.162*** (0.046)
Observations	1847306	1847306	1847306	1847306	1847306	1344491
Adj R-squared	0.028	0.194	0.134	0.075	0.054	0.022
Female sub-sample						
Village migration rate						
x migrant in HH	0.138 (0.117)	0.079 (0.109)	0.059 (0.049)	0.113*** (0.038)	-0.055** (0.026)	0.089** (0.044)
x no migrant in HH	0.214* (0.129)	-0.110 (0.120)	0.323*** (0.052)	0.221*** (0.041)	0.102*** (0.024)	0.134*** (0.050)
Observations	2034078	2034078	2034078	2034078	2034078	925885
Adj R-squared	0.160	0.249	0.057	0.042	0.025	0.035

Source: Author's estimates using the Census 2001 and 2011 data.

Note: This table shows the impact of village migration rates on labor force participation for the working age population (15-64) from households with and without a current migrant. Reported coefficients are the estimates of β from Equation (2). The column headings indicate the participation in various types of activities. Dependent variable is the migration rates in the village. Standard errors, clustered at the village level, are reported in parentheses.

*** : $p < 0.01$; ** : $p < 0.05$; * : $p < 0.1$

Appendix A A model of labor supply response to migration

In this section, I describe a very simple theoretical model illustrating how the substitutability between male and female labor in local production determines how they respond to male out-migration.

Consider a local economy, a village, with the aggregate production given by $AK^{1-\alpha}L^\alpha$, where K is the amount of capital used, and L is the aggregate labor used in production. The aggregate labor is a composite of male labor M and female labor F through a C.E.S relationship as follows:

$$L = \left(M^{\frac{\sigma-1}{\sigma}} + F^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$$

where σ represents the elasticity of substitution between male and female labor. A value of $\sigma = 0$ means that male and female labor are perfect complements, a value of $\sigma = \infty$ means that male and female labor are perfect substitutes.

In this economy, rental price of capital r , and male and female wages w_m and w_f are given by the first-order conditions:

$$\begin{aligned} r &= (1-\alpha)A \left(\frac{L}{K} \right)^\alpha \\ w_m &= \alpha A \left(\frac{K}{L} \right)^{(1-\alpha)} \left(\frac{L}{M} \right)^{\frac{1}{\sigma}} \\ w_f &= \alpha A \left(\frac{K}{L} \right)^{(1-\alpha)} \left(\frac{L}{F} \right)^{\frac{1}{\sigma}} \end{aligned}$$

Male out-migration is represented in this economy as a shock to M . To see how this affects males and female wages, we simply take the derivatives of the first order condition. For female wages,

$$\frac{\partial w_f}{\partial M} = \alpha A \left(\frac{K}{L} \right)^{(1-\alpha)} \left(\frac{L^{2-\sigma}}{M \cdot F} \right)^{\frac{1}{\sigma}} \left[\frac{1}{\sigma} - (1-\alpha) \right]$$

That is, an increase in male labor supply has two effects. The first effect (first term within the square brackets) is through complementarity between the male and female labor supply: an increase in one increases the demand for the other. This effect is higher if the degree of complementarity is higher. The second effect comes from the overall increase in labor supply, which reduces the price of labor. The net effect is positive if and only if $\frac{1}{\sigma} > (1-\alpha)$, that is when the elasticity of substitution is sufficiently low. That means, when male and female labor are less substitutable, a decrease in the supply of male workers will also reduce the demand for female labor, hence lowering their wages.

Now, consider the male wages,

$$\frac{\partial w_m}{\partial M} = \alpha A \left(\frac{K}{L} \right)^{(1-\alpha)} \left(\frac{L^{2-\sigma}}{M \cdot F} \right)^{\frac{1}{\sigma}} \left[-\frac{F}{M} \frac{1}{\sigma} - (1-\alpha) \right]$$

which is always negative as both the effects go in the same direction. That is, a decrease in the supply of male workers will increase the male wages.

Appendix B Additional Results

Tables

Table B.1: Impact of migration on rural wages

	Log(wage) (1)	Log(agric wage) (2)	Log(non-agric wage) (3)	Log(casual wage) (4)
Rural working age (15-64)				
Gulf-Malaysia migration rate	2.604** (1.061)	3.689** (1.456)	2.233* (1.180)	1.766 (1.167)
First-stage F-stat	151.72	99.78	147.36	121.23
Observations	3402	1542	2214	2549
Male sub-sample				
Gulf-Malaysia migration rate	2.758** (1.161)	2.525 (1.548)	2.614** (1.330)	1.280 (1.260)
First-stage F-stat	152.25	74.27	149.06	111.89
Observations	2081	661	1697	1425
Female sub-sample				
Gulf-Malaysia migration rate	2.809* (1.461)	4.462*** (1.649)	0.626 (2.214)	2.670** (1.318)
First-stage F-stat	126.15	103.85	75.70	115.12
Observations	1321	881	517	1124

Source: Author's estimates using the NLSS-III data.

Note: This table shows the impact of village migration rates on rural wages. Reported coefficients are the estimates of β from Equation (1). The column headings indicate the outcome variables. Dependent variable is the migration rates in the village in 2011, and is instrumented with the village level migration rates to Gulf-Malaysia in 2001. Standard errors, clustered at the ward level, are reported in parentheses. *** : $p < 0.01$; ** : $p < 0.05$; * : $p < 0.1$

Table B.2: Impact of migration on urban wages

	Log(wage) (1)	Log(agric wage) (2)	Log(non-agric wage) (3)	Log(casual wage) (4)
Urban working age (15-64)				
Gulf-Malaysia migration rate	2.136 (1.832)	6.305** (2.535)	1.835 (1.912)	3.991** (1.747)
First-stage F-stat	289.19	99.32	350.54	133.20
Observations	1914	187	1778	528
Male sub-sample				
Gulf-Malaysia migration rate	0.264 (1.490)	8.113** (3.849)	-0.351 (1.462)	2.818 (2.257)
First-stage F-stat	255.65	59.79	280.71	130.63
Observations	1216	62	1183	313
Female sub-sample				
Gulf-Malaysia migration rate	5.014 (3.596)	3.162* (1.735)	5.807 (4.934)	6.665*** (2.280)
First-stage F-stat	281.80	75.65	317.01	99.93
Observations	698	125	595	215

Source: Author's estimates using the NLSS-III data.

Note: This table shows the impact of village migration rates on urban wages. Reported coefficients are the estimates of β from Equation (1). The column headings indicate the outcome variables. Dependent variable is the migration rates in the village in 2011, and is instrumented with the village level migration rates to Gulf-Malaysia in 2001. Standard errors, clustered at the ward level, are reported in parentheses. *** : $p < 0.01$; ** : $p < 0.05$; * : $p < 0.1$

Table B.3: Impact of migration on labor force in rural areas

	LFP	Agric- ulture	Participation in non-agriculture			emplo- yer
	(1)	(2)	All (3)	Wage (4)	self (5)	(6)
Rural working age (15-64)						
Village migration rate						
x migrant in HH	0.283*** (0.074)	0.487*** (0.080)	-0.204*** (0.052)	-0.127*** (0.047)	-0.077*** (0.022)	0.102*** (0.037)
x no migrant in HH	0.322*** (0.077)	0.164* (0.087)	0.157*** (0.053)	0.075 (0.048)	0.082*** (0.022)	0.134*** (0.040)
Observations	2528447	2528447	2528447	2528447	2528447	1587888
Adj R-squared	0.051	0.136	0.069	0.053	0.025	0.031
Male sub-sample						
Village migration rate						
x migrant in HH	0.077 (0.070)	0.793*** (0.089)	-0.716*** (0.082)	-0.552*** (0.078)	-0.163*** (0.034)	0.145*** (0.040)
x no migrant in HH	0.391*** (0.061)	0.446*** (0.089)	-0.056 (0.082)	-0.096 (0.076)	0.040 (0.031)	0.175*** (0.042)
Observations	1180178	1180178	1180178	1180178	1180178	887826
Adj R-squared	0.027	0.118	0.105	0.079	0.033	0.029
Female sub-sample						
Village migration rate						
x migrant in HH	0.230** (0.108)	0.105 (0.104)	0.125*** (0.041)	0.150*** (0.035)	-0.026 (0.021)	0.084** (0.043)
x no migrant in HH	0.229* (0.121)	-0.094 (0.116)	0.323*** (0.043)	0.211*** (0.036)	0.112*** (0.021)	0.106** (0.047)
Observations	1348269	1348269	1348269	1348269	1348269	700062
Adj R-squared	0.152	0.201	0.050	0.041	0.023	0.041

Source: Author's estimates using the Census 2001 and 2011 data.

Note: This table shows the impact of village migration rates on labor force participation for the rural working age population (15-64) from households with and without a current migrant. Reported coefficients are the estimates of β from Equation (2). The column headings indicate the participation in various types of activities. Dependent variable is the migration rates in the village. Standard errors, clustered at the village level, are reported in parentheses.

*** : $p < 0.01$; ** : $p < 0.05$; * : $p < 0.1$

Table B.4: Impact of migration on labor force in urban areas

	LFP	Agric- ulture	Participation in non-agriculture			emplo- yer
	(1)	(2)	All (3)	Wage (4)	self (5)	(6)
Urban working age (15-64)						
Village migration rate						
x migrant in HH	-0.368 (0.429)	0.208 (0.439)	-0.576 (0.364)	-0.268 (0.285)	-0.309* (0.174)	0.019 (0.220)
x no migrant in HH	0.771** (0.369)	0.007 (0.494)	0.764** (0.355)	0.643** (0.262)	0.121 (0.166)	0.214 (0.251)
Observations	1352937	1352937	1352937	1352937	1352937	682488
Adj R-squared	0.020	0.129	0.032	0.020	0.011	0.006
Male sub-sample						
Village migration rate						
x migrant in HH	-0.914** (0.397)	0.302 (0.426)	-1.216** (0.540)	-0.776 (0.469)	-0.440 (0.269)	0.154 (0.214)
x no migrant in HH	0.966*** (0.267)	0.130 (0.490)	0.836 (0.551)	0.703 (0.429)	0.133 (0.258)	0.126 (0.217)
Observations	667128	667128	667128	667128	667128	456665
Adj R-squared	0.017	0.113	0.042	0.019	0.016	0.006
Female sub-sample						
Village migration rate						
x migrant in HH	-0.150 (0.583)	0.029 (0.526)	-0.179 (0.269)	0.109 (0.183)	-0.287** (0.143)	0.172 (0.260)
x no migrant in HH	0.437 (0.618)	-0.057 (0.571)	0.494* (0.278)	0.462** (0.191)	0.032 (0.123)	0.507 (0.310)
Observations	685809	685809	685809	685809	685809	225823
Adj R-squared	0.077	0.176	0.038	0.029	0.013	0.014

Source: Author's estimates using the Census 2001 and 2011 data.

Note: This table shows the impact of village migration rates on labor force participation for the urban working age population (15-64) from households with and without a current migrant. Reported coefficients are the estimates of β from Equation (2). The column headings indicate the participation in various types of activities. Dependent variable is the migration rates in the village. Standard errors, clustered at the village level, are reported in parentheses.

*** : $p < 0.01$; ** : $p < 0.05$; * : $p < 0.1$