

Ungrateful children: migration intensity and remittances in Nepal

François Libois and Vincent Somville

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Abstract

Poverty has declined dramatically in Nepal since the end of the conflict. The sharp increase in revenues primarily comes from remittances. From a household's perspective, choosing the appropriate number of migrants is crucial: they must trade-off the direct cost and loss of local income earners versus the potential remittances. We build a standard game theory model of remittances to emphasize two effects of the number of migrants on the total remittances received that go in opposite directions. On one hand, if each migrants earns more than when he stays home, then there is more to remit, and we expect higher total remittances. On the other hand, when there are more migrants, the incentive to free ride also increases: each of them remits less and the total remittances could decrease. We use the last nationally representative survey to test our theoretical predictions. We find that the total remittances received (per household member) in fact substantially decreases with the number of migrants, in line with the free-riding argument. We use past conflict intensity in the district to predict current number of migrants and clear our estimates of endogeneity biases. We also discuss the plausibility of alternative explanations.

Aknowledgements

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1 Introduction

After ten years of conflict, Nepal's economy has evolved and become increasingly dependent on remittances. As The World Bank concludes, the country current's growth is based on remittance financed consumption. Remittances now accounts for twenty-five percent of the GDP and the remittances played an important role in decreasing the levels of poverty (World Bank, 2014). Understanding the migration dynamics and the motives behind the migrants' decisions are crucial to clarify the future of Nepal's economy.

This paper focuses on one particular determinant of the remittances: the number of migrants from a household. While most of the literature takes the migrant's point of view to study how much a particular migrant is sending back, we look at the issue from the original household point of view. We ask how the total amount received by a household varies with the number of migrants from that household.

The answer is theoretically ambiguous. An additional migrant usually means that the total incomes of the migrants increase, there is one more person sending remittances and the household receives more. However, if each migrant is strategic and takes into account the remittances of the other migrants when choosing his own remittances, each migrant will generally send less. Under some conditions, the total amount received by the household will decrease with the number of migrants. We adapt a standard game theory model in Section 2 to develop this argument.

In the following sections, we use the last nationally representative survey of Nepal (NLSSIII) to study the effects of the number of migrants on the total remittances. We first find a positive correlation between the number of migrants and the total remittances that is not statistically significantly different from zero. Using instrumental variables, we further estimate a negative causal effect. On average, an additional migrant reduces the total remittances (per household member) by four to eleven thousand NRs a month. The instruments are based on measures of the conflict's intensity. We find that households living in a district that witnessed more conflict in the nineties have more migrants today. We argue that past conflict determined the levels of migration in the past, but not the current remittances.

Our findings are directly relevant to the literature on the links between fertility and poverty. Some argue that high fertility rates play an important role in perpetuating poverty, because of the increased pressure on a limited household income. With the large majority of the migrants being the children of the household head, a higher fertility also means potentially more migrants and some very high financial benefits in the future. Whether that is the case depends precisely on the trade-offs that we have described above. The paper also falls naturally into the vast literature on migration and remittances. There can be many reasons why people send remittances. In their review of the theoretical literature, Rapoport and Docquier (2006) list six main motives. The first motive is altruism: people may send remittances because their own utility is positively affected by the recipient's consumption or utility. The exchange motive is also emphasized: remittances buy services such as taking care of the migrant's cattle, land or relatives. It also covers the case where remittances are considered as repayments for loans made to finance migration. The strategic motive developed by Stark (1995) shows how remittances can foster a positive selection among potential migrants (also see Docquier and Rapoport, 1998). Remittances can also be part of reciprocal arrangements and be understood as the result of informal insurance between relatives (Stark and Levhari, 1982; Rosenzweig, 1988a,b; Lambert, 1994). Remittances can also be seen as an investment. In particular, remittances are thought of as dividends paid on an earlier investment such as the cost of the migrant's education. Finally, the inheritance motive could play a key role. Migrants would remit because they otherwise fear to be deprived of their inheritance. Alternatively, they know that their remittances will be at least partly saved and invested in household's assets that they will eventually inherit.

Those motives are prominent in the economic literature, but they are not the only ones. Stark (2009) actually lists 12 different motives. In addition, we should expect different people to behave under different motives and under several motives. It is therefore very challenging to disentangle the different motives in empirical work. Our intention here is not to explain why migrants remit. Rather we want to study one simple, but a priori important, determinant of remittances: the number of migrants from a household. From a theoretical point of view, most existing models (as the ones reviewed in Rapoport and Docquier, 2006) assume one migrant per household and abstract away from the possibility of several migrants from the same household. Other models consider several migrants per household, but assume non-strategic migrants (Funkhouser, 1995). We focus explicitly on the strategic relationship between several migrants from the same household. To the best of our knowledge, Konrad et al. (2002) wrote the paper that is the most closely related to our own. They show, theoretically and empirically, how the first mover of two siblings strategically locate further away from his original home to induce the second child to bear the burden of supporting their parents. In our case, the first migrant can reduce his remittances to push the next migrant to remit more.

We present our theoretical framework in Section 2. In Section 3 and 4, we discuss the Nepalese conflict and the validity of our instruments. The empirical analysis is done in section 5. Section 6 concludes.

2 Theoretical framework

Assume a household h composed of 1 head f and n other members. The household's head has an income $y_f > 0$ that is used to buy one good, g_f . The consumption is public at the household level.

The utility functions are given by:

$$U_f = g_f$$

2.1 They all live together

The household members consume the whole income; each member gets a utility given by:

$$U_f = g_f = y_f$$

2.2 The first migrant leaves the home.

Assume now that one member leaves the home and earns an income of y_1 . He can spend that money in his own local household good, g_1 . In addition, he can make transfers to his original household. The motive for transferring money is modeled as follows. We assume that once he has left the house, the migrant still perceives utility benefits from the public good of his original home.

The migrant's utility function is given by:

$$U_1 = g_f g_1$$

The head's income is now equal to $y_f + t_1$, where $t_1 \geq 0$ is the transfer received from the first migrant. The father's consumption becomes:

$$g_f = y_f + t_1$$

The migrant's utility can be written as:

$$U_1 = (y_f + t_1) g_1$$

$$U_1 = (y_f + y_1 - g_1) g_1$$

The first order conditions is:

$$g_1 = \frac{y_f + y_1}{2}$$

And the solution is given by:

$$g_1^* = \begin{cases} \frac{y_f + y_1}{2} & \text{if } y_f < y_1 \\ y_1 & \text{otherwise} \end{cases}$$

$$t_1^* = \begin{cases} \frac{y_1 - y_f}{2} & \text{if } y_f < y_1 \\ 0 & \text{otherwise} \end{cases}$$

2.3 The second migrant leaves the home

Suppose that a second migrant leaves the home. The sequence becomes:

1. The first migrant chooses t_1 and g_1 .
2. The second migrant chooses t_2 and g_2 .
3. The head chooses g_f .

The head's consumption is now equal to $g_f = y_f + t_1 + t_2$.

2.3.1 The second migrant's optimization

The second migrant maximizes:

$$U_2 = (y_f + y_2 - g_2 + t_1) g_2$$

The first order condition is:

$$g_2 = \begin{cases} \frac{y_f + y_2 + t_1}{2} & \text{if } y_f + t_1 < y_2 \\ y_2 & \text{otherwise} \end{cases}$$

And therefore:

$$t_2 = \begin{cases} \frac{y_2 - y_f - t_1}{2} & \text{if } y_f + t_1 < y_2 \\ y_2 & \text{otherwise} \end{cases}$$

2.3.2 The first migrant's optimization

The first migrant maximizes:

$$U_1 = (y_f + y_1 - g_1 + t_2) g_1$$

Which, given the second migrant's optimization, can be written as:

$$U_1 = \begin{cases} (y_f + y_1 - g_1 + t_2) \frac{y_2 - y_f - t_1}{2} & \text{if } y_f + t_1 < y_2 \\ (y_f + y_1 - g_1) g_1 & \text{otherwise} \end{cases}$$

We first discuss the case where $y_f + t_1 \geq y_2$. Under this condition, the first migrant is in the same situation as before, when there was not a second migrant out of the head's home:

$$g_1 = \begin{cases} \frac{y_f + y_1}{2} & \text{if } y_f < y_1 \\ y_1 & \text{otherwise} \end{cases}$$

$$t_1 = \begin{cases} \frac{y_1 - y_f}{2} & \text{if } y_f < y_1 \\ 0 & \text{otherwise} \end{cases}$$

Note that $\frac{y_1 - y_f}{2} < y_2 - y_f$ if $y_1 < 2y_2 - y_f$.

Assume that $y_f < y_1$ and $y_f < y_2$.

Therefore, $y_f < 2y_2 - y_f \leq y_1$ is needed to satisfy the initial condition $y_f + t_1 \geq y_2$. Hence the solution is given by:

$$g_1^* = \begin{cases} \frac{y_f + y_1}{2} & \text{if } 2y_2 - y_f \leq y_1 \\ y_1 - 2y_2 + y_f & \text{otherwise} \end{cases}$$

$$t_1^* = \begin{cases} \frac{y_1 - y_f}{2} & \text{if } 2y_2 - y_f \leq y_1 \\ y_2 - y_f & \text{otherwise} \end{cases}$$

We now turn to the case where $y_f + t_1 < y_2$. Under this condition, the first migrant's utility becomes:

$$U_1 = \frac{y_f + y_1 + y_2 - g_1}{2} g_1$$

The first order condition is:

$$g_1 = \begin{cases} \frac{y_f + y_1 + y_2}{2} & \text{if } y_f + y_2 \leq y_1 \\ y_1 & \text{otherwise} \end{cases}$$

$$t_1 = \begin{cases} \frac{y_1 - y_f - y_2}{2} & \text{if } y_f + y_2 \leq y_1 \\ 0 & \text{otherwise} \end{cases}$$

Note that the initial condition $y_f + t_1 < y_2$ is satisfied if $y_f + \frac{y_1 - y_f - y_2}{2} < y_2$, that is $y_1 < 3y_2 - y_f$. $y_f + y_2 \leq y_1$ and $y_1 < 3y_2 - y_f$ can both be satisfied only if $y_f + y_2 < 3y_2 - y_f$, which is equivalent to $y_f < y_2$, which is guaranteed by assumption.

Hence the solution:

$$g_1^* = \begin{cases} \frac{y_f + y_1}{2} & \text{if } 2y_2 - y_f \leq y_1 < 3y_2 - y_f \\ y_1 + y_f - y_2 & \text{if } 3y_2 - y_f \leq y_1 \\ y_1 & \text{if } 2y_2 - y_f > y_1 \end{cases}$$

$$t_1^* = \begin{cases} \frac{y_1 - y_f - y_2}{2} & \text{if } 2y_2 - y_f \leq y_1 < 3y_2 - y_f \\ y_2 - y_f & \text{if } 3y_2 - y_f \leq y_1 \\ 0 & \text{if } 2y_2 - y_f > y_1 \end{cases}$$

Given the first migrant's transfer, the second migrant's solution is determined by the condition $y_f + t_1 < y_2$.

1. If $2y_2 - y_f > y_1$, the condition becomes $y_f < y_2$. Which is true by assumption.
2. If $3y_2 - y_f \leq y_1$, the condition becomes $y_f + y_2 - y_f < y_2$. Which is never true.
3. If $2y_2 - y_f \leq y_1 < 3y_2 - y_f$, the condition becomes $y_1 < 3y_2 - y_f$. Which is always true when $2y_2 - y_f \leq y_1 < 3y_2 - y_f$.

It follows that the first migrant always sets his transfer such that the second migrant transfers $\frac{y_2 - y_f - t_1}{2}$. The second migrant's equilibrium transfer is thus given by:

$$t_2^* = \begin{cases} \frac{3y_2 - y_f - y_1}{4} & \text{if } 2y_2 - y_f \leq y_1 < 3y_2 - y_f \\ 0 & \text{if } 3y_2 - y_f \leq y_1 \\ \frac{y_2 - y_f}{2} & \text{if } 2y_2 - y_f > y_1 \end{cases}$$

2.3.3 The total transfers to the head

When only one migrant has left the house, the head receives:

$$t^1 = \frac{y_1 - y_f}{2}$$

When two migrants have left the house, the transfers depend on which of the following conditions are satisfied:

$$t^2 = \begin{cases} \frac{y_1 - 3y_f + y_2}{4} & \text{if } 2y_2 - y_f \leq y_1 < 3y_2 - y_f \\ y_2 - y_f & \text{if } 3y_2 - y_f \leq y_1 \\ \frac{y_2 - y_f}{2} & \text{if } 2y_2 - y_f > y_1 \end{cases}$$

We discuss the different cases sequentially:

If $2y_2 - y_f > y_1$, then $t^2 < t^1$ if $y_2 < y_1$. Both conditions are satisfied when $\frac{y_1 + y_f}{2} < y_2 < y_1$, which requires $\frac{y_1 + y_f}{2} < y_1$ (this last inequality is guaranteed by the assumption that $y_f < y_1$).

If $3y_2 - y_f \leq y_1$, then $t^2 < t^1$ if $2y_2 - y_f < y_1$. This is guaranteed since we are considering the case where $3y_2 - y_f \leq y_1$.

If $2y_2 - y_f \leq y_1 < 3y_2 - y_f$, then $t^2 < t^1$ if $y_2 - y_f < y_1$. Which is guaranteed since we are considering the case where $2y_2 - y_f \leq y_1$.

The following proposition summarizes these results.

Proposition

The father receives fewer remittances when more of his children migrate if, and only if, the first migrant has a higher income than the second migrant has.

Proof

We must prove that $t^2 < t^1$ if and only if $y_2 < y_1$. From the previous discussion, we know that:

- If $2y_2 - y_f > y_1$, then $t^2 < t^1$ if and only if $y_2 < y_1$.
- $t^2 < t^1$ if $3y_2 - y_f \leq y_1$. The assumption that $y_2 > y_f$ implies $3y_2 - y_f > y_2$. Hence, $3y_2 - y_f \leq y_1$ implies $y_2 < y_1$.
- $t^2 < t^1$ if $2y_2 - y_f \leq y_1 < 3y_2 - y_f$. The assumption that $y_2 > y_f$ implies $2y_2 - y_f > y_2$. Hence, $2y_2 - y_f \leq y_1$ implies $y_2 < y_1$.

Note that “first” and “second” migrants should be understood as corresponding to the first and second movers of the game. That is what matters, not who leaves the father first.

We have so far assumed that the migrants play a sequential game. This need not be the case in reality. When migrants play a simultaneous game, we can apply the income neutrality theorems. We know from Warr (1983) and Bergstrom et al. (1986) that under very general conditions, the distribution of income between the players of a simultaneous game will not affect the level of public good provided.

Theoretically, even in the very simple framework that we set up, the number of migrants has an ambiguous effect on the remittances received. It could increase, decrease or remain unchanged, depending on the type of game played (sequential or simultaneous) and the distribution of income between the players. We now turn to the empirical analysis of this relationship.

3 The people's war

Detailed descriptions of the conflict can be found in Muni (2003), Thapa and Sijapati (2003) and Hatlebakk (2010). The Communist Party of Nepal (Maoist) (CPN) launched the people's war in 1996, an armed conflict against the state that lasted until 2006. The following characteristics of the conflict are used in this paper.

The conflict can be separated in two distinct periods, pre-2001 and post-2001. The CPN held its second national conference early in 2001. The violence escalated after the conference. In April, the Maoists killed seventy police officers in two police posts. At the same moment the government decided to create The Armed Police Force, a paramilitary unit specifically trained to fight the Maoists.

Other events participated in increasing the tensions between the government and the Maoists. In particular, the murder of several royal family member created confusion and was used by the Maoists in the media, and the attack on the USA in September 2001 that added further pressure on the government to contain the rebellion (Thapa and Sijapati, 2003).

Consequently, the highest rates of casualties have been observed in the period 2001-2006. In our empirical analysis, we show that the data exhibits different relationships between the two phases of the conflict and migration. It seems that first phase is correlated with migration decisions. People from conflict affected areas are more likely to leave. But we do not find a direct correlation with the levels of remittances recorded in 2010. On the other hand, the conflict's intensity in the second phase is correlated with the levels of remittances, but not with the number of migrants. We exploit these differences in our empirical strategy.

4 Empirical strategy

Our theoretical framework emphasizes two effects going in opposite directions:

1. An additional migrant presumably earns a higher income than if he stayed home. Hence, a direct income effect: remittances should increase with the number of migrants because each of them is having a higher income and there is more to remit.
2. The incentive to free-ride increases when there are more migrants. One can strategically reduce my remittances to induce the other migrants to remit more. The sum of remittances can decrease.

There are other crucial effects that we did not model but that must be taken into account in our empirical work. The main drawback from the data is that the migrant's income is unknown. Since a migrant's income is a primary determinant of his remittances, we have to discuss a few other effects that could explain our empirical results. In particular:

1. Destinations:
Migrant's earnings vary a lot by destination, with those in The Gulf or in Western Countries for instance having much higher wages than those in Nepal or in India. The cost of migration is typically higher for higher wages destinations and we therefore need to make sure that the destination country is independent from the number of migrants. Suppose for example that households send either (i) two migrants to Kathmandu with low wages, or (ii) one migrant to Qatar with a very high wage. Then we could observe that the households with one migrant receive more than the households with two migrants, because of the wage differential and not because of the strategic free riding.
2. Clusters:
It is frequent that a migrant starts his own small household in his destination region before coming back to his original household. For example if the household head's son and his wife are temporarily migrating and have a child abroad, then we risk recording simultaneously (i) one more migrant - the new born, and (ii) lower remittances - because the young couple now has to spend on their baby as well. We will therefore consider the total number of migrants, but also the number of working migrants only: the migrants who were earning an income at the time of the survey.
3. Diminishing household size:
When a member leaves the household, everything else equal, there is one less person in that household. In addition to a lower household size, the household local earnings may also decrease if the migrant had a local income. To take these effects into account, we: (i) use the total remittances received, but also the total remittances received per person in the household ; and (ii) control for household (per capita) income.
4. Selection bias:
If there is a fixed cost per migrant (transport cost for instance), households only have an additional migrant if it is profitable (in terms of remittances, among other potential benefits). Therefore, we should find a positive correlation between the remittances received and the number of migrants selected by the household. Indeed, if the households seek to maximize remittances they only send an additional migrant if that decision is expected to increase the remittances.

To avoid this selection bias, we use an instrumental variable that provides us with an exogenous variation in the number of migrants. The instrument is explained in details below.

The conflict has been a driving force behind the recent migration flows. As described by Thapa and Sijapati (2003), already in 97 and 98, men and women were caught between the army and the government and fled to safer areas. We construct three instruments based on the conflict's intensity. The conflict's intensity is itself measured by the INSEC data. INSEC recorded the number of conflict related deaths in each district from 1996 to 2006. We use their records to construct the following variable, for each district d :

$$\text{conflict}(1996 - 2006)_d = c_d = 1000 \frac{\text{Deaths}(1996 - 2006)_d}{\text{Population}(1991)_d}$$

Our first instrument is a binary variable that identifies the districts with the highest rates of deaths. The variable IV1 is equal to one in district d if c_d is higher than the median of c_d over all districts. The exclusion restriction is that, conditional on the covariates that we will include, the conflict related deaths in 1996-2006 do not have a direct effect on the levels of remittances recorded in 2010, but only on the number of migrants. One could argue that the high-conflict districts also have poorer households today, households with greater needs for remittances. Our most important control will therefore be the income and the assets of the household receiving the remittances.

To test the robustness of the instrument, we also use IV2 that is equal to $\frac{\text{conflict}(1996-2001)_d}{\text{conflict}(2002-2006)_d}$. IV2 varies from zero to one. It is equal to zero in a district where there were no deaths before 2002, and it is equal to one in a district where all deaths happened before 2002. If the past conflict has a direct effect on the current remittances, then this second instrument should not be biased like the previous one could be. This instrument does not compare districts with high and low conflict, it compares district where the violence occurred early with districts where the violence occurred some years later, when the conflict entered its second phase.

The reason that IV2 works efficiently in our estimations, is that the number of current migrants is more closely correlated with the conflict in the 90s than with the conflict in the 2000s. This leads us to the use of a third instrument.

Our last instrument, IV3 is equal to the interaction between the conflict in the 90s and the conflict in the 2000s: $\text{IV3} = \text{conflict}(1996 - 2001)_d * \text{conflict}(2002 - 2006)_d$. We use it together with $\text{conflict}(1996 - 2001)_d$ and $\text{conflict}(2002 - 2006)_d$ included in the regression. This approach is similar to that of de la Rupelle et al. (2009). In this case, the first stage equation that we estimate is:

$$Z_{id} = \alpha + \beta \text{IV3}_d + \gamma X_{id} + \lambda \text{conflict}(1996 - 2001)_d + \mu \text{conflict}(2002 - 2006)_d + \kappa$$

and the second stage equation is:

$$Y_{id} = \alpha + \beta \hat{Z}_{id} + \gamma X_{id} + \lambda \text{conflict}(1996 - 2001)_d + \mu \text{conflict}(2002 - 2006)_d + \varepsilon$$

Where Y_{id} are the remittances received by household i in district d , Z_{id} is the number of migrants from that household, \hat{Z}_{id} are the values predicted by the first stage estimation and X_{id} are control variables.

The identification assumption is that the current level of remittances depends linearly on the conflict intensity in the 90s and the 2000s, but not directly on their interaction. This is a much milder assumption than the one made in IV1. We now turn to the empirical analysis.

5 Data

In this section, we first discuss the sources of data. We then present the most important variables, before carrying out the econometric analysis.

5.1 Data sets used.

We use two data sets: the last Nepal Living Standard Survey (NLSSIII) and the data from the human rights organization Nepal Informal Sector Service Centre (INSEC). The NLSSIII is a nationally representative survey carried out in almost all districts of Nepal. It was done in 2010 and 2011. The surveys follow the World Bank's Living Standards Measurement Survey methodology and cover a wide range of topics: demography, consumption, income, access to facilities, housing, education, health, employment, credit, remittances, etc. The quality of the national surveys has been tested by Hatlebakk (2007) who also discusses them in greater details. The details of the sampling, of the methodology and of the execution of the surveys are exposed in CBS (2011).

The NLSSIII contains one particularly detailed section about all household members who are away at the time of the survey. Among other things, we know their relationship to the household, their country of residence, why and when they left, their employment status and how much money they are sending to the household. This information is not available in the previous rounds of the NLSS and we therefore use only the last one.

INSEC is one of the most active Nepalese NGOs. During the people's war, INSEC counted and reported all the conflict related deaths. They have permanent contacts in the villages who report directly to INSEC. The data are available at the district level from INSEC's website.¹

Because we are interested in the link between the number of migrants and the remittances received, we only use data from households with at least one migrant. Remittances are always equal to zero when a household does not have any migrant, which makes this case particularly uninteresting.

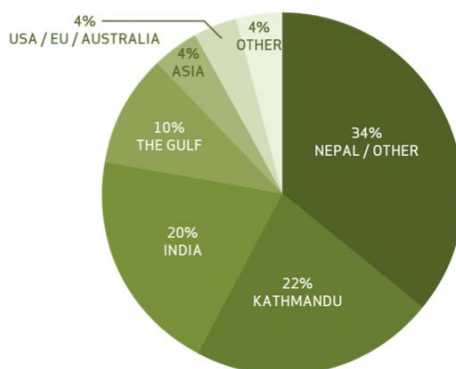
5.2 Main variables.

There are 7 247 migrants from 3 554 households in the NLSS III data set. Households have on average two migrants, the median is one migrant and the maximum is seventeen. Among those, 2 511 are working migrants.²

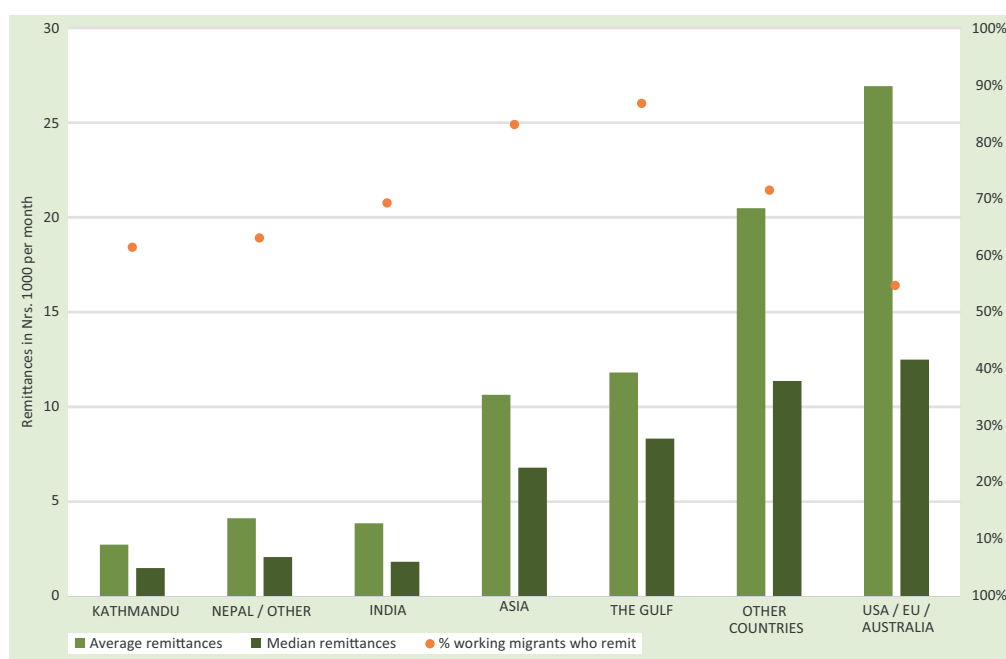
Households have on average 1.4 working migrants, the median is two and the maximum is 7. Of the working migrants, 22% are women, compared to 28% of all migrants. The migrants are 27 years old on average. Seventy one percent of the working migrants are either the spouse (23%) or a child (48%) of the household head. The other migrants have very different relationships to the head. The vast majority are in Nepal or in India (Figure 1).

¹ www.insec.org.np

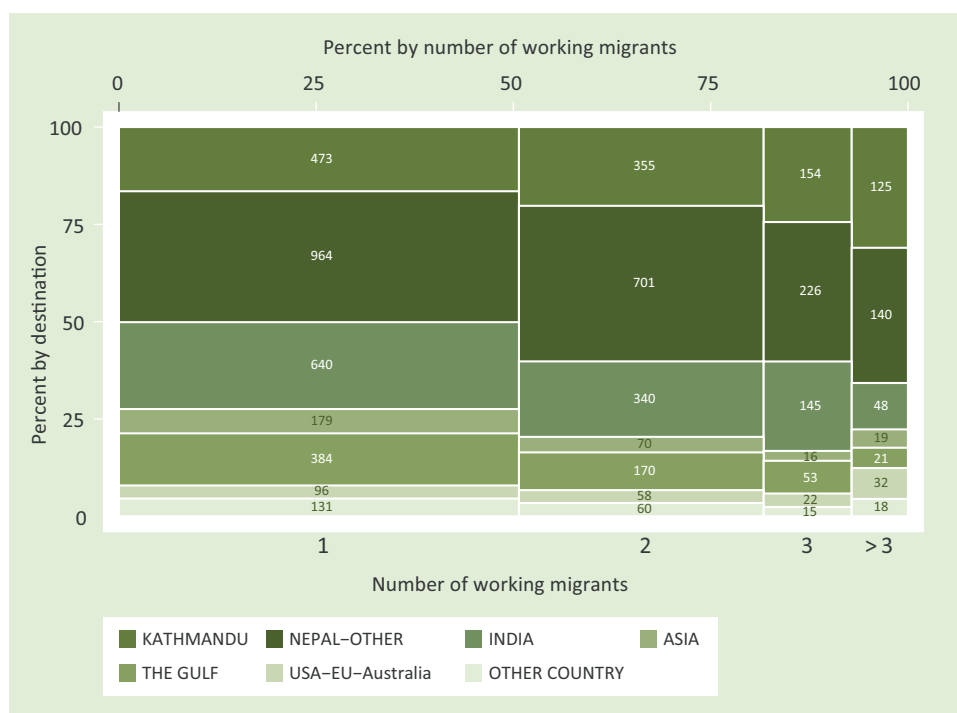
² We exclude one household who reported receiving four million rupees per month. That amount is far out of the rest of the distribution, the mean is six thousands and the second highest amount is three hundred thousands.

Fig 1. The repartition of migrants, by destination.

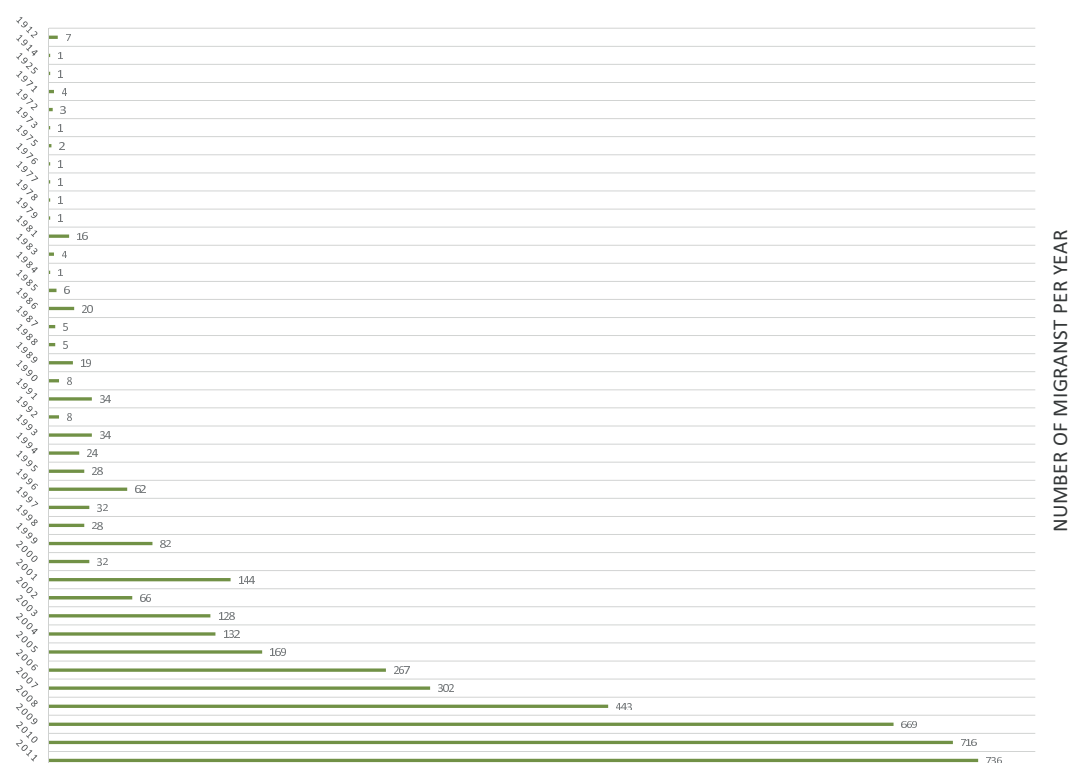
The destination is highly correlated with the level of remittances. The proportion of working migrants who send remittances varies from 55% (USA-EU-Australia) to 87% (The Gulf). Conditional on remitting, the working migrants in Western countries send NRs. 27 000 on average per month, while the lowest levels of remittances are sent by migrants in Kathmandu: NRs. 2 700 on average. Averages and median remittances from other regions can be seen in Figure 2.

Fig 2. Proportion of remitting migrants, average and median remittance, per destination.

The destination country is not significantly affected by the number of migrants in the household. As we can see in Figure 3, around 26% of the migrants from a one-migrant household are located outside of Nepal or India. That is the case for 25% of the migrants from households with 4 or more migrants. Figure 3, shows the full distribution of working migrants by (i) destination and (ii) number of working migrants in the household. Households with more migrants tend to have more of them in Nepal and less in India. The share of migrants in high-wages destination is relatively constant.

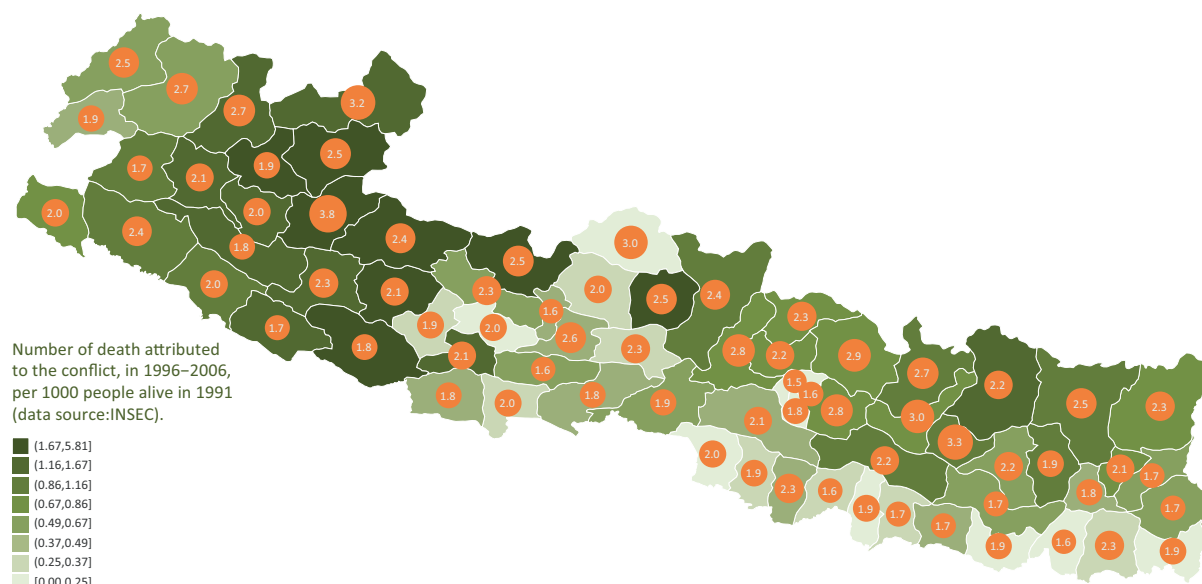
Fig 3. The distribution of working migrants by number of migrants in the household.

The migrants that we are considering are temporary migrants. Ninety percent of the current migrants left their households after the year 2000, and seventy-five percent after 2005. The distribution of migrants per year of departure can be seen from Figure 4.

Fig 4. The number of migrants, per year of departure.

Finally, there is a lot of variation in the conflict's intensity over Nepali districts. The number of recorded deaths varies from 0 to 6 per 1000 inhabitants. In Figure 5 we show both, the geographical distribution of the conflict and the average number of migrants per district.

Fig 5. The conflict intensity and the number of migrants per household.



All the variables that we include in the regressions are summarized in Table 1. Households receive on average NRs. 6 310 per month. There is a lot of variation, from zero to three hundred thousand. They have between one and seventeen migrants, the average is two. The same households have between zero and seven working migrants; one on average. The conflict intensity variables show the number of conflict related deaths per thousand people in the district. Then come a series of household level variables: the number of cows owned, the average years of schooling among adults, whether the household owns a business, the sum of their frequent consumption (does not include extraordinary purchases), the number of people in the household, whether the household is headed by a woman and the age of the household head. We use these variables to control for the household's wealth and income. We use either a direct measure of income, or of consumption, when controlling for income. Both measures lead to the same results. Finally, 42% of the households are in Terai area, 50% in the hills and the rest in other areas.

Table 1. Summary statistics.

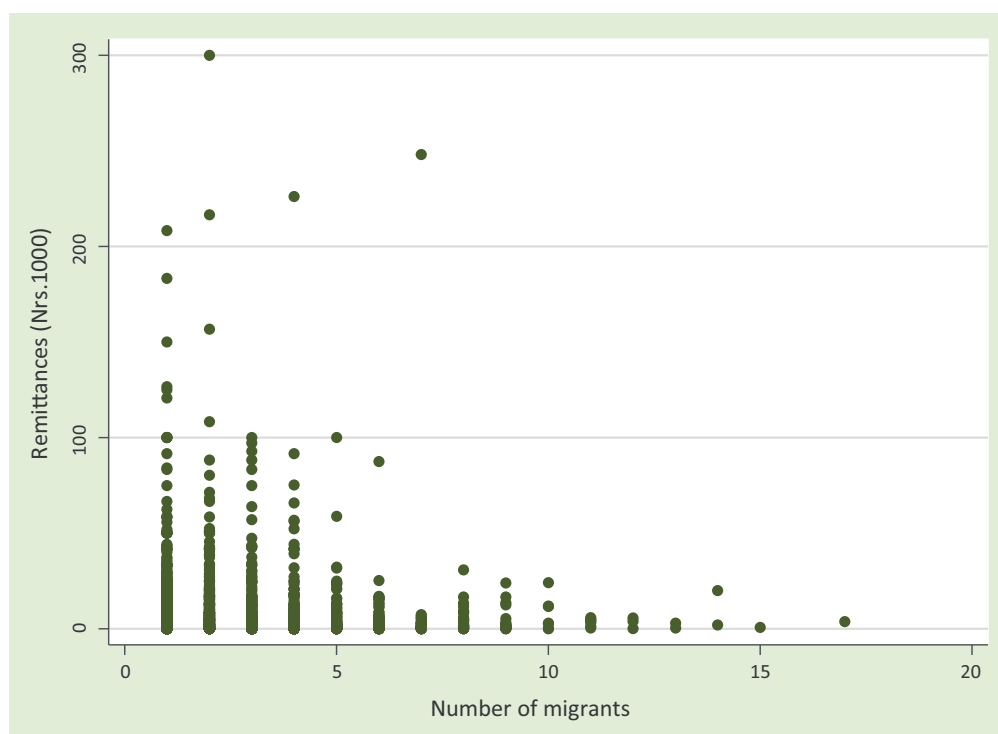
Variable	Observations	Mean	Std. Dev,	Min	Max
Remittances (NRS 1000)	3554	6,31	15,27	0	300
Remittances per capita	3554	1,68	4,58	0	124
Number of migrants	3554	2,04	1,74	1	17
Nb. Of working migrants	3554	0,99	0,89	0	7
Conflict intensity (1996-2001)	3554	0,10	0,26	0	2
Conflict intensity (2002-2006)	3554	0,62	0,53	0	4
Conflict intensity (1996-2006)	3554	0,71	0,73	0	6
High conflict zone	3554	0,48	0,50	0	1

Deaths 96-01 / deaths 96-06	3549	0,08	0,10	0	1
Deaths 96-01 * deaths 02-06	3554	0,15	0,69	0	8
Land owned (ha.)	3554	0,59	1,07	0	24
Cows owned	3554	2,20	2,43	0	20
Avg years schooling	3549	4,07	3,67	0	17
Owns a business	3554	0,29	0,46	0	1
Consumption (NRS 1000)	3554	134,14	87,16	4	1310
Household size	3554	4,71	2,52	1	26
Woman headed hh.	3554	0,38	0,48	0	1
Head of hh.'s age	3554	48,08	14,14	11	93
Terai	3554	0,42	0,49	0	1
Hills	3554	0,50	0,50	0	1

5.3 Number of migrants and remittances received.

Figure 6 shows the relationship between the number of migrants and the total remittances received by the household. From this descriptive standpoint, the correlation looks negative. The correlation between the total remittances received and the number of working migrants is in fact slightly positive but not significantly different from zero.

Fig. 6. The number of migrants and the total remittances received.



In the next Tables, we provide the results of our estimations. We only consider here the effect of the number of working migrants and we do not count migrants who do not have an income (children of working migrants for example). Table 2 shows the effect of the number of working migrants on the total remittances received, in OLS and with the use of IV1. Tables 3 and 4 show the same

estimations, but with IV2 and IV3 instead. The results are consistent: the OLS give a slightly positive, not always significant, correlation between the amounts received and the number of working migrants. The IVs on the other hand give us stronger and negative estimates.

We repeat the same exercise in Tables 5, 6 and 7. But this time the dependent variable is the remittances received per person in the household. The estimates are consistent with our previous estimations. According to the OLS estimates, an additional migrant slightly increases the remittances received per capita. According to the IVs, an additional migrant decreases the remittances received per capita by two to eleven thousand rupees a month.

Finally, to further test the robustness of our findings and to establish a more immediate link between fertility and remittances, we use the number of sons available for migration as a last instrument. The survey includes a 'maternity section' if there is a woman in the household that is between 15 and 49 years old. In that section we have detailed information on all the children ever born. This allows us to construct a new variable: the number of sons who were between 10 and 16 year old in 2000. The variable measures the number of potential migrants from the household when the conflict started to increase. We argue that this number will have a direct effect on the number of migrants in 2010, but not on how much remittances they send (given the covariates included in the regression). The results are shown in Table 8. The first-stage is working well, with a strong instrument. The second stage finds again a negative effect of the number of working migrants on the total remittances received per capita. This time the effect is not statistically significant. Note that the maternity file is only available for 1 335 households in this sample, which greatly reduces the power of our estimations.

Table 2. Number of migrants and total remittances - IV1

	(1) OLS	(2) 2SLS-1st stage	(3) 2SLS-2d stage	(4) OLS	(5) 2SLS-1st stage	(6) 2SLS-2d stage
Number of migrants	0.08 (1.27)		-2.56*** (-4.10)	0.11* (1.77)		-3.50*** (-2.76)
High conflict zone		0.35*** (5.90)			0.23*** (3.62)	
Hh. characteristics	No	No	No	Yes	Yes	Yes
Hh. assets	No	No	No	Yes	Yes	Yes
Geo characteristics	No	No	No	Yes	Yes	Yes
Observations	3554	3554	3554	3549	3549	3549
r ²	0.00	0.01	-1.01	0.06	0.12	-1.60
F	1.61	34.82	16.78	15.45	29.99	5.80

t statistics in parentheses

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

Hh. controls include the head's age and gender and the household size.

Hh. assets include land and cows owned average education of adult members a dummy for the ownership of a non-farm business and the household's income.

Geo characteristics include controls for terai and hills regions.

Table 3. Number of migrants and total remittances - IV2

	(1) OLS	(2) 2SLS-1st stage	(3) 2SLS-2d stage	(4) OLS	(5) 2SLS-1st stage	(6) 2SLS-2d stage
Number of migrants	0.08 (1.27)		-1.54*** (-3.19)	0.11* (1.77)		-1.79** (-2.08)
Deaths 96-01 / deaths 96-06		1.55*** (4.78)			1.07*** (3.15)	
Hh. characteristics	No	No	No	Yes	Yes	Yes
Hh. assets	No	No	No	Yes	Yes	Yes
Geo characteristics	No	No	No	Yes	Yes	Yes
Observations	3554	3549	3549	3549	3544	3544
r ²	0.00	0.01	-0.38	0.06	0.12	-0.41
F	1.61	22.84	10.17	15.45	28.93	9.84

t statistics in parentheses

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

Hh. controls include the head's age and gender and the household size.

Hh. assets include land and cows owned average education of adult members a dummy for the ownership of a non-farm business and the household's income.

Geo characteristics include controls for terai and hills regions.

Table 4. Number of migrants and total remittances - IV3

	(1) OLS	(2) 2SLS-1st stage	(3) 2SLS-2d stage	(4) OLS	(5) 2SLS-1st stage	(6) 2SLS-2d stage
Number of migrants	0.10 (1.48)		-1.88** (-2.41)	0.12* (1.88)		-2.57 (-1.43)
Conflict intensity 1996-2001	0.29 (1.43)	1.02*** (2.75)	0.38 (0.97)	0.27 (1.34)	0.47 (1.30)	0.14 (0.32)
Conflict intensity 2002-2006	-0.84*** (-5.47)	0.23*** (2.94)	-0.46* (-1.81)	-0.61*** (-4.27)	0.19** (2.57)	-0.15 (-0.41)
Deaths 96-01 * deaths 02-06		-0.41*** (-2.93)			-0.21 (-1.62)	
Hh. characteristics	No	No	No	Yes	Yes	Yes
Hh. assets	No	No	No	Yes	Yes	Yes
Geo characteristics	No	No	No	Yes	Yes	Yes
Observations	3554	3554	3554	3549	3549	3549
r ²	0.01	0.01	-0.55	0.06	0.12	-0.86
F	14.06	8.03	8.11	13.17	24.71	6.58

t statistics in parentheses

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

Hh. controls include the head's age and gender and the household size.

Hh. assets include land and cows owned average education of adult members a dummy for the ownership of a non-farm business and the household's income.

Geo characteristics include controls for terai and hills regions.

Table 5. Number of working migrants and total remittances per capita - IV1

	(1) OLS	(2) 2SLS-1st stage	(3) 2SLS-2d stage	(4) OLS	(5) 2SLS-1st stage	(6) 2SLS-2d stage
Nb. of working migrants	0.12 (0.85)		-11.28*** (-2.75)	0.27** (1.96)		-9.20** (-2.57)
High conflict zone		0.09*** (3.18)			0.11*** (3.23)	
Hh. characteristics	No	No	No	Yes	Yes	Yes
Hh. assets	No	No	No	Yes	Yes	Yes
Geo characteristics	No	No	No	Yes	Yes	Yes
Observations	2511	2511	2511	2507	2507	2507
r ²	0.00	0.00	-3.19	0.08	0.06	-1.99
F	0.73	10.09	7.56	13.30	13.93	5.28

t statistics in parentheses

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

Hh. controls include the head's age and gender and the household size.

Hh. assets include land and cows owned average education of adult members a dummy for the ownership of a non-farm business and the household's income.

Geo characteristics include controls for terai and hills regions.

Table 6. Number of working migrants and total remittances per capita - IV2

	(1) OLS	(2) 2SLS-1st stage	(3) 2SLS-2d stage	(4) OLS	(5) 2SLS-1st stage	(6) 2SLS-2d stage
Nb. of working migrants	0.12 (0.85)		-6.12** (-2.29)	0.27** (1.96)		-4.41** (-2.00)
Deaths 96-01 / deaths 96-06		0.51*** (2.67)			0.59*** (2.75)	
Hh. characteristics	No	No	No	Yes	Yes	Yes
Hh. assets	No	No	No	Yes	Yes	Yes
Geo characteristics	No	No	No	Yes	Yes	Yes
Observations	2511	2509	2509	2507	2505	2505
r ²	0.00	0.00	-0.96	0.08	0.06	-0.42
F	0.73	7.11	5.22	13.30	13.96	9.01

t statistics in parentheses

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

Hh. controls include the head's age and gender and the household size.

Hh. assets include land and cows owned average education of adult members a dummy for the ownership of a non-farm business and the household's income.

Geo characteristics include controls for terai and hills regions.

Table 7. Number of working migrants and total remittances per capita - IV3

	(1) OLS	(2) 2SLS-1st stage	(3) 2SLS-2d stage	(4) OLS	(5) 2SLS-1st stage	(6) 2SLS-2d stage
Nb. of working migrants	0.14 (0.93)		-5.62* (-1.96)	0.28** (2.01)		-4.35* (-1.65)
Conflict intensity 1996-2001	0.26 (0.98)	0.58** (2.44)	1.10 (1.57)	0.18 (0.69)	0.54** (2.20)	0.80 (1.39)
Conflict intensity 2002-2006	-0.99*** (-5.12)	-0.00 (-0.05)	-1.09*** (-3.81)	-0.66*** (-3.74)	0.01 (0.33)	-0.69*** (-2.85)
Deaths 96-01 * deaths 02-06		-0.19** (-2.31)			-0.17** (-2.09)	
Hh. characteristics	No	No	No	Yes	Yes	Yes
Hh. assets	No	No	No	Yes	Yes	Yes
Geo characteristics	No	No	No	Yes	Yes	Yes
Observations	2511	2511	2511	2507	2507	2507
r ²	0.01	0.01	-0.80	0.09	0.06	-0.41
F	13.35	2.33	7.26	11.41	11.89	8.05

t statistics in parentheses

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

Hh. controls include the head's age and gender and the household size.

Geo characteristics include controls for terai and hills regions.

Table 8. Number of working migrants and total remittances per capita - Available sons

	(1) OLS	(2) 2SLS-1st stage	(3) 2SLS-2d stage	(4) OLS	(5) 2SLS-1st stage	(6) 2SLS-2d stage
Nb. of working migrants	-0.06 (-0.28)		-0.94 (-1.57)	0.25 (1.33)		-0.10 (-0.13)
Nb. Of sons 10-16		0.21*** (8.03)			0.20*** (5.25)	
Hh. characteristics	No	No	No	Yes	Yes	Yes
Hh. assets	No	No	No	Yes	Yes	Yes
Geo characteristics	No	No	No	Yes	Yes	Yes
Observations	1335	1335	1335	1335	1335	1335
r ²	0.00	0.08	-0.01	0.11	0.10	0.11
F	0.08	64.46	2.46	10.41	11.14	10.68

t statistics in parentheses

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

Hh. controls include the head's age and gender and the household size.

Hh. assets include land and cows owned average education of adult members a dummy for the ownership of a non-farm business and the household's income.

Geo characteristics include controls for terai and hills regions.

6 Conclusion

It is beyond discussion that remittances are playing a crucial role in Nepal's economy and in the dramatic reduction in poverty. We focused on one particular determinant of the remittances received by the household: the number of migrants from that household. While the common sense dictates that having one more migrant should lead to higher remittances, because there is one more person remitting, we use a standard game theory model to argue that the remittances can in fact decrease with additional migrants. The reason is that migrants can free ride on each other and each decrease their remittances.

We then moved to the data and find the first surprising result that the plain correlation between the number of migrants and the remittances is actually very small and not statistically significantly different from zero. We further use different variables, based on past conflict intensity, to instrument the current number of migrants. We find strong and significant negative effects. According to our instruments, an additional migrant decreases the total remittances (per head in the receiving household) by two to eleven thousand rupees.

We also linked the number of sons who were of a migration age when the conflict started to escalate, to the number of current migrants and to the levels of remittances. We found that the number of sons is a strong determinant of the current number of migrant, and again that migrants and remittances are negatively correlated.

This finding is crucial to understanding the future of the remittances in Nepal's economy. It underlines the importance of decreasing (and even negative) returns on the number of migrants. While migration expands and more people leave the country, we should not expect a as high influx of remittances. To keep remittances increasing in the future, one would need to improve the migrants' education and skills, and to target them towards more profitable destinations. Merely increasing the outflow of people may otherwise have the unintended consequence of lowering the total remittances.

Our finding is also important to the literature about the links between fertility and poverty. The majority of the migrants are children of household heads. We show that having more children and migrants can actually decrease parental support (in the form of remittances) later in life.

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INDEXING TERMS

Remittances

Migration

Fertility

Poverty

Nepal

Poverty has declined dramatically in Nepal since the end of the conflict. The sharp increase in revenues primarily comes from remittances. From a household's perspective, choosing the appropriate number of migrants is crucial: they must trade-off the direct cost and loss of local income earners versus the potential remittances. We build a standard game theory model of remittances to emphasize two effects of the number of migrants on the total remittances received that go in opposite directions. On one hand, if each migrants earns more than when he stays home, then there is more to remit, and we expect higher total remittances. On the other hand, when there are more migrants, the incentive to free ride also increases: each of them remits less and the total remittances could decrease. We use the last nationally representative survey to test our theoretical predictions. We find that the total remittances received (per household member) in fact substantially decreases with the number of migrants, in line with the free-riding argument. We use past conflict intensity in the district to predict current number of migrants and clear our estimates of endogeneity biases. We also discuss the plausibility of alternative explanations.