# REMITTANCES, MIGRATION, AND POVERTY.

## A STUDY FOR MEXICO AND CENTRAL AMERICA[1]

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> No one leaves home unless
> home is the mouth of a shark
> you only run for the border
> when you see the whole city running as well
> your neighbors running faster than you
> breath bloody in their throats
> the boy you went to school with
> who kissed you dizzy behind the old tin factory
> is holding a gun bigger than his body
> you only leave home
> when home won't let you stay.
> W. Shire, *Home* (2021).

**ABSTRACT**

In the last two decades, remittances have acquired great importance as a source of external income for various developing economies. In the particular case of Latin America, the United States represents the most important destination, with 62.1 million Latinos living there according to U.S. Census Bureau. This paper analyses the effect that migration and remittances have on poverty in Mexico and Central America. The results show that a 10% increase in migration to the United States (as a percentage of the population in the destination country) translates into an 8.6% reduction in the population living on less than US$ 1.90 a day, while the poverty gap is reduced by 12.8%. With regard to remittances, a reduction of 6.7% is observed in the poor population and 10% in relation to the poverty gap.

**Keywords:** Worker remittances, poverty, international migration, instrumental variables.

**JEL Classification:** C36, F22, F24, I32.

## REMESAS, MIGRACIÓN Y POBREZA.
## UN ESTUDIO PARA MÉXICO Y CENTROAMÉRICA

**RESUMEN**

Recientemente, las remesas han adquirido gran importancia como fuente de ingresos externos de diversas economías en desarrollo. En el caso particular de América Latina, Estados Unidos representa el destino más importante, con 62.1 millones de latinos viviendo en ese país según el U.S. Census Bureau. El presente trabajo analiza el efecto que tienen la migración y el envío de remesas en la pobreza de México y Centroamérica. Los resultados muestran que un incremento del 10% en la migración hacia Estados Unidos (como porcentaje de la población en el país de destino) se traduce en una reducción de 8.6% de la población que vive con menos de US$ 1.90 al día; mientras que la brecha de pobreza se reduce en 12.8%. Con relación al envío de remesas, se observa una reducción de 6.7% en la población pobre y de 10% respecto a la brecha de pobreza.

**Palabras clave**: remesas de trabajadores, pobreza, migración internacional, variables instrumentales.

**Clasificación JEL:** C36, F22, F24, I32.

# 1. INTRODUCTION

Migration and its counterpart, remittances, are probably some of the most human topics in economic science where many questions remain to be solved. Despite the efforts and advances in the study of migration and remittances, it is still necessary to know the dynamics of migration in order to understand the link that exists between this population group and the evolution of the remittances they send to their families in the country of origin to be able to analyse the effect on poverty (Banerjee and Duflo, 2019). Therefore, this study aims to discuss the effect of migration and remittances on poverty in the origin country. In this sense, the analysis is twofold: We first compute the effect of migration on poverty and then the impact of remittances on poverty.

The remittances that Mexico and Central America receive from abroad increase the living standards of recipient households and reduce poverty in the recipient country (World Bank, 2019). In fact, remittances measured in relation to Gross Domestic Product (GDP) reach very high percentages in economies with lower per capita income. However, the contribution of remittances is often ignored when measuring poverty.

In Mexico, during the 1990s, financial flows from the United States by way of remittances from Mexican workers living in that country increased rapidly. The flow from Mexico to the United States was the main migratory corridor in 2020, representing 3.9% of global migration (Fundación BBVA Bancomer-CONAPO, 2020). The Bank of Mexico reported that in 2020 Mexico received US$ 40,606 million in remittances, of which 95.4% came from the United States.

Central America, meanwhile, is an important regional source of migrants. In 2018, this region received more than US$ 22,000 million in remittances. These resources are very important in El Salvador, where they are equivalent to 21.4% of GDP; in Honduras they amount to 20.0% of GDP, in Guatemala 12.0% and in Nicaragua 11.3%. In recent decades, two major stages of Central American emigration can be distinguished. One of them is associated with political conflicts and civil wars in different countries, exacerbated in the 1980s, and which caused an increase in emigrants from El Salvador, Nicaragua and Guatemala. The second is explained by the economic conditions, the search for better opportunities and the increase in violence, all of which have been increasingly

*Margin notes:*

efecto ambivalente

cuando los políticos dicen que hay un crecimiento en el PIB y realmente no hay en el percapita

Esta cantidad de remesas representó el \(3.8\%\) del PIB de México en \(2020\).

noticeable since the beginning of the 21st century, leading to a growth of emigrants from Guatemala, El Salvador and Honduras (Fundación BBVA Bancomer-CONAPO, 2019).

The paper is organized as follows: In addition to this introduction, the second section reviews the relevant literature on the subject; the third section presents the database and the fourth one the methodology used for indicators of poverty, remittances and migration; in the fifth section, the relevant empirical results are shown. In section sixth some additional robustness tests are presented and the last section presents the conclusions that arise from the analysis carried out.

## 2. LITERATURE REVIEW

There is specialised literature on the relationship between remittances and poverty that has addressed this issue[2], For example, Adams and Page (2005) analyse the effect of remittances in a sample of 71 developing countries. Their conclusions show that a 10% increase in remittances per capita would reduce the proportion of people living below the poverty line by 3.5%. Fajnzylber and López (2008) find that remittances have a positive effect on reducing poverty; they explain that for every 1% increase in the proportion of remittances to GDP, the segment of the population living in poverty would decrease by 0.4%. However, they clarify that the impact of remittances on poverty varies across countries depending on their general level of development. Gosh (2006) states that although there is a minority of poor recipients, most of the migrants do not come from poor households, if there is a link between remittances and poverty reduction it would be indirect and would be a spillover of the remittances received by the families of these migrants.

While there have been case studies for Central America, however, these are still in short supply. Among the relevant research, we highlight

IMPORTANTE

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[2]  Another aspect of remittances dealt with in the literature is their impact on economic activity through the so-called "Dutch disease" (see Lartey, Mandelman, and Acosta, 2012; Ratha, 2013; Solís Tepexpa and Muñoz González, 2019, for Mexico and Central America). Palley (2021) has put forth important criticisms debunking the Dutch disease hypothesis and showing its weaknesses for macroeconomic analysis. However, this topic is beyond the scope of the present study.

the work of Vacaflores (2018), he considers 18 Latin American countries and analyses the effectiveness of international remittances in reducing poverty and inequality, finding that increases in remittances have a negative and statistically significant impact on overall poverty and inequality. Sana and Massey (2005) find that in Mexico, the Dominican Republic, Nicaragua and Costa Rica remittances seem to be associated with the traditional patriarchal family, whereas in the Dominican Republic they are associated with the matriarchal family. The receipt of remittances is positively associated with the degree of development of Mexican households, but the association is negative in the Dominican Republic

In El Salvador, Gammage (2006) points out that remittances mitigate poverty and create expansion opportunities for the financial market that have benefited the rich as well as some of the poor. Gindling (2009) finds little evidence to support the hypothesis that Nicaraguan migration to Costa Rica was an important factor that contributed to the fall in income, the increase in inequality or the stagnation of poverty. In a study for Nicaragua, Hobbs and Jameson (2012) examine the impact of migrant remittances on poverty and income distribution in Nicaragua and identify that the poorest migrants mainly migrate to Costa Rica, which results in higher per capita household consumption for poor households, whereas richer migrants favour the United States.

## 3. DATA

Based on world development indicators from the World Bank, Table 1 presents the main variables used in this study[3]. In the case of distance measurement, information was obtained from Google Maps using the code *gmapsdistance*[4]; the distance between the capital city of each of the Central American countries and Mexico with respect to California was calculated. We consider California as a connection point to the United States since it is close to the main border crossing points from Mexico (Emif, 2020).

Regarding poverty measurements, we used three indicators. Firstly, the poverty ratio, which measures the percentage of the population

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[3]  See footnote to Table 1 for more information on the period used for each country.
[4]  For more information see: <https://github.com/rodazuero/gmapsdistance>.

that lives on at least US$ 1.90, or $ 3.20 or $ 5.50 per day. In general, between 1981 and 2017 12.2% of the population (21 million people) of Mexico and Central America lived on at least US$ 1.90 per day, the countries with the highest poverty ratios being Honduras (23.6%) and Guatemala (21.2%). This characteristic is accentuated when we use the other poverty lines.

Secondly, we used the poverty gap for the same poverty lines as the previous indicator, in order to analyse the depth of poverty in the region. This index allows us to analyse the population's income deficit to reach the minimum poverty line required. Thus, for example, a value of 5.3 such as that observed for the average of the region indicates that it would be necessary to increase US$ 0.10 for each individual on a daily basis to reach the poverty line of US$ 1.90 per day or transfer US$ 17.4 million to the poor in the region. Thirdly, we use the squared poverty gap which measures the severity of poverty. This is calculated as the average of the squared poverty gap and allows us to consider a person's distance from the poverty line.

With regards migration, we used the number of migrants in the United States with respect to the total population of each country. In general, for the period under study and according to World Bank data, 7% of the population of Mexico and Central America reside in the United States. It is important to mention that this study only considers those migrants from Central America who arrive in the United States and not the migration that occurs to Mexico; in this sense, the results found can be interpreted as a lower bound of migration between the countries under study.

Regarding the explanatory variables used in the model, we considered both GDP per capita and average income per capita as possible explanatory variables of poverty. Following Adams and Page (2005), countries with higher GDP growth rates are expected to have lower levels of poverty. Although GDP per capita as an indicator is too aggregated to explain the reasons why some countries are poorer than others, and it does not refer to inequality of the distribution of the country's income, it can give indications of the effects of macroeconomic policies on poverty. We also considered the average income per capita, which was calculated at household level and makes it possible to have a better approximation of the effects of household income on poverty.

**Table 1. Descriptive statistics**

|  | All | Costa Rica |  |
|---|---|---|---|
| **Poverty headcount ratio (% of population, 2011 Purchasing Power Parity (PPP)** |  |  |  |
| US$ 1.90 per day | 12.2 | 5.7 |  |
| US$ 3.20 per day | 23.3 | 11.8 |  |
| US$ 5.50 per day | 41.7 | 26.2 |  |
| **Poverty gap (2011 PPP)** |  |  |  |
| US$ 1.90 per day | 5.3 | 2.7 |  |
| US$ 3.20 per day | 10.4 | 5.1 |  |
| US$ 5.50 per day | 19.7 | 10.8 |  |
| **Squared poverty gap (US$ 1.90 per day, 2011 PPP)** | 3.3 | 1.9 |  |
| **Migration to USA (% of population)** | 6.9 | 1.9 |  |
| **Yearly remittances per capita (US$, 2011 PPP)** | 396.8 | 136.0 |  |
| **GDP per capita (US$, 2011 PPP)** | 8,616.2 | 11,261.0 |  |
| **Average monthly income per capita ($, 2011 PPP)** | 353.4 | 472.4 |  |
| **Gini index** | 50.96 | 47.52 |  |
| **Domestic credit provided by financial sector (% of GDP)** | 49.6 | 41.9 |  |
| **Rural labor (% of total employment)** | 24.6 | 14.1 |  |
| **Distance to USA (miles)** | 2,950.7 | 3,398.4 |  |
| **Population (thousands)** | 172,751 | 4,950 |  |
| **Observations** | 134 | 31 |  |

Note: Authors' calculations, using the *World Development Indicators* of the World Bank. Distance to the USA computes the distance between the capital city of each country and California. Costa Rica covers the years: 1981, 1986, and 1989-2017; El Salvador: 1989, 1991, 1995, 1996, and 1998-2017; Guatemala: 1986, 1989, 1998, 2000, 2006, and 2014;

| | El Salvador | Guatemala | Honduras | Mexico | Nicaragua | Panama |
|---|---|---|---|---|---|---|
| | | | | | | |
| | 9.5 | 21.2 | 23.6 | 7.7 | 16.0 | 9.5 |
| | 21.1 | 36.9 | 40.7 | 18.8 | 33.8 | 17.0 |
| | 43.4 | 57.4 | 61.4 | 39.9 | 57.5 | 30.1 |
| | | | | | | |
| | 4.1 | 9.3 | 9.9 | 2.8 | 6.5 | 4.9 |
| | 8.6 | 17.5 | 19.1 | 6.9 | 13.9 | 8.3 |
| | 18.6 | 30.2 | 32.9 | 16.4 | 27.5 | 14.7 |
| | 2.7 | 5.5 | 5.7 | 1.5 | 3.9 | 3.5 |
| | 18.1 | 4.8 | 5.6 | 9.8 | 4.1 | 3.5 |
| | 980.6 | 479.9 | 446.4 | 292.6 | 294.3 | 140.4 |
| | 5,928.8 | 6,311.7 | 3,649.9 | 15,857.4 | 3,734.9 | 13,569.5 |
| | 277.8 | 249.0 | 220.0 | 334.1 | 227.2 | 501.7 |
| | 46.87 | 55.00 | 54.69 | 51.00 | 50.60 | 54.20 |
| | 48.9 | 33.4 | 37.4 | 39.4 | 77.2 | 68.7 |
| | 21.9 | 34.9 | 35.1 | 17.4 | 30.7 | 17.9 |
| | 2,812.7 | 2,704.0 | 2,942.5 | 1,809.8 | 3,135.9 | 3,851.3 |
| | 6,388 | 16,715 | 9,429 | 124,777 | 6,385 | 4,107 |
| | 24 | 6 | 28 | 15 | 6 | 24 |

Honduras: 1989, 1990-1999, and 2001-2017; Mexico: 1989, 1992, 1994, 1996, 1998, 2000, 2002, 2004-2006, 2008, 2010, 2012, 2014, and 2016; Nicaragua: 1993, 1998, 2001, 2005, 2009, and 2014; and Panama: 1989, 1991, 1995, and 1997-2017. Data shows the annual average for each country. Population presents the last value registered in the sample.

The Gini index was also considered as an explanatory variable of poverty. Cornia (2004), shows that high levels of inequality lead to a lower impact of economic growth on the reduction of poverty[5]. Similarly, domestic credit provided by the financial sector was considered as an indicator of restrictions on access to the market and to the creation of new companies. As shown by Arestis and Caner (2005) and Kirkpatrick, Sirageldin, and Aftab (2000), as restrictions on the market and the creation of companies increase the effect on poverty will be greater. Finally, we considered the percentage of the population that works in the rural sector, since it is the area in Latin America that still has the largest number of poor people (López and Valdés, 2000; Duncan, 1992).

## 4. METHODOLOGY

In order to analyse the relationship between poverty considering remittances and migration, we followed the model proposed by Ravallion (1997), Ravallion and Chen (1997) and Adams and Page (2005), who formulate the equation:

$$\log Y_{it} = \alpha + \gamma_i + \beta \log X_{it} + \theta W_{it} + \mu_{it} \qquad [1]$$

where $Y_{it}$ is one of the poverty indicators mentioned in the previous section for each country $i$ in the year $t$; $\gamma_i$ are country fixed effects; $X_{it}$ represents remittances per capita (in the first regression model) or the percentage of migrants in the United States with respect to the population of each country (in the second estimated model); $W_{it}$ is a set of explanatory variables such as GDP per capita (or monthly income per person), Gini index, percentage of the population that works in rural activities, and domestic credit provided by the financial system (as a percentage of GDP); finally, $\mu_{it}$ represents an error term.

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[5] We consider the Gini index since most of the countries in the sample have standardized information on this variable. Although these measures may be affected by the lack of information at the extremes of the income distribution (see Campos-Vázquez, Chávez, and Esquivel, 2018), and the inequality could be larger than the computed one, we consider that our findings may be reinforced with better indicators.

It is important to mention that the estimation of equation [1] may be biased as long as the causality between the dependent and independent variables is not unidirectional. In other words, changes in remittances, as well as in migration, may have implications for poverty, just as poverty can have an effect on the behavioural profile of people who decide to migrate and, therefore, on remittances[6]. Failure to take these characteristics into account would lead to biased estimators. Similarly, Acosta et al. (2006) mention, as a possible additional problem, that remittances can affect poverty through changes in income or inequality.

Given this, authors such as Karemera, Oguledo, and Davis (2000), Vogler and Rotte (2000), Hanson and Woodruff (2003), Adams and Page (2005), Hanson (2005), Amuedo-Dorantes and Pozo (2006), Acosta et al. (2006) and Acosta (2006) consider the application of instrumental variables as a way to recover the causal effect of migration. The use of this method requires an instrument that mainly meets the relevance and exclusion conditions. The relevance condition for the instrument indicates that it must be related to the explanatory variable that causes endogeneity; that is to say, $Cov(X,Z \mid W) \neq 0$ while the exclusion condition is related to the independence of the instrument with those unobservable factors that affect the dependent variable; that is, $Cov(Z,\mu \mid W) = 0$. It is important to mention that, while the relevance conditions for the instrument are possible to prove (Bound, Jaeger, and Baker, 1995; Stock and Yogo, 2005), the exclusion conditions are not, so it is important to have the necessary evidence to guarantee the exogeneity of the proposed instrument in order to avoid the problem of weak instruments.

The literature on the subject mainly proposes the use of instruments such as: Access to Automated Teller Machines (ATMs) [Amuedo-Dorantes and Pozo, 2006], migrant population in the destination country (Vogler and Rotte, 2000; Hanson and Woodruff, 2003; Hildebrandt and McKenzie, 2005; McKenzie, 2005; Acosta, 2006; Acosta et al., 2006) and distances to the destination country (Karemera, Oguledo, and Davis,

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[6] For example, it is possible that as a country reduces its poverty indicators, the number of people who decide to migrate will be less, since the country of origin presents better conditions for the development and well-being of its inhabitants.

2000; Adams and Page, 2005, Lopez Cordoba, 2005). For each of the proposed instruments, it is possible to think that the population's accessibility to them encourages migration. In this sense and following Karemera, Oguledo, and Davis (2000) and Adams and Page (2005), we used the distance to the United States as an instrumental variable to determine the causal effect of migration and remittances on poverty in Mexico and Central America. In this regard, as Vogler and Rotte (2000) mention, since the proposed instrument does not vary with time but only between countries, we used the interaction of this variable with time in order to add variation to it.

## 5. RESULTS

Table 2 presents the Ordinary Least Squares (OLS) results of equation [1] using a pooled model. Panel A shows the effect of migration (expressed in logarithms and as a percentage of the population of each country) on different indicators of poverty (in logarithms). In all cases, the covariates indicated in the previous section were incorporated. In the case of the poverty indicator, a 10% increase in the participation of the migrant population in the region reduces the percentage of people living on less than US$ 1.90 per day by 2%, while for the poverty line of US$ 3.20 per day, the reduction is 0.8%. However, these results are not significant. Similarly, with respect to the poverty gap and squared poverty gap, we observed negative effects in all the poverty lines, but they are not significant.

Panel B shows the effect of remittances (expressed in logarithms and as a percentage of the population of each country) on poverty. In the case of the poverty ratio, column 2 shows that a 10% increase in remittances per capita translates into a 1.2% reduction in the percentage of people who receive less than US$ 1.90 a day. For the poverty lines US$ 3.20 and US$ 5.50, the values are –0.6% and –0.1%, respectively. However, in all cases the values are not significant. We found similar results for both the poverty gap and squared poverty gap. Although the values presented in this table do not indicate any relationship between migration and remittances with poverty, we consider that these results should be taken with caution in the presence of unobservable factors that may bias our results. In that sense, Table 3 seeks to correct this problem.

**Table 2. OLS results**

| | Poverty headcount ratio (% of population, 2011 PPP) | | | Poverty gap (2011 PPP) | | | Squared poverty gap |
|---|---|---|---|---|---|---|---|
| | US$ 1.90 | US$ 3.20 | US$ 5.50 | US$ 1.90 | US$ 3.20 | US$ 5.50 | |
| Panel A | | | | | | | |
| Migration | −0.198 | −0.083 | 0.000 | −0.308 | −0.164 | −0.064 | −0.412 |
| | (0.129) | (0.071) | (0.044) | (0.197) | (0.111) | (0.062) | (0.254) |
| N | 134 | 134 | 134 | 134 | 134 | 134 | 134 |
| Adjusted R-squared | 0.756 | 0.847 | 0.895 | 0.668 | 0.781 | 0.865 | 0.604 |
| F-statistic | 46.06 | 117.5 | 433.8 | 84.47 | 49.25 | 91.13 | 41.86 |
| Panel B | | | | | | | |
| Remittances | −0.116 | −0.056 | −0.012 | −0.193 | −0.107 | −0.049 | −0.263 |
| | (0.085) | (0.052) | (0.031) | (0.129) | (0.076) | (0.044) | (0.172) |
| N | 134 | 134 | 134 | 134 | 134 | 134 | 134 |
| Adjusted R-squared | 0.749 | 0.847 | 0.896 | 0.662 | 0.778 | 0.866 | 0.597 |
| F-statistic | 5,260 | 681.9 | 126.9 | 145.4 | 661.1 | 1,579 | 76.07 |

Note: Authors' calculations, using the World Development Indicators of the World Bank. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All variables are computed in logs. Migration refers to the percentage of migrants in the USA as a proportion of the population in the origin country. Remittances refer to per capita official remittances. Dependent variable in US$ per day. Calculations include the following variables: Gini index, average monthly income per capita, domestic credit provided by the financial sector (% of GDP), rural labor (% of total employment), and country fixed effects.

Table 3 presents the results of the model using instrumental variables[7]. It is interesting to note that in both the estimates of the effects of migration (panel A) and the case of remittances (panel B), the proposed instrument is significant, and the F test of weak instruments is above the values proposed by Bound, Jaeger, and Baker (1995) and Stock and Yogo (2005).

In the case of migration (panel A), we observed that the effects are negative and significant in all poverty indicators, with the magnitude of poverty reduction being greater than that observed in the OLS estimate. In relation to the poverty ratio, when US$ 1.90 per day is used as the poverty line (column 2), an increase of 10% in the percentage of the migrant population translates into a reduction in poverty of 8.6%; that is, the population in the region that lives on less than US$ 1.90 a day is reduced by 1.8 million. In the case of the poverty lines of US$ 3.20 and US$ 5.50, poverty is reduced by 1.8 and 1.3 million people, respectively. Similar results are found with the poverty gap indicator (columns 5 to 7), where as the poverty line increases, the impact of migration on the poverty gap is reduced.

Finally, the squared poverty gap indicator shows a reduction of 16.2%, which translates into a reduction of US$ 1.7 million needed to get out of poverty. These results are higher than those found by Adams and Page (2005) for the general case of developing countries. Although they only use US$ 1.08 per day as the poverty line, their results indicate a reduction in both the poverty ratio (–3.4%) and the poverty gap (–2.3%), while, in the case of the squared poverty gap indicator, the result is negative (–0.6%) but not significant. A possible explanation for the difference in magnitudes between the two estimates is the greater importance that migration plays in Mexico and Central America as a mechanism for reducing poverty.

Panel B shows the effect of remittances on poverty in the region. As in the case of migration, the results are negative and significant, and of greater magnitude than those found by OLS. Thus, in the case of the poverty ratio, for the poverty line of US$ 1.90 per day a 10% increase

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[7] For complete details of the results presented in this section, see Tables A1 to A4 of the online Appendix.

in remittances as a percentage of the population reduces the number of poor people by 6.7% (1.4 million people). These results are in line with those found by Acosta *et al.* (2008), who observe that an increase of 10% in remittances (as a percentage of GDP) reduces the poverty ratio between 3% and 4%.

Similarly, the poverty gap indicator and the squared poverty gap show negative and significant effects. In the case of the poverty line of US$ 1.90 per day, a 10% increase in remittances per capita reduces the poverty gap by 10%; in other words, the transfer necessary to reach the poverty line is reduced by US$ 1.7 million. Finally, using the squared poverty gap, the reduction is 12.6% (around US$ 1.4 million). In comparison with the results found by Adams and Page (2005), we observed that the negative effect is maintained, but is of greater magnitude for the group of developing countries. This would indicate that, although both migration and remittances help to alleviate poverty in the home country of migrants, in the particular case of Mexico and Central America migration per se has a greater impact on the fight against poverty.

## 6. ROBUSTNESS

Table 4 presents results additional to those shown in Table 3. Column 1 removes El Salvador, Honduras and Guatemala from the sample, since they present different poverty trajectories from the rest of the countries in the period under study. The results for both the migration variable and remittances show that poverty has been reduced, the magnitude of the effects being significant in most cases, but greater than those found in Table 3.

In the same way, the period under study may have an effect on the results presented in the previous section, as it may incorporate structural changes in the countries that affected migration decisions. For this reason, column 2 restricts the analysis to 1990 onwards, where the majority of countries showed a reduction in poverty levels. The results of the effects of migration and remittances on poverty are maintained, being negative and significant in most cases. Thus, on average, poverty has been reduced by 2 million people in the region.

**Table 3. IV results**

| | Poverty headcount ratio (% of population, 2011 PPP) | | | |
|---|---|---|---|---|
| | US$ 1.90 | US$ 3.20 | US$ 5.50 | |
| Panel A | | | | |
| IV - first stage | 0.009*** | 0.009*** | 0.009*** | |
| | (0.001) | (0.001) | (0.001) | |
| Migration | −0.864*** | −0.455*** | −0.184*** | |
| | (0.314) | (0.125) | (0.045) | |
| N | 134 | 134 | 134 | |
| Adjusted R-squared | 0.495 | 0.686 | 0.810 | |
| F-weak identification | 36.67 | 36.67 | 36.67 | |
| Panel B | | | | |
| IV - first stage | 0.011*** | 0.011*** | 0.011*** | |
| | (0.002) | (0.002) | (0.002) | |
| Remittances | −0.671** | −0.354*** | −0.143*** | |
| | (0.308) | (0.134) | (0.045) | |
| N | 134 | 134 | 134 | |
| Adjusted R-squared | 0.392 | 0.643 | 0.810 | |
| F-weak identification | 22.51 | 22.51 | 22.51 | |

Note: Authors' calculations, using the World Development Indicators of the World Bank. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All variables are computed in logs. Migration refers to the percentage of migrants in the USA as a proportion of the population in the origin country. Remittances refer to per capita official remittances. Dependent variable in US$ per day. Calculations in

| | Poverty gap (2011 PPP) | | | Squared poverty gap |
|---|---|---|---|---|
| | US$ 1.90 | US$ 3.20 | US$ 5.50 | |
| Panel A | | | | |
| | 0.009*** | 0.009*** | 0.009*** | 0.009*** |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| | −1.278** | −0.754*** | −0.395*** | −1.618** |
| | (0.519) | (0.257) | (0.113) | (0.689) |
| | 134 | 134 | 134 | 134 |
| | 0.340 | 0.543 | 0.717 | 0.242 |
| | 36.67 | 36.67 | 36.67 | 36.67 |
| Panel B | | | | |
| | 0.011*** | 0.011*** | 0.011*** | 0.011*** |
| | (0.002) | (0.002) | (0.002) | (0.002) |
| | −0.992** | −0.586** | −0.306*** | −1.256* |
| | (0.489) | (0.253) | (0.115) | (0.641) |
| | 134 | 134 | 134 | 134 |
| | 0.223 | 0.469 | 0.689 | 0.114 |
| | 22.51 | 22.51 | 22.51 | 22.51 |

both stages include the following variables: Gini index, average monthly income per capita, domestic credit provided by the financial sector (% of GDP), rural labor (% of total employment), and country fixed effects. We use the distance between the capital cities of each country and California in the USA as an instrument in the first stage.

**Table 4. Robustness testing**

| | (1) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Poverty headcount ratio (% of population, 2011 PPP) | | | Poverty gap (2011 PPP) | | | |
| | US$ 1.90 | US$ 3.20 | US$ 5.50 | US$ 1.90 | US$ 3.20 | US$ 5.50 | |
| Panel A | | | | | | | |
| IV- first stage | 0.012** | 0.012** | 0.012** | 0.012** | 0.012** | 0.012** | |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | |
| Migration | −0.226*** | −0.203*** | −0.106*** | −0.218 | −0.212*** | −0.151*** | |
| | (0.061) | (0.023) | (0.023) | (0.134) | (0.062) | (0.032) | |
| N | 76 | 76 | 76 | 76 | 76 | 76 | |
| Adjusted R-squared | 0.944 | 0.943 | 0.954 | 0.930 | 0.952 | 0.963 | |
| F-weak id. | 28.98 | 28.98 | 28.98 | 28.98 | 28.98 | 28.98 | |
| Panel B | | | | | | | |
| IV- first stage | 0.014*** | 0.014*** | 0.014*** | 0.014*** | 0.014*** | 0.014*** | |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | |
| Remittances | −0.194*** | −0.174*** | −0.091*** | −0.187* | −0.182*** | −0.129*** | |
| | (0.052) | (0.028) | (0.028) | (0.106) | (0.046) | (0.028) | |
| N | 76 | 76 | 76 | 76 | 76 | 76 | |
| Adjusted R-squared | 0.932 | 0.925 | 0.945 | 0.930 | 0.944 | 0.955 | |
| F-weak id. | 68.51 | 68.51 | 68.51 | 68.51 | 68.51 | 68.51 | |

Note: Authors' calculations, using the World Development Indicators of the World Bank. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All variables are computed in logs. Migration refers to the percentage of migrants in the USA as a proportion of the population in the origin country. Remittances refer to per capita official remittances. Dependent variable in US$ per day. Calculations in both

| | (2) | | | | | |
|---|---|---|---|---|---|---|
| | Poverty headcount ratio (% of population, 2011 PPP) | | | Poverty gap (2011 PPP) | | |
| | US$ 1.90 | US$ 3.20 | US$ 5.50 | US$ 1.90 | US$ 3.20 | US$ 5.50 |
| | Panel A | | | | | |
| | 0.008*** | 0.008*** | 0.008*** | 0.008*** | 0.008*** | 0.008*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| | −0.984*** | −0.489*** | −0.173*** | −1.471** | −0.844*** | −0.419*** |
| | (0.380) | (0.163) | (0.057) | (0.601) | (0.308) | (0.140) |
| | 125 | 125 | 125 | 125 | 125 | 125 |
| | 0.307 | 0.591 | 0.791 | 0.117 | 0.383 | 0.636 |
| | 37.15 | 37.15 | 37.15 | 37.15 | 37.15 | 37.15 |
| | Panel B | | | | | |
| | 0.007*** | 0.007*** | 0.007*** | 0.007*** | 0.007*** | 0.007*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| | −1.017** | −0.506** | −0.179** | −1.521** | −0.872** | −0.433** |
| | (0.493) | (0.228) | (0.078) | (0.747) | (0.399) | (0.186) |
| | 125 | 125 | 125 | 125 | 125 | 125 |
| | 0.039 | 0.448 | 0.754 | -0.173 | 0.169 | 0.523 |
| | 18.74 | 18.74 | 18.74 | 18.74 | 18.74 | 18.74 |

stages include the following variables: Gini index, average monthly income per capita, domestic credit provided by the financial sector (% of GDP), rural labor (% of total employment) and country fixed effects. Column 1 does not consider El Salvador, Honduras, and Guatemala. Column 2 only considers years from 1990 onwards.

## 7. CONCLUSIONS

In this paper, the impact of migration and remittances on poverty was analysed. The evidence presented is robust, which contributes to the contemporary academic discussion by providing current elements on migration policies. One of the findings of the research carried out is that a 10% increase in migration reduces poverty by 8.6%; that is, the population in the region that lives on less than US$ 1.90 a day was reduced by 1.8 million. In the case of the poverty lines of US$ 3.20 and US$ 5.50, poverty was reduced by 1.8 and 1.3 million people, respectively. Regarding remittances, a 10% increase in remittances (in per capita terms) reduces poverty by 6.7% (1.4 million people) for the poverty line of US$ 1.90 per day. These results are in line with those found in the previous literature for the general case of developing countries.

We conclude that, in the particular case of Mexico and Central America, migration has a greater impact on the fight against poverty, with remittances being an additional component in this objective. In this regard, it is important to highlight that migration and remittances do not necessarily present a linear o direct correlation since the migration effect may surpass the current migratory flow. That is why this factor seems to be emerging as an element that will continue to have effects on the regional social and economic structure, beyond those related to the consumption of migrant families and households. Therefore, it is urgent to analyse the effects of migration and remittances on social well-being. ◄

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# ONLINE APPENDIX

## Table A1. IV results

| | Poverty headcount ratio (% of population, 2011 PPP) | | | | | | |
|---|---|---|---|---|---|---|---|
| | US$ 1.90 | | US$ 3.20 | | US$ 5.50 | | |
| | 1° Stage | 2° Stage | 1° Stage | 2° Stage | 1° Stage | 2° Stage | |
| IV - first stage | 0.009*** | | 0.009*** | | 0.009*** | | |
| | (0.001) | | (0.001) | | (0.001) | | |
| Gini | 0.085 | 0.068 | 0.085 | 0.037 | 0.085 | 0.009 | |
| | (0.156) | (0.124) | (0.156) | (0.069) | (0.156) | (0.031) | |
| Restriction | 0.132 | 0.636 | 0.132 | 0.300 | 0.132 | 0.104 | |
| | (0.261) | (0.418) | (0.261) | (0.243) | (0.261) | (0.151) | |
| Rural | 0.220** | 0.337*** | 0.220** | 0.201*** | 0.220** | 0.113*** | |
| | (0.060) | (0.102) | (0.060) | (0.052) | (0.060) | (0.031) | |
| Income | −0.943** | −1.855*** | −0.943** | −1.482*** | −0.943** | −1.119*** | |
| | (0.383) | (0.308) | (0.383) | (0.196) | (0.383) | (0.137) | |
| Migration | | −0.864*** | | −0.455*** | | −0.184*** | |
| | | (0.314) | | (0.125) | | (0.045) | |
| N | 134 | 134 | 134 | 134 | 134 | 134 | |
| Adjusted R-2 | 0.611 | 0.495 | 0.611 | 0.686 | 0.611 | 0.810 | |
| F-weak id. | | 36.67 | | 36.67 | | 36.67 | |

Note: Authors' calculations, using the World Development Indicators of the World Bank. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All variables are computed in logs. Migration refers to the percentage of migrants in the USA as a proportion of the population in the origin country. Remittances refer to per capita official remittances. Dependent variable in US$ per day. Calculations

| | Poverty gap (2011 PPP) | | | | | |
|---|---|---|---|---|---|---|
| | US$ 1.90 | | US$ 3.20 | | US$ 5.50 | |
| | 1° Stage | 2° Stage | 1° Stage | 2° Stage | 1° Stage | 2° Stage |
| | 0.009*** | | 0.009*** | | 0.009*** | |
| | (0.001) | | (0.001) | | (0.001) | |
| | 0.085 | 0.082 | 0.085 | 0.057 | 0.085 | 0.031 |
| | (0.156) | (0.170) | (0.156) | (0.104) | (0.156) | (0.058) |
| | 0.132 | 0.898 | 0.132 | 0.519 | 0.132 | 0.253 |
| | (0.261) | (0.602) | (0.261) | (0.364) | (0.261) | (0.219) |
| | 0.220** | 0.473*** | 0.220** | 0.294*** | 0.220** | 0.176*** |
| | (0.060) | (0.156) | (0.060) | (0.085) | (0.060) | (0.047) |
| | −0.943** | −2.131*** | −0.943** | −1.757*** | −0.943** | −1.400*** |
| | (0.383) | (0.438) | (0.383) | (0.268) | (0.383) | (0.173) |
| | | −1.278** | | −0.754*** | | −0.395*** |
| | | (0.519) | | (0.257) | | (0.113) |
| | 134 | 134 | 134 | 134 | 134 | 134 |
| | 0.611 | 0.340 | 0.611 | 0.543 | 0.611 | 0.717 |
| | | 36.67 | | 36.67 | | 36.67 |

in both stages include the following variables: Gini index, average monthly income per capita, domestic credit provided by the financial sector (% of GDP), rural labor (% of total employment) and country fixed effects. We use the distance between the capital cities of each country and California in the USA as an instrument in the first stage.

**Table A2. IV results**

| | Poverty headcount ratio (% of population, 2011 PPP) | | | | | | |
|---|---|---|---|---|---|---|---|
| | US$ 1.90 | | US$ 3.20 | | US$ 5.50 | | |
| | 1° Stage | 2° Stage | 1° Stage | 2° Stage | 1° Stage | 2° Stage | |
| IV - first stage | 0.011*** | | 0.011*** | | 0.011*** | | |
| | (0.002) | | (0.002) | | (0.002) | | |
| Gini | 0.343 | 0.225 | 0.343 | 0.119 | 0.343 | 0.042 | |
| | (0.236) | (0.212) | (0.236) | (0.108) | (0.236) | (0.042) | |
| Restriction | 0.122 | 0.604* | 0.122 | 0.283 | 0.122 | 0.098 | |
| | (0.253) | (0.344) | (0.253) | (0.208) | (0.253) | (0.135) | |
| Rural | 1.017*** | 0.830** | 1.017*** | 0.461*** | 1.017*** | 0.218*** | |
| | (0.168) | (0.361) | (0.168) | (0.169) | (0.168) | (0.068) | |
| Income | 0.152 | −0.939 | 0.152 | −0.999*** | 0.152 | −0.924*** | |
| | (0.458) | (0.644) | (0.458) | (0.263) | (0.458) | (0.103) | |
| Remittances | | −0.671** | | −0.354*** | | −0.143*** | |
| | | (0.308) | | (0.134) | | (0.045) | |
| N | 134 | 134 | 134 | 134 | 134 | 134 | |
| Adjusted R-2 | 0.850 | 0.392 | 0.850 | 0.643 | 0.850 | 0.810 | |
| F-weak id. | | 22.51 | | 22.51 | | 22.51 | |

Note: Authors' calculations, using the World Development Indicators of the World Bank. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All variables are computed in logs. Migration refers to the percentage of migrants in the USA as a proportion of the population in the origin country. Remittances refer to per capita official remittances. Dependent variable in US$ per day. Calculations in both

| | Poverty gap (2011 PPP) | | | | | |
|---|---|---|---|---|---|---|
| | US$ 1.90 | | US$ 3.20 | | US$ 5.50 | |
| | 1° Stage | 2° Stage | 1° Stage | 2° Stage | 1° Stage | 2° Stage |
| | 0.011*** | | 0.011*** | | 0.011*** | |
| | (0.002) | | (0.002) | | (0.002) | |
| | 0.343 | 0.314 | 0.343 | 0.194 | 0.343 | 0.103 |
| | (0.236) | (0.310) | (0.236) | (0.176) | (0.236) | (0.090) |
| | 0.122 | 0.851* | 0.122 | 0.492 | 0.122 | 0.239 |
| | (0.253) | (0.482) | (0.253) | (0.299) | (0.253) | (0.186) |
| | 1.017*** | 1.201** | 1.017*** | 0.724** | 1.017*** | 0.401*** |
| | (0.168) | (0.557) | (0.168) | (0.298) | (0.168) | (0.144) |
| | 0.152 | −0.777 | 0.152 | −0.957* | 0.152 | −0.982*** |
| | (0.458) | (1.056) | (0.458) | (0.535) | (0.458) | (0.230) |
| | | −0.992** | | −0.586** | | −0.306*** |
| | | (0.489) | | (0.253) | | (0.115) |
| | 134 | 134 | 134 | 134 | 134 | 134 |
| | 0.850 | 0.223 | 0.850 | 0.469 | 0.850 | 0.689 |
| | | 22.51 | | 22.51 | | 22.51 |

stages include the following variables: Gini index, average monthly income per capita, domestic credit provided by the financial sector (% of GDP), rural labor (% of total employment) and country fixed effects. We use the distance between the capital cities of each country and California in the USA as an instrument in the first stage.

**Table A3. IV results**

| | Squared poverty gap | |
|---|---|---|
| | 1° Stage | 2° Stage |
| IV - first stage | 0.009*** | |
| | (0.001) | |
| Gini | 0.085 | 0.069 |
| | (0.156) | (0.199) |
| Restriction | 0.132 | 1.078 |
| | (0.261) | (0.752) |
| Rural | 0.220** | 0.587*** |
| | (0.060) | (0.198) |
| Income | −0.943** | −2.272*** |
| | (0.383) | (0.547) |
| Migration | | −1.618** |
| | | (0.689) |
| N | 134 | 134 |
| Adjusted R-squared | 0.611 | 0.242 |
| F-weak identification | | 36.67 |

Note: Authors' calculations, using the World Development Indicators of the World Bank. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All variables are computed in logs. Migration refers to the percentage of migrants in the USA as a proportion of the population in the origin country. Remittances refer to per capita official remittances. Dependent variable in US$ per day. Calculations in both stages include the following variables: Gini index, average monthly income per capita, domestic credit provided by the financial sector (% of GDP), rural labor (% of total employment) and country fixed effects. We use the distance between the capital cities of each country and California in the USA as an instrument in the first stage.

**Table A4. IV results**

|  | Squared poverty gap | |
| --- | --- | --- |
|  | 1° Stage | 2° Stage |
| IV - first stage | 0.011*** | |
|  | (0.002) | |
| Gini | 0.343 | 0.363 |
|  | (0.236) | (0.384) |
| Restriction | 0.122 | 1.019* |
|  | (0.253) | (0.597) |
| Rural | 1.017*** | 1.509** |
|  | (0.168) | (0.721) |
| Income | 0.152 | −0.557 |
|  | (0.458) | (1.392) |
| Remittances | | −1.256* |
|  | | (0.641) |
| N | 134 | 134 |
| Adjusted R-2 | 0.850 | 0.114 |
| F-weak id. | | 22.51 |

Note: Authors' calculations, using the World Development Indicators of the World Bank. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All variables are computed in logs. Migration refers to the percentage of migrants in the USA as a proportion of the population in the origin country. Remittances refer to per capita official remittances. Dependent variable in US$ per day. Calculations in both stages include the following variables: Gini index, average monthly income per capita, domestic credit provided by the financial sector (% of GDP), rural labor (% of total employment) and country fixed effects. We use the distance between the capital cities of each country and California in the USA as an instrument in the first stage.