

Remittances and Financial Inclusion: Evidence from Nepal

Sadichchha Shrestha* Nayan Krishna Joshi†

This version: March 31, 2018

Abstract

We use a unique micro-level data from a large Nepali household survey to investigate the impact of remittances on financial inclusion - households' access to and use of formal financial services. We measure financial inclusion using two alternative binary variables, which indicate whether the household has a deposit account at a formal financial institution, and whether the household has received a loan from a formal financial institution. Using the probit regression models, we show that remittances tend to reduce the demand for both deposit accounts and credit from formal financial institutions. Additionally, we show that this finding is unlikely to be driven by omitted variables.

JEL classification: D14, G21

Keywords: remittances, financial inclusion, Nepal, instrumental variable, bivariate probit

*New York University Shanghai, Shanghai, China. Tel: +862120595000 Email: ss9387@nyu.edu

†Corresponding author: International Maize and Wheat Improvement Center (CIMMYT), Lalitpur, Nepal. Tel: +977015525490 Email: n.joshi@cgiar.org

1 Introduction

Since 2008, Nepal has been consistently ranked as one of the top ten remittance recipient countries in the world when remittances are measured as a proportion of gross domestic product (GDP) (see Figure 1). In fact, among the countries receiving remittances as a share of GDP, Nepal stood second in 2016, first in 2015, and third in 2013 and 2014. However, despite these facts, the empirical evidence on how remittances impact financial inclusion - households' access to and use of formal financial services - in Nepal remains scarce. One reason for lack of such study in Nepal is data availability. However, this investigation is important because financial inclusion has been shown to contribute to the economic growth of the country through: a) improvements in efficiency and convenience of payments for both parties; b) increase in transparency of transfer payments; c) women empowerment by increasing their household decision making power due to their ability to save and invest; d) expansions and improvements of businesses (Demirgüç-Kunt & Singer, 2017).

Insert Figure 1 here

There is relatively limited research on the relationship between remittances and financial inclusion at the household level in the international literature. Anzoategui, Demirg-Kunt, Pera (2014) focus on El Salvador and find that remittances increase the probability of households having deposit accounts but not loans. Using the household data from Mexico, Ambrosius and Cuezuecha (2016) document a positive effect on the ownership of savings accounts and borrowings. However, they show that the impact of remittances on borrowings is associated with informal, and not the formal, financial sector. In a related study, Brown, Carmignani, and Fayad (2013) use the household survey data and report a positive effect of remittances on the likelihood of holding a bank account for Kyrgyzstan but a negative effect for Azerbaijan.

Given the conflicting findings in the existing literature, this study fills three gaps. First, we use a unique micro-level data from a large household survey undertaken by Government of Nepal, Ewha Womans University (Korea), International Organization for Migration, and the Institute for Integrated Development Studies (Nepal) from November 2015 through June 2016. Unlike other household surveys used in the previous literature, this survey was conducted with a major focus on remittances and migration. Second, following Knapp and Seaks (1998), we use biprobit model to test the endogeneity of our main explanatory variable - household remittances. Third, we use the approach of Oster (2016) to test the robustness of our findings to omitted variable bias.

Conceptually, remittances could impact financial inclusion through a variety of mechanisms. First, remittances are typically lumpy and thus, the increase in remittances may increase the demand for deposit services at formal financial institutions because households need these services for the safe storage of their temporary excess funds (Aggarwal, Demirgüç-Kunt, & Peria, 2011; Anzoategui, Demirgüç-Kunt, & Peria,

2014; Ambrosius & Cuecuecha, 2016). Second, remittances reduce the information asymmetry between formal financial institutions (lenders) and recipient households (borrowers) by providing information on the income of the households to the lenders (Anzoategui, Demirgüç-Kunt, & Pería, 2014; Ambrosius & Cuecuecha, 2016). This increases households' creditworthiness and the likelihood of obtaining loans from formal financial institutions. However, remittances may also function as a substitute for credit by relaxing households' credit-constraints and thus reducing the households' demand for loans from formal financial institutions. In summary, we expect ex-ante remittances to increase the households' use of accounts at formal financial institutions. However, the impact of remittances on demand for loans is *a priori* unclear. We measure financial inclusion using two alternative binary variables, which indicate whether the household has a deposit account at a formal financial institution and whether the household has received a loan from a formal financial institution. We individually regress each of the financial inclusion measures on remittances along with other control variables: age of the household head, gender of the household head, education level of the household head, household size, log of household's monthly per capita income, agriculture as a household occupation, caste of the household head, and log of household's distance to a formal financial institution (in minutes).

Following the previous literature (Lokshin, Bontch-Osmolovski, & Glinskaya, 2010; Anzoategui, Demirgüç-Kunt, & Pería, 2014), we use the instrumental variables approach, the instrument being 'the proportion of households receiving international remittances in the municipality' (a proxy for network effects). While we find this instrument to be relevant in explaining household remittances, the result from the endogeneity test (Knapp & Seaks, 1998) shows that our main explanatory variable, household remittances, is not endogenous. Hence, we use a univariate probit model since estimates from this model are consistent when there is no endogeneity problem.

The findings from univariate probit regressions show that remittance recipients are less likely to have deposit accounts at formal financial institutions and also less likely to receive loans from formal financial institutions. In particular, we find that households that receive remittances are less likely to have deposit accounts at formal financial institutions by 3.52 percentage points and receive loans from formal financial institutions by 9.14 percentage points in the baseline specification that includes all control variables except the district fixed effects. These findings are similar when we control for district fixed-effects dummy variables which would address the concern that district level factors might be driving both remittances and financial inclusion. Furthermore, we use the approach of Oster (2016) to assess how much omitted variables could potentially bias our results. The results suggest that the impact of remittances on financial inclusion is not driven by omitted variables.

The remainder of the paper is organized as follows. Section 2 reviews the literature. Section 3 describes the data, and Section 4 presents the empirical model we employ. Section 5 presents the empirical results followed by robustness checks in Section 6. Section 7 concludes.

2 Previous Literature

This paper is related to three strands of literature. The first strand of literature examines the impact of various factors, other than remittances, on financial inclusion. Allen, Demirgüç-Kunt, Klapper, and Peria (2016) examine the factors that affect financial inclusion for the economically disprivileged groups such as women, poor, children or rural individuals by using data set from over 140 countries and considering the individual level and the country level characteristics. They find that 58% of adults in upper middle income countries have formal accounts as compared to 19% of adults in low-income countries. In developing countries urban-rural divide, education, gender, age and costs play important roles in financial inclusion.

The second strand of literature examines the impact of remittances on financial inclusion. Anzoategui, Demirgüç-Kunt, and Pería (2014) discuss the impact of remittances on access to financial services such as loans, savings and checking accounts through formal financial institutions using household level survey data from El Salvador, where remittances account for 16.4% of GDP. They find that receiving remittances increases the probability of having deposit accounts by 11%. However, receiving remittances does not increase the likelihood of borrowing loans. Ambrosius and Cuecuecha (2016) study the effect of remittances on the use of formal and informal financial services using household data from Mexico. They find that remittances have a positive and significant effect on borrowings and on ownership of savings accounts. However, the impact of remittances on borrowings in their study is associated with informal financial sector, not the formal financial sector.

In a related study, Brown, Carmignani, and Fayad (2013) discuss the nonlinear behavior of bank credit with respect to remittances by developing a theoretical model of bank credit in a hypothetical remittances receiving country and using panel data set for a large group of developing and emerging economies between the time period 1970-2009. The nonlinear relationship between bank credit and remittances implies that the curve associated with bank credit is U-shaped. This means that initially when remittance level is low, an increase in remittances reduces the volume of credit given by banks and eventually when the level of remittances is high, an increase in remittances increases the volume of credit given by banks with turning point at 2.5% of GDP. In another study, Ambrosius (2016) using Mexican household data set reveals that the impact of remittances on ownership of savings accounts among remittance receiving households is significant but its impact on borrowings is not significant. Nonetheless, most of the studies have shown that the effect of remittances on the banking sector usually has a positive impact, especially on the number of bank accounts or deposit accounts opened. This is also known as an expansion in bank breadth. Increasing bank breadth is important because it helps in financial development of the country which fosters growth and reduces poverty (Demirgüç-Kunt, Córdoba, Peria, & Woodruff, 2011). Inoue and Hamori (2016) examine the impact of remittances on access to formal financial services using panel data from 38 developing countries in Asia and Oceania between 2001 and 2012. They state that remittances contribute towards financial access only if those who are unbanked also get opportunities

to use financial services. Their results show that higher income and greater openness are required for promoting financial access. They also find that remittances work as a catalyst for access to formal finance only when people know the importance of formal finance.

The third strand of literature investigates the impact of remittances on banking sector breadth and depth. Banking breadth can be described as the expansion capacity of banks. This may include opening new bank branches and the extension of existing bank branch networks in large scales (Uchenna, Evans, & Stephen, 2015). Banking depth can be described as the volume of deposits and credit to GDP (Demirgüç-Kunt, Córdoba, Peria, & Woodruff, 2011). Demirgüç-Kunt, Córdoba, Peria, and Woodruff (2011), using the municipal-level data from Mexico, show that remittances are strongly associated with depth. They find that one percentage point increase in the share of households that receive remittances causes an increase in the percentage of households that use financial services by 0.16-0.19 percentage points. Thus, their results are statistically and economically significant. However, a study in Nigeria by Uchenna, Evans, and Stephen (2015) contradicts this finding. Using the 2011 World Bank household survey, their study reveals that remittances do not influence the recipients' decision to open a bank account. They argue that this is due to the exchange rate in Nigeria: the recipients usually prefer to hold foreign currency due to unfavorable exchange rate. Hence they would either hold foreign exchange or trade currency in black market. Nonetheless, overall we see that remittances do have a positive impact on financial inclusion in developing countries. Most studies show that remittances cause people to open bank accounts, savings accounts, and use other formal financial services which enable economic growth and development.

3 Data

We use a unique micro-level data from a large household survey undertaken by Government of Nepal, Ewha Womans University (Korea), International Organization for Migration, and Institute for Integrated Development Studies (Nepal) from November 2015 through June 2016. The survey is nationally representative and covers 31 of the 75 districts in Nepal, with the sample design created in close coordination with the Central Bureau of Statistics (Nepal). The dataset includes migrant households, non-migrant households, potential migrant individuals, and returnee migrant individuals as separate target groups with individualized questionnaires. Among others, the dataset provides detailed information on the household head, remittances, banking and saving behavior, and investment behavior for 5837 households. We combine the datasets of migrant households and non-migrant households to assess the impact of remittances on financial inclusion.¹

¹We do not use the datasets of potential migrant individuals and returnee migrant individuals because these do not have information on the variables related to household head.

4 Empirical Model

To examine the impact of remittances on financial inclusion, we use the following econometric model:

$$\text{FININC}_i = \alpha + \beta \text{REMIT}_i + \lambda \mathbf{X}_i + \epsilon_i \quad (1)$$

Here, FININC are binary variables that indicate different financial services used by households i at the time of the survey. The different financial services are: i) whether the household has a deposit account (savings, current, fixed, or other) at a formal financial institution (bank, finance company, and co-operatives) and ii) whether the household has received one of the following loans from a formal financial institution: educational loan, personal loan, business loan, housing/construction loan, and debit/credit card. Our main independent variable is REMIT, a dummy variable that takes the value 1 if household i received remittances during the last 12 months at the time of the survey. As discussed in Section 1, we expect ex-ante remittances to increase the household's use of a deposit account at a formal financial institution, whereas the impact of remittances on demand for a loan from a formal financial institution is *a priori* unclear. \mathbf{X} are the control variables at the household and the district level. We include the following household-level control variables: age of the household head, gender of the household head, education level of the household head, household size, whether the household is involved in agriculture or not, log of monthly per capita expenditure as a proxy for income level of the household, caste of the household head, log of household's distance to a formal financial institution (in minutes), and district of the household.

We expect age of the household head to have a positive impact on financial inclusion. This is because age serve as a proxy for the potential experience of households, a major factor determining households' earnings. Allen, Demirguc-Kunt, Klapper, and Peria (2016) also find that adults between the ages of 25 and 65 are more tend to own accounts at formal financial institutions. Gender is defined as a dummy variable that takes the value 1 if the household head is female. We expect gender of the household head to have a positive impact on financial inclusion. Usually, households where financial responsibilities are handled by women tend to be better managed and thus could also be correlated with greater financial literacy. Previous studies (e.g., Brown, Carmignani, and Fayad (2013)) indicate that female-headed households are more likely to hold bank accounts.

Caste of the household head consists of the following categories: Hill Brahmin, Hill Chhetri, Hill Janajati, Hill Dalit, Terai Brahmin, Terai Chhetri, Terai Dalit and others. Dalits (both Hill and Terai) are one of the economically and socially disadvantaged groups of people in Nepal and are usually discriminated in all aspects of society in Nepal. We can thus expect that being a Dalit as compared to other castes will have a negative impact on financial inclusion.

Education level of the household head is classified into five categories: i) Intermediate degree or

higher which is the base category; ii) whether the household head is illiterate; iii) whether the household head can read and write; iv) whether the household head did schooling under School Leaving Certificate (SLC); iv) whether the household head is SLC passed or has a formal/informal vocational training. It is likely that financial literacy is higher with higher level of education, and we expect it to be positively correlated with financial inclusion. Previous studies Anzoategui, Demirgüç-Kunt, and Pería (2014) and Brown, Carmignani, and Fayad (2013) indicate that education has a positive and significant impact on financial inclusion.

Household size is denoted by the total number of people that live in a household. We expect it to be positively correlated with financial inclusion because usually when household size is large, it is more likely that at least one of the household members uses financial services. Brown, Carmignani, and Fayad (2013) find that increase in household size-adults and seniors increase the likelihood of having bank accounts in Azerbaijan. Another study by Ambrosius (2016) also finds that household size has a positive and significant effect on financial inclusion.

Agriculture is mostly concentrated in rural areas in Nepal, and the literacy rate in rural areas is much lower than the literacy rate in urban areas. Thus, it is more likely, that households involved in agriculture are financially illiterate, and so we expect the use of financial services to be higher for households in non-agriculture sector. Log of household's monthly per capita expenditure serves as a proxy for per capita household income. Households with high income are more likely to have accounts at formal financial institutions, and hence we expect income to have a positive impact on financial inclusion. Ambrosius and Cuenca (2016) find that income has a positive and significant effect on the existence of debts and recent formal borrowings and savings.

We also control for a variable capturing the accessibility of a formal financial institution as measured by the log of distance in minutes to the nearest formal financial institution. We expect this variable to have a negative impact on financial inclusion because the transaction costs for the use of financial services from a formal financial institution will increase with the increase in the distance. Brown, Carmignani, and Fayad (2013) report a negative impact of distance to a formal financial institution on financial inclusion.

Insert Tables 1-2 here

Table 1 provides descriptions of the variables we employ in our analysis. Table 2 presents the descriptive statistics for remittance-receiving and non-remittance receiving households. On average, non-remittance receiving households are more likely to have deposit accounts at formal financial institutions, and also more likely to receive loans from formal financial institutions. To examine this more formally, we use the econometric model 1.

The OLS estimate of β in equation 1 cannot be interpreted as a causal effect because household remittances may not be exogenous. There are two reasons for this. First, there may be a possibility of reverse causality from financial inclusion to remittances, e.g., if migration is financed through debt from

formal financial institutions or if financial inclusion reduces the cost of remittances, then financial inclusion might have a causal impact on remittances (Anzoategui, Demirgüç-Kunt, & Pería, 2014; Ambrosius & Cuecuecha, 2016). Second, there may be a possibility of omitted variable bias: there may be unobserved factors that are correlated with both financial inclusion and remittances. There are at least two reasons why reverse causality is less likely in our study. First, migration is less likely to be financed through debt from formal financial institutions because migrants are normally poor individuals with little or no collateral. Second, the World Bank’s Remittance Prices Worldwide database shows that the recent cost of sending remittances to Nepal is, on average, lower for money transfer operators vis-a-vis formal financial institutions. Thus, ex-ante it is not clear whether financial inclusion reduces the cost of sending remittances. To address omitted variable bias, we control for all the theoretically relevant observables. We also include district fixed-effects dummy variables, which we believe would address the concern that district-level factors might be driving both remittances and financial inclusion.

Even though we think there is less likelihood of endogeneity, we use the instrumental variables (IV) approach to deal with the endogeneity problem. The ideal instrumental variable for the IV approach should explain remittances (a strong instrument), but should not determine financial inclusion, other than via remittances (exclusion restriction). We follow the literature (Lokshin, Bontch-Osmolovski, & Glinskaya, 2010; Anzoategui, Demirgüç-Kunt, & Pería, 2014) and use ‘the proportion of households receiving international remittances in the municipality’² (a proxy for network effects) as the instrumental variable. Intuitively, as the proportion of households receiving international remittances in the municipality increases, the households’ likelihood of receiving international remittances in the given location will also increase because of the network effects. To check whether the instrument is weak, we estimate the linear probability model with the instrumental variable.³ The first-stage regression of the model shows that the coefficient and *t*-statistic on the instrument are 0.9035 and 13.24, respectively. This suggests that the instrument is strongly correlated with remittances. In addition, the Cragg-Donald Wald F statistic (183.51) and the Kleibergen-Paap rank Wald F statistic (175.47)⁴ indicate that the instrument is not weak.

The major threat to the validity of exclusion restriction is municipal factors which might be correlated

²The local unit level is the second lowest administrative level of Nepal. It refers to either Village Development Committee, or Municipality, or Sub-metropolitan city, or Metropolitan city.

³There are three approaches for estimating the binary choice model with endogenous regressors: maximum likelihood, control functions, and linear probability models. We use linear probability models for five reasons. First, unlike maximum likelihood or control functions, the linear probability model does not require errors in the first stage regressions to satisfy any of the properties of a correctly specified model (Dong & Lewbel, 2015). Second, maximum likelihood estimators rely on the assumption of joint normality of error terms that is usually violated. Third, control function estimators are consistent only for continuous endogenous variables, but in our case, endogenous variable is binary in nature. Fourth, unlike maximum likelihood or control functions, linear probability models allow for general forms of heteroskedasticity (Dong & Lewbel, 2015). Fifth, the average causal effect produced by maximum likelihood estimator like bivariate probit, is similar to the linear probability model with the instrumental variable (Angrist & Pischke, 2008). However, we also use the bivariate probit model when we test for the endogeneity of binary regressor.

⁴The critical value at 10 % significance level is 16.38. We use these statistics, since there is no alternative version of these when the structural model is non-linear.

with both the instrument and households’ use of financial products. For example, the number of branches of formal financial institutions (bank breadth) per capital at the municipal level, which could be correlated with the instruments as well as households’ use of financial products (Demirgüç-Kunt, Córdova, Peria, & Woodruff, 2011). Unfortunately, because of unavailability of such data at the municipal level for Nepal, we cannot control for that variable in the model, and so we address this issue by including district fixed-effects dummy variables.⁵ In sum, while it is possible that omitted variables could invalidate the exclusion restriction, it is plausible that conditional on district fixed-effects dummy variables, the instrument is not likely to affect households’ use of financial products.

To examine whether the household remittances is endogenous, we estimate the bivariate probit model of financial inclusion and remittances in which the endogeneous remittances binary variable is included in the financial inclusion equation as simply another regressor. Knapp and Seaks (1998) show that a likelihood-ratio test of whether the correlation coefficient of the error terms in bivariate probit model is equal to zero provides a test for endogeneity. Appendix Table A1 reports the results of the bivariate probit model for deposit accounts and loans received. A likelihood ratio (Hausman) test of the correlation coefficient suggests that remittances variable is exogeneous for both deposit accounts and loans received. The correlation coefficients for both deposit accounts and loans received are positive and suggest that unobserved factors that increase the probability of remittances also increase the probability of deposit accounts as well as the probability of loans received. Since endogeneity is not a problem for both measures of financial inclusion, we report only estimates from a univariate probit model.⁶ As a robustness check, we use the approaches of Altonji, Elder, and Taber (2005) and Oster (2016) to assess how much omitted variables could potentially bias our results.

5 Empirical Results

We examine the impact of remittances on financial inclusion variables using the probit model. Specifically, we individually regress deposit account and loan received on remittances along with other control variables: age of the household head, gender of the household head, education level of the household head, household size, log of household’s monthly per capita expenditure, agriculture occupation, caste of the household head, and the log of household’s distance from a financial institution (in minutes). Appendix Table A2 reports the estimated coefficients for these two models. We present two specifications for each measure of financial inclusion: the first specification excludes district fixed-effects dummy variables (baseline), and the second specification includes district fixed-effects dummy variables (fixed effects). Table 3 reports the corresponding marginal effects. Columns 2 and 4 present the marginal effects for the

⁵We cannot include municipality-level fixed-effects dummy variables, since we use municipality proportion of households that receive remittances as the instrument.

⁶When there is no endogeneity problem, estimates from univariate probit models are consistent.

specification without district fixed-effects dummy variables, and Columns 3 and 5 report the marginal effects for the specification with district fixed-effects dummy variables.

Insert Table 3 here

Columns 2 and 3 of Table 3 show the marginal effects associated with the impact of remittances on the likelihood of the household owning a deposit account at a formal financial institution. The results show that remittances dummy is negative and statistically significant in both model specifications. Numerically, the result in Column 2 suggests that the household that receives remittances is less likely to have a deposit account at a formal financial institution by 3.49 percentage points. The magnitude is slightly lower when we control for district fixed-effects dummy variables (Column 3, Table 3).

Columns 4 and 5 show that there is also a strong, statistically significant negative relationship between remittances and probability that the household receives a loan from a formal financial institution. In particular, the household that receives remittances has 9.17 percentage points lower probability of receiving a loan from a formal financial institution in the baseline specification and 8.13 percentage points in the fixed effects specification. The finding for the household's demand for credit could be driven by the fact that remittances may act as a substitute for credit by relaxing the household's credit constraints, and hence could reduce the demand for credit.

With respect to control variables, we find that age has a positive and significant impact on the demand for deposit accounts and credit. In addition, households headed by a female are more likely to have deposit accounts at formal financial institutions. The marginal effects indicate that a female-headed household is 4.07 percentage points more likely to have a deposit account at a formal financial institution in the baseline specification and 2.89 percentage points in fixed effects specification. In larger households (household size), the probabilities of having deposit accounts and receiving loans from a formal financial institutions are larger.

As expected, the log of household income per capita has a positive and significant effect on the demand for the use of financial products. Furthermore, lower educated household heads are associated with lower demand for deposit accounts and loans. However, no clear-cut relationship exists between caste and financial inclusion measures. Regarding the distance, the household's distance from a formal financial institution is negatively related to probabilities of having a deposit account and receiving a loan from that institution.

6 Robustness Checks

We test the robustness of our findings in Section 5 to omitted variable bias using the approach of Oster (2016). This approach examines the robustness of estimates to omitted variable bias by using the information on movements in coefficients and R-squared when including additional explanatory variables. The

underlying assumption is that the relationship between treatment and unobservables can be recovered from the relationship between the treatment and observables (Oster, 2016).

To apply Oster’s approach, we first estimate the relationship⁷ between each financial inclusion measure and remittances using a regression that includes the following control variables: age of the household head, gender of the household head, education level of the household head, household size, log of household’s monthly per capita income, agriculture as a household occupation, and caste of the household head. This regression yields a baseline estimate for the impact of remittances β_o and a baseline R-squared R_o . Next, we run a regression using all control variables, as in baseline specification, and district fixed effects. This regression yields an estimate for the impact of remittances $\tilde{\beta}$ and an \tilde{R} after controlling for all observables. Oster (2016) suggests testing whether the identified set for the treatment effect includes zero. The recommended identified set is given by $[\beta^*, \tilde{\beta}]$ where,

$$\beta^* = \tilde{\beta} - \delta \frac{(\beta_o - \tilde{\beta})(R_{\max} - \tilde{R})}{\tilde{R} - R_o} \quad (2)$$

δ is a value for the relative degree of selection on observed and unobserved variables (Oster, 2016). For example, $\delta = 1$ would mean observables are at least as important as the unobservables. R_{\max} is the maximum R-squared from a hypothetical regression that includes all observed and unobserved controls. The upper bound of the identified set, β^* , is computed by setting $\delta = 1$ and $R_{\max} = \min(2.2\tilde{R}, 1)$. If the identified set $[\beta^*, \tilde{\beta}]$ does not include zero, it suggests that the estimates that include all controls can be considered as being robust to omitted variable bias.

Table A3 presents results for the two indicators of financial inclusion. The identified sets for the household having a deposit account at a formal financial institution and receiving a loan from a formal financial institution are $[-0.0249, -0.0084]$ and $[-0.0843, -0.0679]$, respectively. Since these identified sets exclude zero, the impact of remittances on financial inclusion measures are not driven by omitted variables.

7 Conclusion

In this paper, we present a new evidence on the relationship between remittances and financial inclusion for Nepal using a unique micro-level data from a large household survey. We measure financial inclusion using two alternative dummy variables: a) whether the household has a deposit account at a formal financial institution; and b) whether the household has received a loan from a formal financial institution. Using the probit model, we document that remittances have a negative impact on the household’s use of financial services such as deposit accounts and loans. In particular, we find that the household that receives remittances is less likely to have a deposit account at a formal financial institution by 3.49

⁷We estimate the linear model rather than the probit model for this purpose.

percentage points and less likely to receive a loan from a financial institution by 9.17 percentage points in the baseline specification that includes all control variables except the district fixed-effects dummy variables. These findings are qualitatively and quantitatively similar when we control for district fixed-effects dummy variables which would address the concern that district level factors might be driving both remittances and financial inclusion. We also investigate the robustness of our findings to omitted variable bias using the approach of Oster (2016) and show that our findings are unlikely to be driven by omitted variables.

Our finding that remittances have a negative impact on financial inclusion by decreasing the likelihood of having a deposit account at a formal financial institution is similar to that of Brown, Carmignani, and Fayad (2013) for Azerbaijan. However, it is not consistent with that of Anzoategui, Demirgüç-Kunt, and Pería (2014), Ambrosius and Cuenca (2016), and Brown, Carmignani, and Fayad (2013) who find positive impacts for El Salvador, Mexico, and Kyrgyzstan, respectively. Moreover, we document that our result regarding the household's likelihood of receiving a loan from a formal financial institution also differs from the findings reported by Anzoategui, Demirgüç-Kunt, and Pería (2014) and Ambrosius and Cuenca (2016).

Overall, these findings suggest that remittances could reduce the demand for both deposit accounts and credit. There could be at least three reasons for this. First, remittances could act as a substitute for formal credit. Second, it could be that remittance-receiving households avoid formal financial institutions to deposit their earnings and use informal channels like hundi because of the fear of being recorded by the authorities, and the related high transaction costs they might incur. To reduce the use of informal channels and effectively allocate the remittances in the productive sectors of the economy, the Government of Nepal has made it mandatory from the fiscal year 2017/18 for potential migrants to open a bank account before going for foreign employment.⁸ Third, it could be that formal financial institutions are unable to address the financial needs of remittance recipients. Data for mid-July 2017 shows that, 411 local units out of 744 local units, delineated under the new federal set up of Nepal, did not have any bank branches. We leave these issues for future research.

⁸See the Government of Nepal's Budget Speech of fiscal year 2017/18. The fiscal year in Nepal starts from July 16 and ends with July 15 of the following year.

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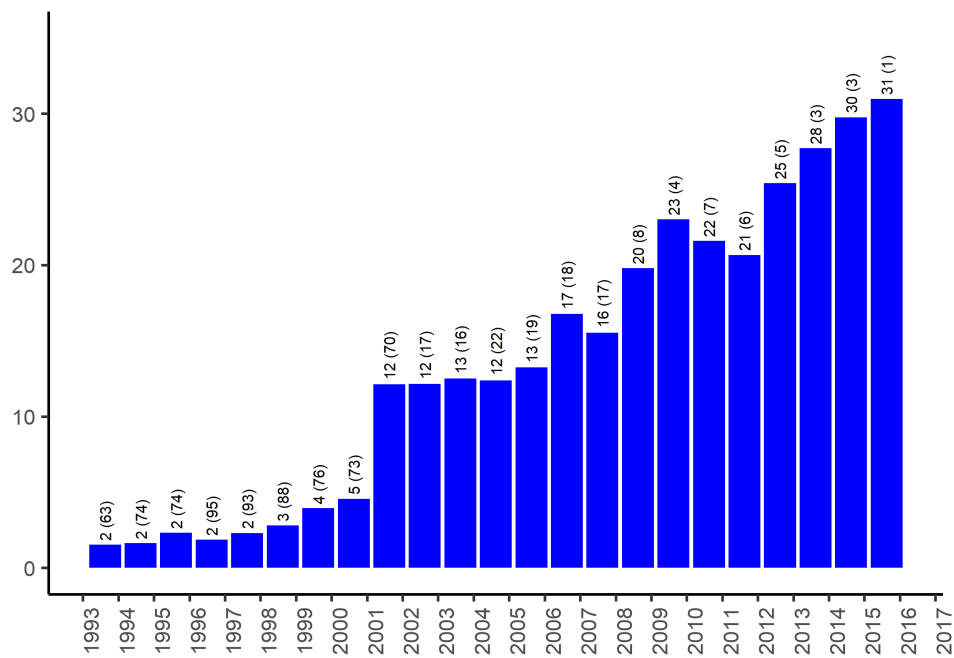


Figure 1: **Remittances as a share of nominal GDP (in percent)**

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Sources: Economic Survey, Ministry of Finance, Government of Nepal, Ratha et al. (2017), and World Bank (<http://data.worldbank.org/indicator/BX.TRF.PWKR.DT.GD.ZS>)

Table 1: **Data Description**

Variable	Description
<i>Financial inclusion measures</i>	
Deposit Account	Binary variable that takes the value 1 for households that reported to have account (current, savings, and fixed deposit) at a formal financial institution
Loan Received	Binary variable that takes the value 1 for households that reported to have received loan from a formal financial institution
<i>Main explanatory variable</i>	
Remittances	Binary variable that takes the value 1 for households that reported to have received international remittances
<i>Household characteristics</i>	
Age	Age of the household head
Gender	Binary variable that takes the value 1 if household head was female
Household size	Categorical variable that takes the value: 1, if $j=1$ household size $j=5$ 2, if $j=6$ household size $j=10$ 3, if $j=11$ household size $j=15$. 4, if $j=16$ household size $j=24$. where, 1 is the base category
Agriculture	Binary variable that takes the value 1 if the household was involved in agriculture sector
Education	Categorical variable that takes the value: 1, if the household head had an intermediate or higher degree 2, if the household head was illiterate 3, if the household could read and write 4, if the household head was under SLC passed 5, if the household head was SLC passed where, 1 is the base category
Caste	Categorical variable that takes the value: 1, if the household head belonged to others category. 2, if the household head was Hill Brahmin/Hill Chhetri 3, if the household head was Hill Janajati 5, if the household head was Terai Brahmin/ Terai Chhetri 6, if the household head was Terai Dalit 7, if the household head was Terai Janajati where, 1 is the base category
Distance	Log of household's distance to a formal financial institution (in minutes)
<i>Income and wealth variables</i>	
Income	Log of household's monthly per capita expenditures, in current Nepali Rupees, as a proxy for household's income
<i>District fixed effects</i>	
District	District fixed-effects dummy variables

Table 2: **Descriptive Statistics**

	Receivers		Non-receivers		All	
	Mean	SD	Mean	SD	Mean	SD
Deposit Account	0.639	0.480	0.667	0.472	0.647	0.478
Loan Received	0.353	0.478	0.451	0.498	0.379	0.485
Remittances	1.000	0.000	0.000	0.000	0.730	0.444
Age	45.759	13.926	47.218	12.980	46.153	13.691
Gender	0.489	0.500	0.184	0.387	0.407	0.491
Household size	1.546	0.624	1.461	0.582	1.523	0.614
Income	8.368	0.746	8.263	0.788	8.34	0.759
Agriculture	0.776	0.417	0.780	0.414	0.777	0.416
Education	3.025	0.966	3.164	1.128	3.062	1.014
Caste	2.127	1.469	2.263	1.700	2.164	1.535
Distance	81.377	134.78	79.67	125.03	80.917	132.209
Observations	3007		1110		4117	

Notes: See Table 1 for descriptions of variables. Receivers include households receiving remittances, and non-receivers include households not receiving remittances.

Table 3: **Financial Inclusion and Remittances: Probit Marginal Effects**

	Deposit account		Loan received	
	Baseline	Fixed Effects	Baseline	Fixed Effects
Remittances	-0.0349** (0.0159)	-0.0270* (0.0158)	-0.0917*** (0.0177)	-0.0813*** (0.0169)
Age	0.0028*** (0.0006)	0.0025*** (0.0006)	0.0005 (0.0007)	0.0003 (0.0007)
Gender	0.0407** (0.0163)	0.0289* (0.0164)	-0.0108 (0.0190)	-0.0068 (0.0183)
Household size greater than 5 and less than 11	0.0728*** (0.0148)	0.0778*** (0.0147)	0.0513*** (0.0174)	0.0566*** (0.0165)
Household size greater than 10 and less than 16	0.1506*** (0.0280)	0.1465*** (0.0280)	0.1316*** (0.0396)	0.1108*** (0.0374)
Household size greater than 15 and less than 25	0.2550*** (0.0506)	0.2496*** (0.0524)	0.2492*** (0.0964)	0.2383** (0.0942)
Income	0.1985*** (0.0109)	0.1955*** (0.0119)	0.0623*** (0.0114)	0.0919*** (0.0115)
Agriculture	-0.0243 (0.0170)	-0.0122 (0.0181)	-0.0218 (0.0190)	0.0073 (0.0188)
Education: Illiterate	-0.3318*** (0.0295)	-0.3256*** (0.0295)	-0.0994** (0.0425)	-0.0878** (0.0399)
Education: Read and write	-0.2717*** (0.0272)	-0.2770*** (0.0273)	-0.1285*** (0.0401)	-0.1069*** (0.0377)
Education: Under SLC	-0.1993*** (0.0279)	-0.1924*** (0.0279)	-0.1238*** (0.0404)	-0.0783** (0.0382)
Education: SLC	-0.1352*** (0.0317)	-0.1341*** (0.0317)	-0.0583 (0.0439)	-0.0381 (0.0409)
Caste: Hill Brahmin/Hill Chhetri	-0.0773*** (0.0168)	-0.0669*** (0.0188)	-0.0872*** (0.0183)	-0.0261 (0.0196)
Caste: Hill Janajati	-0.1030*** (0.0220)	-0.1044*** (0.0220)	0.0499** (0.0248)	0.0416* (0.0235)
Caste: Terai Brahmin/Terai Chhetri	-0.0028 (0.0442)	0.0221 (0.0425)	-0.042 (0.0522)	-0.0001 (0.0487)
Caste: Terai Dalit	-0.0212 (0.0293)	0.0088 (0.0298)	-0.0785** (0.0347)	-0.0228 (0.0347)
Caste: Terai Janajati	0.0443* (0.0244)	0.0319 (0.0253)	-0.0575** (0.0287)	-0.0343 (0.0286)
Distance	-0.0008*** (0.0001)	-0.0006*** (0.0001)	-0.0002** (0.0001)	-0.0002** (0.0001)
No. of observations	4117			

Notes: See Table 1 for descriptions of variables. FEs indicate district fixed effects.

Table A1: **Endogeneity Test using Bivariate Probit Model**

	Deposit account	Loan received
ρ	0.0840	0.0210
Likelihood ratio test of $\rho = 0$		
χ^2_1	0.3224	0.0267

Notes: See Table 1 for descriptions of variables.

Table A2: **Financial Inclusion and Remittances: Probit Estimates**

	Deposit account		Loan received	
	Baseline	Fixed Effects	Baseline	Fixed Effects
Remittances	-0.1182** (0.0540)	-0.0950* (0.0556)	-0.2491*** (0.0486)	-0.2458*** (0.0515)
Age	0.0095*** (0.0021)	0.0088*** (0.0022)	0.0013 (0.0019)	0.0009 (0.0020)
Gender	0.1388** (0.0561)	0.1022* (0.0584)	-0.0292 (0.0517)	-0.0206 (0.0553)
Household size greater than 5 and less than 11	0.2491*** (0.0519)	0.2769*** (0.0538)	0.1399*** (0.0476)	0.1712*** (0.0500)
Household size greater than 10 and less than 16	0.5436*** (0.1128)	0.5461*** (0.1153)	0.3505*** (0.1036)	0.3292*** (0.1089)
Household size greater than 15 and less than 25	1.0436*** (0.2910)	1.0443*** (0.3002)	0.6576** (0.2580)	0.6967** (0.2767)
Income	0.6713*** (0.0415)	0.6874*** (0.0462)	0.1692*** (0.0313)	0.2777*** (0.0354)
Agriculture	-0.0824 (0.0581)	-0.0429 (0.0638)	-0.059 (0.0511)	0.0221 (0.0571)
Education: Illiterate	-1.3526*** (0.1831)	-1.3787*** (0.1875)	-0.2598** (0.1100)	-0.2567** (0.1152)
Education: Read and write	-1.1669*** (0.1795)	-1.2221*** (0.1839)	-0.3386*** (0.1037)	-0.3149*** (0.1083)
Education: Under SLC	-0.9280*** (0.1808)	-0.9314*** (0.1855)	-0.3258*** (0.1048)	-0.2283** (0.1099)
Education: SLC	-0.6916*** (0.1912)	-0.7070*** (0.1964)	-0.1509 (0.1134)	-0.1097 (0.1177)
Caste: Hill Brahmin/Hill Chhetri	-0.2561*** (0.0549)	-0.2307*** (0.0641)	-0.2394*** (0.0511)	-0.079 (0.0596)
Caste: Hill Janajati	-0.3376*** (0.0705)	-0.3548*** (0.0732)	0.1302** (0.0645)	0.1228* (0.0688)
Caste: Terai Brahmin/Terai Chhetri	-0.0095 (0.1519)	0.0801 (0.1559)	-0.1127 (0.1426)	-0.0004 (0.1461)
Caste: Terai Dalit	-0.0722 (0.0987)	0.0318 (0.1075)	-0.2147** (0.0980)	-0.069 (0.1059)
Caste: Terai Janajati	0.1579* (0.0895)	0.1162 (0.0939)	-0.1555** (0.0792)	-0.1043 (0.0881)
Distance	-0.0025*** (0.0002)	-0.0020*** (0.0003)	-0.0004** (0.0002)	-0.0006** (0.0002)
Constant	-4.2256*** (0.4111)	-4.8393*** (0.5219)	-1.2405*** (0.3072)	-1.1753*** (0.4336)
No. of observations	4117	4117	4117	4117

Notes: See Table 1 for descriptions of variables. FEs indicate district fixed effects.

Table A3: Results from Oster's (2016) Test

	Deposit account	Loan received
Identified set	[-0.0249, -0.0084]	[-0.0843, -0.0679]

Notes: Oster 's (2014) test examines the robustness of estimates to omitted variable bias. See Section 6 for details.