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REMITTANCES AND LABOR SUPPLY IN THE NORTHERN TRIANGLE

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ABSTRACT

Through substitution and income effects, remittances can alter an individual's allocation of time between market activities and household production, decreasing labor supply. This paper uses propensity score matching and household surveys for 2006 and 2014 to estimate the impact of remittances on labor supply in the three countries of the Northern Triangle (El Salvador, Guatemala, and Honduras). The results show that remittances are associated with a reduction in labor force participation, particularly among women. This effect is largest for Salvadoran women (13 percentage points). A sensitivity analysis finds that the negative effect on labor force participation rates of men in El Salvador and Guatemala and women in El Salvador is robust to potential selection bias. Receiving remittances is also associated with a lower likelihood of young adults being in school or at work, with this effect being robust to selection bias for young men in Guatemala. At the same time, the evidence suggests that remittances may be supporting small enterprises and self-employment in El Salvador and Guatemala. The analysis does not find robust evidence of remittances affecting the labor supply in Honduras in 2014.

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Remittances and Labor Supply in the Northern Triangle¹

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Migration and remittances have become increasingly important factors in the development of El Salvador, Guatemala, and Honduras over the past three decades. According to the most recent global estimates of international migration, an estimated 1.6 million Salvadorans, 1.1 million Guatemalans, and nearly 800,000 Hondurans lived outside their countries of birth in 2013.⁴ These migrants represent 6 and 8 percent of all people born in Guatemala and Honduras, respectively, and 20 percent of all Salvadorans. These migrants, in turn, remitted over \$17 billion in 2017. Remittances accounted for 18 percent of the national GDP in Honduras, 17 percent in El Salvador, and 11 percent in Guatemala in 2016; the world average is 0.8 percent.

What impact do remittances have on the labor markets of El Salvador, Guatemala, and Honduras, collectively referred to as the Northern Triangle of Central America? Out-migration can negatively impact labor supply through two channels – directly through outflows of labor and indirectly through labor substitution effects of remittances. Migration from the Northern Triangle has historically been biased towards young adults, disproportionately decreasing the size of the labor force. Due to positive selection into migration, migration also leads to a decrease in the skills composition of the labor force (Del Carmen and Sousa, 2018). However, through remittances migration can also reduce the labor supply of those who do not migrate. In per capita terms, El Salvador receives \$724 per year in remittances, followed by Guatemala with \$450 and Honduras with \$424 - six times higher than the world average (\$77) and representing a significant income source for the households receiving them. As with other income types, receiving remittances can raise reservation wages and reduce labor supply. This may be of particular concern in the countries of the Northern Triangle, where labor supply, particularly of women, is below the regional average.

In this paper, we analyze the impact of the receipt of remittances on the labor supply and employment outcomes of men and women in El Salvador, Guatemala, and Honduras. Using household surveys for the years 2006 and 2014, we analyze the extent to which remittances affect the labor decisions of recipients. There is a well-known problem of endogeneity in establishing causal links between non-random income (such as remittances) and household labor decisions. In short, the population of households that receive remittances differs from households that do not receive remittances in systematic yet unobserved ways. These differences may themselves explain differences in other outcomes, including labor supply. Hence, the crucial question – do remittances reduce labor supply? – requires addressing issues of selection. Given the data limitations in these three countries, the strategy undertaken in this study is propensity score matching.

Background

Given the central role of labor markets as determinants of growth and poverty reduction, the impact of remittances on labor supply is an important factor to understand in countries with high remittance inflows. An increase in income (such as via remittances) increases the household budget which, as shown in the economics literature, affects the relative value of “leisure” (including home production) and market activities of household members.⁵ The resulting income effect increases the reservation wage of recipients, altering the utility-maximizing allocation of time between leisure and market activities. That is, individuals are able to buy more leisure or home production time because of remittances, at the expense of time in the labor market. Simultaneously, the change in the demographic composition of the household resulting from migration can alter the value of home production. The returns to home production for households with migrating members may be higher than for households without migration if the individuals who do not

⁴ Migration and remittance estimates for 2013 are from the Migration and Remittances Factbook, World Bank.

⁵ For an overview of household decision models and their implications, see Killingsworth and Heckman (1986).

migrate take over household tasks previously performed by migrants (for example, parenting obligations and upkeep of the dwelling).

Under an assumption of perfect information and well-functioning markets, a reduction in labor supply resulting from remittances implies an increase in household utility. Previous research has found that, even after accounting for forgone wages from migrating household members, remittances have lowered poverty rates in these three countries (Acosta et al. 2009; Scott and Soler 2018). Yet, for the individual, reducing labor supply because of remittances can pose some risks. Exits from employment can permanently decrease individuals' earnings potential if there are returns to professional experience and there is on-the-job learning. This can leave the individual at higher risk of poverty or unemployment in the event of a reduction in remittances.⁶ This can be particularly detrimental to young household members who defer entering the labor market and may opt to underinvest in human capital (in particular, the so-called *ninis* young adults who are neither employed nor in school).

While individual welfare may increase with receipt of remittances, the effect of remittances on social welfare is more mixed. A reduction of labor supply resulting from receipt of remittances compounds the loss in labor supply due to out-migration and becomes a key policy concern. Lower labor supply from remittances can reduce economic growth even as it feeds consumer demand and increases wages. Higher wages can erode the country's international competitiveness by increasing the cost of production. Higher wages and increased consumer demand (fueled by remittances) can also lead to higher prices, deteriorating the value of remittances and the returns to migration. A related concern is the so-called Dutch disease, wherein consumption fueled by remittances leads to deteriorating terms of trade and an inefficient allocation of labor from the tradable to the non-tradable sectors.⁷

On the other hand, given the limited employment opportunities in the countries of the Northern Triangle and limited access to credit, remittances could represent an alternative source of credit and financing both for investments in human capital⁸ as well investments in small businesses and self-employment. This is particularly important given the limited demand for low-skill labor in the formal sectors of these countries. If that is the case, remittances could have positive effects on job creation and productivity (and hence wages and job posts) of domestic firms. Some evidence has been found supporting the hypothesis that remittances are used to start or support business enterprises, for example in Albania (Kilic et al 2007), the Dominican Republic (Amuedo-Dorantes and Pozo 2006a), Mexico (Shapiro and Mandelman 2016), and the Philippines (Yang 2008).

Labor Markets in the Northern Triangle

El Salvador, Guatemala and Honduras are small countries (population ranging from 6.3 million in El Salvador to 16.6 million in Guatemala) with service-dominated, low growth economies and high poverty

⁶ The amount remitted typically decreases over time (for example, Funkhouser 2005).

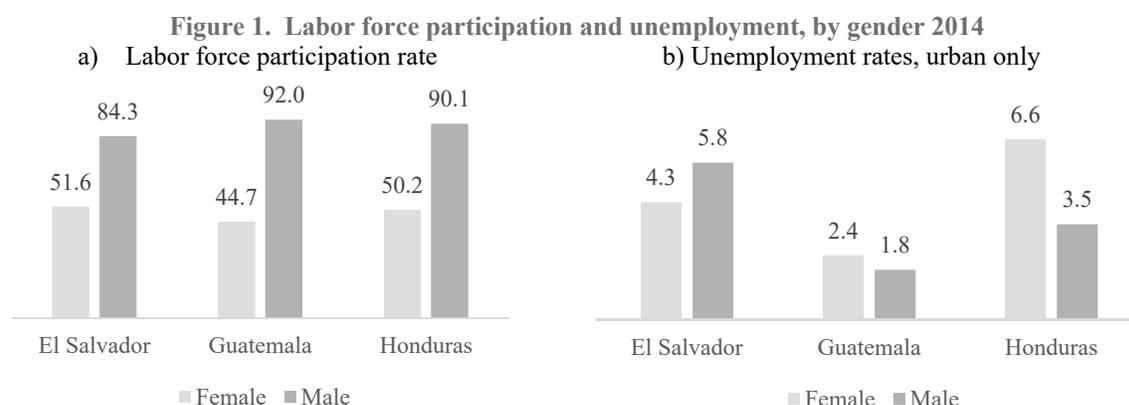
⁷ Remittances have been found to contribute to "Dutch disease" effects in Latin America, as high capital inflows result in real exchange-rate appreciation (for example, Acosta, Fajnzylber, and Lopez 2009; Bourdet and Falck 2006; Amuedo-Dorantes and Pozo 2004; Lartey, Mandelman, and Acosta 2012; Vargas-Silva 2009; and Bayangos and Jansen 2011). Increased household income due to the inflow of remittances increases consumer demand. This raises the relative prices for domestic nontradable goods, leading to higher relative wages in these sectors (such as local services) and prompting a reallocation of labor away from export sectors and a real exchange rate appreciation. Lopez, Molina, and Bussolo (2008) find that, among LAC economies, a one percentage point increase in remittances as a proportion of GDP is estimated to lead to a real-exchange rate appreciation of 18–24 percent. Rising domestic demand and lowered competitiveness of domestic tradable sectors widens the current-account deficit, weakening the country's macroeconomic position.

⁸ Remittances have been found to contribute to better nutrition and more schooling in the region (Oliveri, Scott and Sousa, forthcoming).

rates. While they are all lower-middle-income countries, Honduras is the poorest, with a per capita GDP of US\$ 4,740 in 2016 PPP - just over half of that of its two neighbors (\$8,620 for El Salvador and \$7,950 in Guatemala). Poverty rates are high – with half of Hondurans and Guatemalans living on less than \$5.50 per day in 2016 (data are from 2014 in the case of Guatemala), and 30 percent of Salvadorans.

Labor demand is weak, and most jobs are low-skill and informal. The agriculture sector, including subsistence farming and market crops like coffee, employs 29 percent of workers in Guatemala and Honduras and 19 percent in El Salvador. Even after excluding agricultural employment, the majority of jobs are in the informal sector, which absorbs 63 percent of workers in El Salvador and 74 percent in the other two countries.⁹ Due to the countries' low average educational attainment, most of these workers are low-skilled. In each of the three countries, only about a quarter of the potential labor force has completed upper secondary school, and only about one in ten has completed any type of tertiary education. Workers rely heavily on self-employment: nearly half of Honduran workers are self-employed as are 38 and 40 percent of workers in Guatemala and El Salvador respectively. This group includes employers, mostly small business owners and family enterprises: 3 percent of all workers in El Salvador and Guatemala and 10 percent in Honduras.

In this context of weak labor demand, a largely low-skilled workforce, and high informality, labor force participation is low, especially for women. Participation rates for women range from 44.7 percent in Guatemala to 51.6 in El Salvador (Figure 1). Participation rates are higher for men, accounting for 9 out of 10 working-age men in Guatemala and Honduras. However, they are lower in El Salvador, where only 84.3 percent of men are in the labor force. Crime, which can reduce labor supply by both absorbing labor (particularly male labor) and imposing obstacles to participation due to security costs and concerns, is a significant factor in these three countries.¹⁰



Source: Authors' tabulations using the Socioeconomic Database for Latin America and the Caribbean or SEDLAC (World Bank and CEDLAS).

Note: The sample is limited to individuals ages 18-65.

Since a large fraction of the workforce is absorbed in informal work, unemployment rates are relatively low in the three countries, and particularly so in Guatemala where urban unemployment rates are 2.4 percent

⁹ Figures in this paragraph are from the World Development Indicators, World Bank.

¹⁰ Sizeable gangs and other criminal enterprises have resulted in the Northern Triangle having some of the highest homicide rates in the world, with either El Salvador or Honduras recording the highest rates globally each year between 2008 and 2015 (the most recent year for which global data are available).

for women and 1.8 percent for men.¹¹ Yet, underemployment rates are significantly higher, at 15 percent for El Salvador and 20 percent for Honduras.¹² While this statistic cannot be calculated for Guatemala, 12 percent of the working age population is either unemployed or would like to work more hours.¹³

Across the three countries, adults who are working are less likely to live in households that receive remittances than those who are not working.¹⁴ The difference is largest in El Salvador: in 2014, 18.7 percent of working-age adults versus 15.8 percent of employed adults lived in households that received remittances. The difference between the share of all adults who receive remittances and those who are employed and receive remittances is just over 1 percentage point in the other two countries. Among adults who are not working, in Guatemala and Honduras adults who are out of the labor force (inactive) and those who are unemployed receive remittances at about the same rate. In El Salvador, however, those who are inactive are significantly more likely to receive remittances than the unemployed, particularly in 2006. This table suggests that remittances in El Salvador may be more associated with labor supply effects than in the other two countries.

Table 1 Percent of adults receiving remittances, overall and by employment status

	El Salvador		Guatemala		Honduras	
	2006	2014	2006	2014	2006	2014
Overall	22.4%	18.7%	15.4%	8.3%	18.2%	16.6%
Employed	17.9%	15.9%	13.8%	7.2%	16.3%	15.1%
Inactive	31.3%	24.6%	19.4%	10.5%	21.9%	20.1%
Unemployed	19.9%	19.3%	19.0%	10.9%	21.9%	20.4%

Source: Authors' estimates based on SEDLAC and household surveys. The sample is limited to adults, ages 18-65.

Methodology

The household models suggest that the decision for one or some household members to migrate may be made jointly with the labor supply of other household members. That is, the household decides that the utility-maximizing strategy is for some member to migrate and remit while another increases household production. In this case, the receipt of remittances and local labor supply are both the result of an earlier and unmeasured decision. The resulting analysis of the impact of remittances on labor supply should address this potential endogeneity, otherwise it may overestimate an effect.

Research on this topic that does not address endogeneity has typically found negative correlation between remittances and labor supply – that is, adults who receive remittances are also less likely to be working. For example, Funkhouser (1992) finds a negative relationship between remittances and labor participation and a positive relationship with self-employment for both men and women in Nicaragua.¹⁵ Studies like Airola (2008) use Heckman selection to address selection into the labor force, but do not address selection into the

¹¹ Rural unemployment rates are about half that of urban rates.

¹² Source: ILOSTAT. Underemployment LU4 definition is calculated as the share of the working age population that is unemployed, plus those who are employed but want to work more hours, and potential labor force participants currently out of the labor force: discouraged workers (available but not seeking), and seeking yet unavailable.

¹³ Source: ILOSTAT. Underemployment LU2 definition is calculated as the share of the working age population that is unemployed, plus those who are employed but want to work more hours.

¹⁴ The share of households (and adults) that report having received remittances fell for the three countries between 2006 and 2014. However, macroeconomic estimates of remittances in 2006 and 2014 do not report such significant drops, suggesting that the 2014 household surveys may suffer from higher levels of underreporting. This is a larger concern in the case of Guatemala, which records the share of adults in recipient households falling from 15 percent to 8 percent.

¹⁵ An increase in remittances of \$100 decreases the probability of labor force participation by 2.1 percentage points for men and 5 percentage points for women while it increases the probability of being self-employed (conditional on being in the labor force) by 1.2 and 1.1 percentage points respectively.

group of households receiving remittances. Airola (2008) finds a small negative correlation between remittances and labor supply in Mexico: the estimated elasticity suggests that, at the sample mean, male recipients of remittances worked 4.25 fewer hours per week.

Approaches used in the literature to address potential endogeneity range from limiting the sample to only some types of migrants, using panel or pseudo-panel data, using propensity score matching, to using instrumental variables. Instrumental variables (IV) are exogenous variables, often based on geographical variation, that are correlated with a household's probability of receiving remittances but not correlated with its labor supply decisions. Amuedo-Dorantes and Pozo (2006b) use the location of Western Union offices in Mexico to estimate the effect of remittances on local labor supply. Similarly, Acosta (2006) uses out-migration rates at the county and village level in El Salvador as instrumental variables to predict receipt of remittances. Using a set of 11 countries in Latin America and the Caribbean, Acosta, Fajnzylber, Lopez (2009) build instrumental variables using the percentage of households that receive remittances in the country, and its interaction with household characteristics that are expected to affect the decision to migrate.¹⁶ In each of these papers, addressing endogeneity through IV reduced the estimated negative impact of remittances on labor supply and in some cases, especially for men, erased it completely.

However, strong IVs are difficult to find in the context of limited data found in the Northern Triangle. Yang (2008) uses exchange rate shocks to instrument for changes in remittances, finding evidence of remittances leading to more entrepreneurship and more hours worked in self-employment in the Philippines. Taking advantage of the sampling strategy of the household survey, Kim (2007) builds pseudo-panels in Jamaica identified by sampling cluster and finds that remittances reduced labor force participation (but not hours worked). Funkhouser (2006) uses a 3-year panel from Nicaragua and finds no effect of migration or remittances on the labor supply of adults who did not migrate, but finds that young adults in remittance-receiving households are less likely to work. Rodriguez and Tiongson (2001) mitigate the bias from endogeneity by considering only households with temporary migrant members, arguing that in these cases household labor supply decisions and the decision to migrate are inseparable. They find a negative correlation between remittances and the number of hours worked and labor participation of recipients. Cox-Edwards and Rodriguez-Oreggia (2009) use propensity score matching to limit the sample to recipient and non-recipient individuals who are similar across observable characteristics, mitigating but not fully addressing the endogeneity. They conclude that remittances have a neutral effect on participation rates, in essence replacing the income of the missing household member.

To better understand the causal impact of remittances on labor supply, suppose that a measure of labor supply of individual i in household h in region r , $Y_{i,h,r}$, is a function of a set of individual, household, and regional characteristics. This is written out as equation (I) where the key variable of interest is R_h , a variable identifying households in which any member received remittances.¹⁷

$$Y_i = F[R_h, X_i, Z_h, R_r] \quad (I)$$

Beyond receipt of remittances, other characteristics that affect labor supply decisions include: a vector X_i of individual-level characteristics; a vector Z_h of household characteristics; and a vector R_r of local and regional characteristics (such as urban status).

As discussed above, a significant challenge to address in this analysis is the selection on unobservables associated with both labor force participation and the receipt of remittances. Suppose the migration of one

¹⁶ In particular, the presence of young children and adult men in the household, and the educational level of adults in the household.

¹⁷ The variable R_h could also be reported as a continuous measure of the average monthly amount of remittances received by the household.

or more members is a household strategy to increase income through remittances. Let the parameter $\theta_{i,h}$ be an unobserved measure of household welfare generated by individual i 's leisure time (i.e., non-market activities including production in the household). If the household's decision for a member to migrate, and subsequently send remittances, depends on this function of household welfare, then R_h is itself a function of $\theta_{i,h}$ (Equation II).

$$Y_i = F[R_h(\theta_{i,h}), X_i, Z_h, R_r, \theta_{i,h}] \quad (\text{II})$$

Under this scenario, there are two econometric problems in determining the relationship between Y_i and R_h : omitted variable bias arising from the unobservable nature of $\theta_{i,h}$ and a violation of the ignorability assumption since selection into the group of beneficiaries of remittances is non-random.

To address the impact of $\theta_{i,h}$ on the estimates, access to either panel data, which can be used to remove individual and household fixed effects, or a strong instrumental variable are ideal. Yet no household panel data exist for the Northern Triangle with sufficient observations for this type of analysis. At the same time, a lack of geographical disaggregation in the regions' household surveys limits the extent to which survey-based geographical and temporal variation can be exploited for instrumental variables. Other potential data sources that could be mined for instrumental variables – like municipal or departmental migration rates based on census or administrative data, are not complete or available for the three countries.

Given the lack of exogenous information that can be used as a strong instrumental variable in the three countries, an alternative approach is to maximize the similarity between the treated group (households who receive remittances) and the control group (households that did not receive remittances). This can be accomplished through the use of propensity score matching. This methodology has been widely used to look at the impact of remittances internationally, including Acosta (2011) for El Salvador; Berloti and Marchetta (2014) for Ecuador; Bouoiyour and Miftah (2015) for Morocco; Clement (2011) for Tajikistan; Cox-Edwards and Rodriguez-Oreggia (2009) and Esquivel and Huerta-Pineda (2007) for Mexico; De and D. Ratha (2012) for Sri Lanka; Dey (2015) for India; Garip (2014) for Thailand; Jimenez-Soto and Brown (2012) for Tonga; Kahn (2008) for Bangladesh; and Siddiqui (2013) for Pakistan. This approach identifies a sample of households that do not receive remittances that are similar to households that receive remittances by matching across invariant household socioeconomic features. This reduces biases that are due to systematic differences between receiving and non-receiving households (for example, Dehejia and Whaba 2002). In other words, this approach eliminates confounding effects related to differences in *observable* characteristics between recipients and non-recipients.¹⁸

Propensity score matching depends on the strong ignorability condition, i.e., the outcome and treatment are independent conditional on the observable feature. This is violated by the inclusion of $R_h(\theta_{i,h})$ in the model. However, to the extent that unobservable characteristics are correlated with observable characteristics, propensity score matching attenuates potential endogeneity (see Stuart 2010). That is, suppose that $\theta_{i,h}$ is correlated with observable characteristics in the vectors X_i, Z_h, R_r . This could be the case if, for example, the value of home production is higher in households with higher dependence ratios or in rural households with lower access to basic services. Matching across households with similar sets of these characteristics would thus reduce the difference in $\theta_{i,h}$ between treated and untreated households.

¹⁸ In addition, using propensity score matching may also reduce the potential for bias due to survey undercount. This is a concern since the decrease in the number of households reporting the receipt of remittances in the 2014 surveys compared to 2006 surveys suggests a potential measurement issue in the survey instruments.

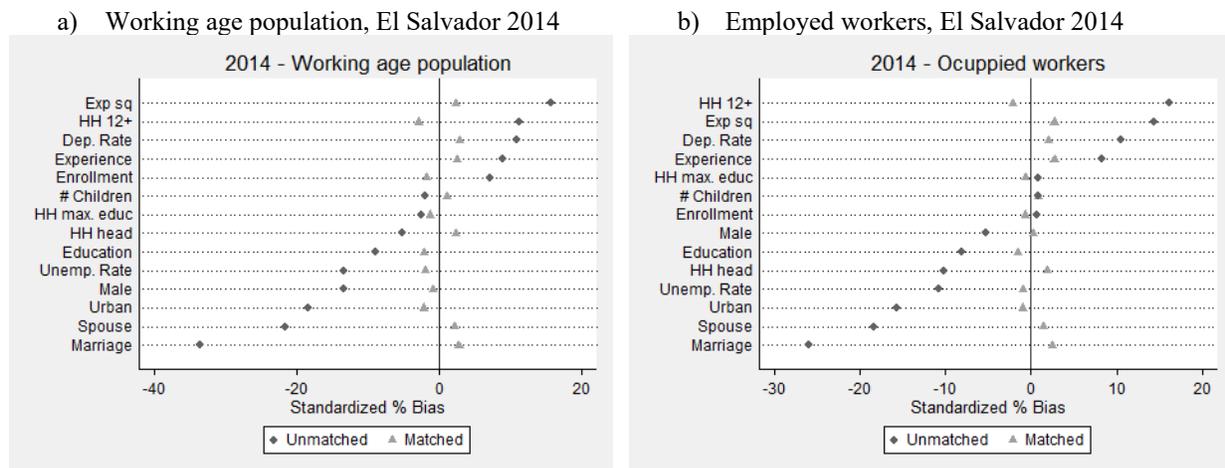
To ascertain the sensitivity of these results to selection bias, we estimate Rosenbaum bounds (Rosenbaum 2002; Caliendo and Kopeinig 2008). This approach allows us to estimate the sensitivity of the results to potential bias due to differences in unobservable characteristics between the treated and control groups. It does not, however, establish whether this bias exists. These are reported in the robustness section.

We focus on the years 2006 and 2014, the two most recent years where nationally representative household surveys are available for all three countries. These surveys are included in the SEDLAC database, a regional harmonization project that generates comparable statistics for 18 countries across Latin America and the Caribbean.¹⁹ A table of basic demographic characteristics for each sample is included in the Annex.

We perform a matching procedure based on standard logit models for the probability of being treated (i.e., receiving remittances) using radius matching.²⁰ To focus on the labor market implications, the sample is limited to individuals of working age – specifically those between the ages of 18 and 65. We match between treated and untreated individuals using individual characteristics (X_i), household characteristics (Z_h), and regional characteristics (R_r). X_i includes gender, years of schooling, potential work experience, school enrollment status and household position (head, spouse or other). Z_h includes the dependence ratio (based on the younger of members under 15 as share of working age adults under the age of 65); the number of members older than 12; number of children under age six; and the highest level of schooling completed by any adult in the household (as a proxy of wealth). Finally, R_r includes urban status and the local unemployment rate.

This exercise was done for a total of 12 data universes – one each per country and survey year, and for three adult samples (all working age adults, adults in the labor force, and employed adults). The different employment samples are necessary so as to consider different dimensions of the labor supply decision (participation, employment, type of employment, and hours worked). Once households receiving remittances are matched with their counterparts, we evaluate the effect of receiving remittances on labor participation, occupation status (extensive margin), and number of hours worked (intensive margin).

Figure 2. Differences between treatment and control groups, before and after matching



Source: Authors' tabulations using SEDLAC (CEDLAS and the World Bank).

¹⁹ Since SEDLAC does not include a comparable variable of remittances, this variable was constructed using the original household surveys and added to the SEDLAC data sets. This variable was based on the amount received either in the last month or the last three months, depending on the availability of data in each country.

²⁰ We specify a neighborhood of 0.01 percentage points, so as to improve balance properties of the sample.

Using two of the constructed matched samples as examples, Figure 2 illustrates the significant reduction in differences between the treated and control groups achieved through the matching exercise. It reports the standardized bias for each variable, before and after the matching exercise. Whereas the two samples vary significantly across characteristics prior to matching, propensity score matching results in samples with very low bias for each variable. Similarly, Table 2 reports the χ^2 statistic and corresponding p-values from a likelihood ratio test on the joint significance of all variables regressed on the propensity score. The results support the model used for each data universe at the 95 percent confidence level.

Table 2. Balance property test results of likelihood ratio test, by data universe

Universe		El Salvador		Guatemala		Honduras	
		2006	2014	2006	2014	2006	2014
Working age	LR chi2	21.60	15.42	19.69	4.56	13.94	1.66
	p>chi2	0.09	0.35	0.14	0.99	0.45	1.00
Labor force	LR chi2	2.19	5.00	6.69	1.12	5.81	0.48
	p>chi2	1.00	0.99	0.95	1.00	0.97	1.00
Employed	LR chi2	1.99	5.17	6.69	0.90	5.79	0.49
	p>chi2	1.00	0.98	0.95	1.00	0.97	1.00

Source: Authors' tabulations using SEDLAC (CEDLAS and the World Bank).

Findings

Remittances can impact different dimensions of labor supply: 1) the extensive margin – the extent to which remittances impact who is working, and 2) the intensive margin – the extent to which labor intensity is affected by remittances. In particular, for the extensive margin we look at the impact of remittances on entry into the labor force and unemployment among all adults, and *nini* status among youth. The intensive margin is assessed looking at informality, type of employment, and hours worked. The results are organized into two sections: the first considers the extensive margin of labor supply – participation and unemployment, while the second considers the intensive margin – employment outcomes.

Labor participation and unemployment

Among working age adults, remittances are associated with lower levels of labor force participation in all countries and for both years analyzed (Table 3). In line with other results in the literature, the reduction in labor force participation associated with remittances is more pronounced among women than men, though evidence of drops in male participation rates is evident for both years in Guatemala and El Salvador and in 2006 in Honduras. As suggested from Table 1, participation seems particularly affected by remittances in El Salvador. The difference in participation rates between recipients and non-recipients is largest among Salvadoran women (17.5 percentage points in 2006) and smallest among Honduran men in 2014 (1 percentage point, a difference not statistically different from 0). The results also suggest a change between 2006 and 2014 in how remittances affect participation in Honduras: while the negative effect on participation for men fell and lost statistical significance, the effect on women increased by 3 percentage points.

As discussed above, remittances are hypothesized to decrease labor supply by increasing the reservation wage. This could be reflected in increases in unemployment (as individuals use remittances to finance longer job searches) as well as decreases in participation (as discouraged workers who are unable to find work at their reservation wage stop searching). If remittances are used to finance more home production in a welfare-increasing reallocation, then we would expect to see no change in the likelihood of being unemployed along with a decrease in the participation rate as individuals exit the labor force and specialize

in household production. Table 3 shows statistically weak or insignificant relationships between remittances and unemployment. The combination of lower participation rates and no difference in unemployment among recipients suggests the latter motivation, a welfare increasing reallocation of household labor, may be playing a more important role in the Northern Triangle than would-be workers searching for higher wage jobs.

Table 3. Labor force participation and unemployment rates by gender, propensity score matching results

		El Salvador		Guatemala		Honduras	
		2006	2014	2006	2014	2006	2014
Labor force participation							
Men	Treated	0.757	0.781	0.903	0.858	0.838	0.858
	Control	0.819	0.831	0.936	0.894	0.880	0.872
	Diff (p.p.)	-0.062	-0.049	-0.033	-0.036	-0.042	-0.014
	Diff (%)	-0.076	-0.059	-0.035	-0.041	-0.048	-0.017
	t-stat	-7.48	-6.86	-4.44	-3.19	-6.23	-1.12
Women	Treated	0.382	0.403	0.462	0.392	0.445	0.463
	Control	0.558	0.537	0.523	0.468	0.506	0.555
	Diff (p.p.)	-0.175	-0.134	-0.061	-0.075	-0.062	-0.092
	Diff (%)	-0.315	-0.250	-0.116	-0.161	-0.122	-0.166
	t-stat	-21.010	-17.430	-5.390	-5.480	-7.780	-5.640
Unemployment							
Men	Treated	0.046	0.058	0.025	0.032	0.053	0.079
	Control	0.048	0.052	0.014	0.021	0.047	0.060
	Diff (p.p.)	-0.002	0.006	0.012	0.010	0.006	0.019
	Diff (%)	-0.033	0.106	0.852	0.482	0.136	0.312
	t-stat	-0.33	1.19	2.83	1.67	1.41	1.76
Women	Treated	0.032	0.041	0.016	0.038	0.057	0.086
	Control	0.026	0.037	0.015	0.021	0.051	0.083
	Diff (p.p.)	0.006	0.003	0.001	0.016	0.006	0.003
	Diff (%)	0.218	0.088	0.085	0.766	0.116	0.035
	t-stat	1.28	0.72	0.32	1.99	1.12	0.22

Source: Authors' tabulations using SEDLAC (CEDLAS and the World Bank).

Note: This table reports the labor force participation rate and unemployment rate of the treated group (those who received remittances) and the control group (similar individuals who did not receive remittances).

Youth in Latin America are vulnerable to unemployment and economic inactivity; research on the “*ninis*,” from the Spanish acronym for “not in school and not working”, finds high rates in the countries of the Northern Triangle (de Hoyos, Rogers, and Szekely 2016). Considering only those between the ages of 18 and 25, Table 4 reports the likelihood of being neither in school nor employed for youth who receive remittances compared to similar youth who did not, by gender. With the exception of Honduran women in 2006, youth who received remittances were statistically more likely to be *ninis* than similar youth who did not receive remittances. For women, the effect of receiving remittances on being a *nini* are in line with the results reported above for participation rates for all women. In 2014, young women in households that received remittances were 13 percent (Guatemala), 19 percent (Honduras) and 22 percent (El Salvador) more likely to be *ninis* than similar young women without remittances. For comparison, overall, adult women that same year were about 16 percent (Guatemala and Honduras) and 25 percent (El Salvador) less

likely to be in the labor force than similar women without remittances. While the rates of being a *nini* for men are not as high as for women, the percent difference in *nini* status associated with receiving remittances was higher for men than for women in each country in 2014. For men, remittances were associated with an increase in the likelihood of becoming a *nini* by about a third in Honduras and El Salvador and by two-thirds in Guatemala.

Table 4. *Nini* rates by gender

		El Salvador		Guatemala		Honduras	
		2006	2014	2006	2014	2006	2014
Men	Treated	0.188	0.204	0.077	0.125	0.122	0.171
	Control	0.153	0.150	0.045	0.074	0.098	0.130
	Diff (p.p.)	0.035	0.054	0.032	0.051	0.024	0.041
	Diff (%)	0.230	0.358	0.714	0.686	0.241	0.313
	t-stat	2.51	4.38	2.69	2.89	2.30	1.73
Women	Treated	0.492	0.503	0.522	0.546	0.429	0.514
	Control	0.363	0.411	0.445	0.481	0.414	0.431
	Diff (p.p.)	0.129	0.092	0.077	0.065	0.015	0.083
	Diff (%)	0.356	0.224	0.173	0.134	0.037	0.193
	t-stat	7.74	6.16	3.68	2.52	1.09	2.74

Source: Authors' tabulations using SEDLAC (CEDLAS and the World Bank).

Employment outcomes

The analysis shows that, conditional on being employed, individuals in El Salvador and Guatemala who live in households that receive remittances are more likely to have informal employment. Salvadorans and Guatemalans were 11 percent and 14 percent more likely, respectively, to be informal if they received remittances (Table 5). The analysis suggests that there is no statistically significant relationship between remittances and informality in Honduras. Looking at informality separately by gender reveals that the effect of remittances is larger for men than for women in El Salvador (15.7 percent and 6.5 percent in 2014). This was also the case in Guatemala in 2006, but the effect was about the same size for men and women in 2014 (13.7 percent and 14.6 percent, respectively).

Table 5 Informality rates by gender, propensity score matching results

		El Salvador		Guatemala		Honduras	
		2006	2014	2006	2014	2006	2014
Overall	Treated	0.598	0.652	0.729	0.705	0.525	0.555
	Control	0.538	0.585	0.637	0.618	0.507	0.542
	Diff (p.p.)	0.060	0.066	0.093	0.086	0.018	0.013
	Diff (%)	0.112	0.113	0.145	0.140	0.035	0.024
	t-stat	6.95	8.78	10.02	6.72	2.22	0.83
Men	Treated	0.556	0.627	0.673	0.651	0.483	0.508
	Control	0.482	0.542	0.571	0.573	0.488	0.516
	Diff (p.p.)	0.074	0.085	0.102	0.078	-0.004	-0.008
	Diff (%)	0.154	0.157	0.179	0.137	-0.009	-0.016
	t-stat	6.36	8.33	7.83	4.48	-0.41	-0.38
Women	Treated	0.650	0.685	0.793	0.780	0.572	0.619
	Control	0.607	0.643	0.724	0.680	0.536	0.575

Diff (p.p.)	0.043	0.042	0.069	0.099	0.036	0.044
Diff (%)	0.071	0.065	0.095	0.146	0.067	0.076
t-stat	3.36	3.71	5.04	5.12	3.03	1.81

Source: Authors' tabulations using SEDLAC (CEDLAS and the World Bank).

Could remittances be associated with more job creation by financing self-employment and entrepreneurship? In El Salvador and Guatemala, remittances are associated with increased likelihood of self-employment (Table 6). In 2014, self-employment rates were 25.7 percent (from 28.7 percent to 36.1 percent) higher for those who received remittances relative to those who did not in El Salvador, and 40.9 percent higher in Guatemala. As in the analysis on informality, there is no evidence of a relationship between self-employment and remittances in Honduras. The likelihood of being an employer was higher for individuals who received remittances in El Salvador and Honduras than those who did not receive remittances. The share of working individuals who report being an employer among remittance receivers was 2.4 (El Salvador) and 3.6 (Honduras) percentage points higher than the control group. This is the equivalent of more than doubling the propensity to be an employer in El Salvador. No statistical relationship is found between remittances and employer status in Guatemala.

Table 6. Self-employment and employer rates, propensity score matching results

		El Salvador		Guatemala		Honduras	
		2006	2014	2006	2014	2006	2014
Self-employed	Treated	0.348	0.361	0.419	0.377	0.306	0.309
	Control	0.286	0.287	0.335	0.267	0.293	0.293
	Diff	0.062	0.074	0.084	0.109	0.014	0.016
	Diff (%)	0.219	0.257	0.251	0.409	0.046	0.056
	t-stat	7.55	9.89	8.40	8.12	1.86	1.10
Employer	Treated	0.062	0.060	0.039	0.034	0.125	0.140
	Control	0.043	0.035	0.038	0.024	0.106	0.104
	Diff	0.020	0.024	0.001	0.009	0.019	0.036
	Diff (%)	0.460	0.690	0.026	0.389	0.182	0.350
	t-stat	4.80	6.79	0.25	1.89	3.71	3.30

Source: Authors' tabulations using SEDLAC (CEDLAS and the World Bank).

One interpretation of these results is that remittances encourage small enterprises, either via self-employment or through employer status, at the expense of employment in larger firms. Under this interpretation, remittances could be supporting lower productivity employment at the expense of employment in larger and presumably more productive firms. On the other hand, if there is insufficient demand from larger firms, remittances could be generating employment opportunities for individuals who are unable to secure better employment. In addition, if remittances reduce credit constraints of small business owners, they could lead to higher earnings for self-employed and employers. One check to see if remittances are encouraging lower productivity employment is to check for wage differentials between individuals who receive remittances and those who do not. This analysis was done for all employed workers, as well as for the self-employed and employers separately. The results do not reveal any statistically significant difference in average wage between individuals who receive remittances and those who do not (Annex Table A2). That is, there is no evidence that remittances are associated with lower productivity employment nor with higher earnings for small business owners.

Sensitivity analysis

As noted above, the methodology of propensity score matching does not fully correct for unobserved differences between the treated and control groups. While it is not possible to directly test for selection bias based on unobservables, it is possible to ascertain how sensitive the results reported above are to potential selection on unobservables by estimating Rosenbaum bounds (Rosenbaum 2002; Becker and Caliendo 2007; Caliendo and Kopeinig 2008). The underlying logic of this robustness check is that selection on unobservables implies that some individuals are more likely to receive remittances than others who have otherwise similar observable characteristics. Rosenbaum bounds report how strongly an unobservable characteristic must influence the selection into the treatment group such that the difference in outcome between the treated and control group is explained by nonrandom assignment.

Table 7 reports how much higher the odds of treatment must be among the treated to explain the statistical differences seen in the results above. The test was conducted for odds ratio equal to 1 (no selection bias) through 2 (double the odds of treatment) following the standards in the literature. Higher values mean that the difference between treated and control groups are more robust. Values closer to 1 are more sensitive to selection bias.

Table 7. Rosenbaum Bounds: Critical values of odds ratio of receiving treatment

	El Salvador		Guatemala		Honduras	
	2006	2014	2006	2014	2006	2014
Labor force participation						
Men	1.90	1.80	1.95	1.90	1.90	1.30
Women	1.75	1.60	1.00	1.10	1.00	1.15
Youth inactivity						
Men	1.05	1.25	1.40	1.45	1.15	1.05
Women	1.05	No Sig	No Sig	No Sig	1.10	No Sig
Informality						
Men	1.30	1.55	1.40	1.30	1.05	No Sig
Women	1.00	1.10	1.20	1.25	No Sig	No Sig
Self-employed						
All	1.20	1.35	1.40	1.50	No Sig	No Sig
Employer						
All	1.30	1.40	No Sig	No Sig	No Sig	1.05

Source: Authors' tabulations using SEDLAC (CEDLAS and the World Bank).

Note: This table reports the results of Rosenbaum bounds test using the Mantel and Haenszel test statistic. The table reports the minimum value of gamma (odds ratio at which the treated group is more likely to be treated) for which the treatment effect could be explained by differences in selection rather than due to treatment. "No Sig" means the treatment effect is not statistically significant.

The values reported in Table 7 show that some of the results of the propensity score matching exercise are highly sensitive to selection bias. This includes the impact of remittances on female labor force participation in Guatemala and Honduras as well as female youth inactivity in all three countries. On the other hand, the results are robust for male participation (especially in El Salvador and Guatemala and Honduras 2006), male youth inactivity in Guatemala, and the negative impact on female labor force participation in El Salvador.

Among employment outcomes, the results for male informality are more robust than those for female informality in El Salvador and Guatemala. The propensity score matching results did not show differences in informality for men in Honduras and only small differences for women in 2014, which the Rosenbaum bounds show are not robust. The treatment effect of remittances on self-employment is more robust in Guatemala than in El Salvador, and, in line with the propensity score matching results, is not significant in Honduras. The effect on employer status is insignificant or highly sensitive to selection in Guatemala and Honduras. This exercise shows that some of the results of the matching exercise could be sensitive to the presence of selection bias, but it does not establish whether there is selection bias.

Conclusion

Remittances can play a positive role in development. Evidence shows that they reduce poverty and are contributing to more human capital in the region by increasing spending on education and nutrition (Scott and Soler 2018; Oliveri, Scott and Sousa 2018). Yet, when it comes to their effect on local labor markets and employment outcomes, the evidence from the literature suggests that remittances have a small yet negative impact on labor supply.

Selection bias is a significant factor to consider in all research on migration and remittances. Propensity score matching does not fully address selection bias, but it attenuates its effects by comparing individuals who receive remittances with similar individuals who do not receive remittances. While we are unable to ascertain the extent to which selection bias is an issue in the analysis of the effect of remittances on labor supply in these three countries, the combination of propensity score matching and Rosenbaum bounds, which test for robustness to selection bias, allows us to identify some robust causal relationships in this analysis.

The results show that there is robust evidence supporting the hypothesis that remittances are associated with changes in the labor supply decisions of those who receive them. In particular, the results indicate that remittances decrease the labor participation rates of women in El Salvador by about 25 percent relative to similar women who did not receive remittances. Remittances decrease participation rates for men in El Salvador (6 percent) and Guatemala (4 percent). The only result that is robust for Honduras is a negative effect on male labor participation in 2006. Remittances also increase the likelihood that young Guatemalan men are neither employed nor in school. Other results from propensity score matching for participation and *nini* status are less robust to potential selection bias. For example, while remittances are associated with lower female participation rates in Guatemala and Honduras, this could be explained by non-random selection.

Remittances are not associated with increased unemployment in any of the three countries, suggesting that they are not being used to finance longer job searches. Rather, they are likely used to purchase more time for home production and leisure. In the absence of affordable child or elder care options, remittances may be allowing families to increase their welfare even while reducing labor income. This is aligned with the larger impact of remittances on women's labor supply, as household tasks and care work in the region are typically seen as the responsibility of the women in the household.

The results also show that remittances can affect employment outcomes. In particular, remittances increase the likelihood of men working in the informal sector in El Salvador (in 2016) and in Guatemala. They increase self-employment rates, a finding particularly robust for Guatemalans and less so for Salvadorans, and employer rates for Salvadorans. No distinction in informality is found between those who receive and do not receive remittances in Honduras. This effect of remittances on small businesses (both through self-employment and employer status) suggests that they may be financing small and family enterprises in some

cases. Since earnings are not different for those who receive remittances and those who do not, the evidence does not indicate that these small enterprises are any more or less productive than those not supported by remittances.

In this study, we use propensity score matching to estimate the effect of remittances on labor supply in El Salvador, Guatemala, and Honduras. While some of the results suggest that remittances dampen labor supply in El Salvador and, to a lesser extent, Guatemala, it is important to note that these countries have weak labor demand as evidenced by high levels of underemployment and informality. In this context, remittances may be supporting a welfare increasing reallocation of household labor that, while potentially reducing social welfare of the country, is nonetheless increasing individual welfare. At the same time, they may also be supporting some jobs in El Salvador and Guatemala through increased likelihood of self-employment or employer status.

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Annex

Table A.1. Sample characteristics

Variables	Guatemala		Honduras		El Salvador	
	2006	2014	2006	2014	2006	2014
Individual						
Received remittances (%)	15.2	9.1	18.4	15.9	24.0	21.6
Male (%)	45.8	46.9	45.0	45.4	44.4	45.7
Potential experience	24.8	23.8	22.8	22.2	23.6	23.0
Enrolled in school (%)	6.5	6.3	10.4	9.5	6.9	7.1
Household head (%)	37.6	35.2	36.7	36.9	38.6	38.0
Spouse (%)	29.8	28.3	26.5	25.6	26.0	25.5
Married (%)	68.9	64.7	59.8	58.2	55.2	55.4
Years of education	4.6	5.5	6.4	7.2	6.6	7.4
Household						
Dependence ratio	0.39	0.34	0.36	0.32	0.33	0.29
Highest education level	7.3	8.5	8.8	9.7	9.4	10.2
Number of children (<6 years old)	0.9	0.7	0.7	0.6	0.6	0.5
Household members older than 12	4.0	4.2	3.9	3.8	3.7	3.7
Region						
Urban (%)	42.6	44.9	57.0	56.5	52.2	54.4
Local unemployment rate (%)	1.2	1.6	4.0	6.0	3.1	3.9
Population weighted						
Variables	Guatemala		Honduras		El Salvador	
	2006	2014	2006	2014	2006	2014
Individual						
Received remittances (%)	15.5	8.2	18.2	16.7	22.6	18.7
Male (%)	45.1	46.9	45.3	45.4	43.9	45.5
Potential experience	24.2	23.4	23.3	22.4	23.0	22.5
Enrolled in school (%)	7.8	6.9	9.5	9.3	7.4	8.2
Household head (%)	38.1	35.0	36.8	36.8	39.2	38.0
Spouse (%)	29.3	27.9	27.0	25.5	25.7	25.3
Married (%)	67.7	63.9	60.6	57.9	54.6	54.7
Years of education	5.2	5.8	6.0	7.2	7.2	8.1
Household						
Dependence ratio	0.38	0.33	0.36	0.32	0.32	0.28
Highest education level	7.9	8.7	8.4	9.8	9.9	10.8
Number of children (<6 years old)	0.9	0.7	0.7	0.6	0.5	0.4
Household members older than 12	4.0	4.2	3.9	3.8	3.6	3.6
Region						
Urban (%)	53.4	53.3	49.7	55.9	62.9	65.1
Local unemployment rate (%)	1.6	1.9	3.7	5.8	3.4	4.1
Observations	31,683	28,213	48,180	12,713	34,834	45,893

Source: Authors' tabulations using SEDLAC (CEDLAS and the World Bank). Potential experience is measured as (age-years of schooling-6).

Table A.2. Wages, propensity score matching results

		El Salvador		Guatemala		Honduras	
		2006	2014	2006	2014	2006	2014
Employer	Treated	0.773	0.958	3.013	2.705	3.274	3.528
	Control	0.772	0.942	2.953	3.005	3.261	3.260
	Diff	0.001	0.016	0.058	-0.300	0.012	0.269
	t-stat	0.010	0.200	0.430	-1.020	0.150	1.070
Self-employed	Treated	0.591	0.661	1.908	2.106	2.865	3.052
	Control	0.580	0.620	1.887	2.116	2.783	3.134
	Diff	0.011	0.042	0.021	-0.009	0.083	-0.082
	t-stat	0.520	2.170	0.360	-0.120	0.560	-0.890

Source: Authors' tabulations using SEDLAC (CEDLAS and the World Bank)



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