The Impact of Remittances on the Economy of Mexican States and Municipalities: Do Remittances Generate Economic Growth and Economic Development?

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Abstract

The level of remittances received in Mexico has increased to record levels since 2013. The objective of this paper is to analyze whether these resources have affected the economic growth and economic development in Mexico's states and municipalities. This research finds that, even that there is no statistical relationship between remittances (as a percentage of GDP) and economic growth in Mexican states for the period of 2005 to 2019, in the case of municipalities, results show the opposite. The regression results express a positive relationship between remittances (as a percentage of VACB) and economic growth for Mexican municipalities.

I. Introduction

Remittances are defined as transfers of money from international migrants to family members in the home country. Today, these transfers are one of the largest sources of financial flows toward developing countries. For some developing countries, remittances have become so important that they are as large as their foreign direct investment (FDI) flows (IMF, 2009).[1] In 2023 alone, remittances to low- and middle-income countries were $669 billion or 72.8% of the total cash transfers worldwide.[2] Top recipient countries are India, China and Mexico, with the United States leading remittance-sending countries.

But, to be sure, households in developing countries tend not to use remittances to invest or save. Instead, they are often used to buy essential commodities such as food, clothing or medical care. That is, oftentimes, they merely help recipients to survive, as they aid in alleviating poverty by subsidizing day-to-day expenses.[3] Consequently, understanding and forecasting the economic impact of remittances in developing countries is difficult. In the short run, remittances affect an economy by stimulating consumption. Yet, in other ways, remittances impact an economy through investment in physical or human capital, with longer-term effects. Thus, the impact of remittances on economic growth and development is more complex and not clear than it at first appears. And although their overall effect on economic growth and development appears positive, it is not easy to calculate as there are other factors involved. Past research reinforces this difficulty. The International Monetary Fund (2009) concluded that remittances had a small impact on economic growth in recipient countries and in others they even had a negative effect.[4] Salahuddin and Gow (2015) found that there is a significant long-term positive relationship between remittances and economic growth, but there is no significant relationship in the short-term.[5] Their study focused only on some of the world's largest remittance recipients: Bangladesh, India, Pakistan, and the Philippines. Similarly, Gutiérrez and Almonte (2011) found that remittances in Mexico had a positive impact on economic development but only if they relax credit constraints.[6] Thus, research suggests that the effect of remittances on economic growth is not as straightforward to measure and understand.

The Case of Mexico

Remittances in Mexico have increased exponentially since 2013. Given that remittances are growing to historical records, recipient households may be consuming more, generating consumption-based short-term economic growth. But, as already theorized, in poor communities, remittances are used as permanent income to meet basic life needs and alleviate poverty. If that dependence on these funds from abroad stops or reduces economic growth, the Mexican economy is likely to stagnate in a trend of lower economic growth and higher emigration. This condition is often referred to as a "remittance trap" and the International Monetary Fund has warned of the consequences of this trap for developing countries like Mexico.[7] Thus, the case is useful to ask the question: Do remittances contribute to economic development in recipient countries? Moreover, given Mexico's federal makeup, do remittances have differentiated effects in the development of states and municipalities?

In this paper, data on remittances of the Mexican states is examined to investigate whether there is a relationship between remittances and economic growth and economic development using an economic model of convergence. The paper also focuses on Mexican municipalities to find the relationship between these. Finally, both levels of analysis are compared to see if they differ. The goal is to understand the importance of remittances on households in Mexico and if these resources have improved the Mexican economy of its states and municipalities.

II. Literature Review

Theoretically, convergence is defined as the tendency of a poor economy to grow at a higher rate per capita than rich economies, enabling it to catch up.[8] There are two types of convergence: absolute and conditional. If the per capita income of a specific economy converges with that of other economies regardless of the degree of similarity between the economies and the initial conditions, there is absolute convergence. If the per capita income of a specific economy converges with that of other economies identical in their structural characteristics and regardless of initial conditions, there is conditional convergence. Given these definitions, through an economic growth model, it is possible to know whether the economies of relatively poor states and municipalities are growing faster than the economies of relatively rich states and municipalities. To this model, remittances and other control variables can be added to verify the role these play in the economy of municipalities and states of Mexico.

For this, the Solow model is used. This model was developed in 1956 to relate the rate of growth in an economy to two major variables: The ability of an economy to invest and save and to transform capital into products.[9] This model predicts that economies converge to a steady state and the speed of this convergence depends on their initial differences in capital. The rate of return to capital is lower in economies with higher capital per capital; the opposite is true for capital-poor economies. The empirical tests to verify this convergence regresses growth rate of gross domestic product (GDP) on a measure of initial income. The expected sign of this regression is negative under the maintained hypothesis that poor economies grow faster than rich economies and all of them converge to the steady state.

Barro and Sala-i-Martin analyzed convergence between states and regions of the United States and found statistical evidence for both absolute and conditional convergence.[10] Other studies throughout the world have found the existence of convergence as described by Esquivel.[11] These studies used different approaches to test convergence, such as nonlinear least squares (NLS), ordinary least squares (OLS) and seemingly unrelated nonlinear equations (SUNR). Esquivel's paper was seminal regarding convergence in Mexico. He analyzed the characteristics of the economic convergence process among states and regions in Mexico from 1940 to 1995. He found the existence of absolute convergence in the per capita income of the Mexican states at a rate of approximately 1.2% per year between 1940 and 1995.[12]

Empirically, remittances have accelerated worldwide since 2000, from $123 billion in 2000 to $718 billion in 2020 (an increase of 483%).[13] These resources may affect economic growth and development, but this depends on how households spend these resources—investing in human and physical capital, in consumption, in savings, or merely to survive. If households use remittances to finance productive investments and activities, they can improve income over time, something important to marginalized or rural areas in developing countries.[14] They can also increase household consumption of goods and services and, hence, greater aggregate demand that generates economic growth. Indeed, there is empirical evidence that remittances contribute to economic growth, through positive impact on investment and consumption.[15] However, if households spend those remittances on unproductive investments, this can create a barrier to economic growth. Furthermore, remittances can reduce incentives to work, reducing labor force participation as they adversely affect the labor supply decisions of recipient families.[16] Other studies have found that rising levels of remittances could be harmful to the long-run growth of recipient economies

through an appreciation of the real exchange rate which makes recipient economies less competitive in international trade.[17]

It has been argued that remittances increase income and reduce poverty rates. Households receiving remittances may spend them on education or health care, and with that, they promote economic development. Most research on developing countries has found evidence of a positive effect of remittances on education and health.[18] Regarding Mexico, some studies have shown just this effect in some states.[19] In effect, remittances can enable economic development, as shown in human development indices (HDI). This would imply that remittances are better invested in human development if the share of a country's remittances to GDP is relatively higher.[20] Indeed, evidence shows that remittances have a positive correlation with human development levels and are an effective way to improve it in middle-income countries. The general impact of remittances on both relative and absolute changes in HDI is significant. In fact, remittances have a higher impact than FDI and public expenditure on the economic development of these countries.[21] Another study, where a sample of low-and middle-income countries was used, found that the relationship between remittances and development outcomes such as education and health are robust at the aggregate level after controlling for economic and geographic differences and time trends.[22]

That said, this paper looks at the impact of remittances on the economic growth and development of Mexican states and municipalities. The results are important because if there were a dependence on remittances on these two variables, any negative change in international markets (particularly the U.S.) and thus in remittances could negatively affect the economy of states and municipalities and the welfare of their inhabitants.

III. Methodology

In this section, a model to test convergence (absolute and conditional) is presented, including the impact of remittances on economic growth and economic development. Convergence is measured by the inverse relationship between the rate of growth of per capita income and the initial level of that income measured by its productivity. To test this convergence, this paper relies on Barro and Sala-i-Martin, employing a log- linearization model of the Cobb-Douglas function as follows:[23]

$$\left(\frac{1}{T}\right) log\left(\frac{y_{iT}}{y_{i0}}\right) = \alpha - \left[\frac{\left(1-e^{-\lambda}\right)}{T}\right] log(y_{i0}) + w_{i0,T} \qquad (1)$$

where, Y_{iT} is the real GDP per capita in economy i at time T, Y_{i0} is the real GDP per capita in economy i at time 0, α is a constant, T is the number of years and $W_{i0,T}$ is the error term.

If $\beta_0 = \left[\frac{(1-e^{-\lambda T})}{T}\right]$, then the goal is to estimate this parameter and test for convergence. In this case, λ is the rate of convergence. Since I have considered a unique constant (α), I have assumed the existence of a common steady state. If there is evidence in favor of the existence of convergence but there are no control variables besides Y_{i0}, then there is absolute convergence. If control variables are added to equation (1) and there is convergence, then there is conditional convergence. In this case, the equation to be estimated is the following:

$$\left(\frac{1}{T}\right) log\left(\frac{y_{iT}}{y_{i0}}\right) = \alpha + \beta_0 log(y_{i0}) + \beta\ (Z) + w_{i0,T} \qquad (2)$$

where, Z represents different control variables. One of these control variables is remittances[24] as a percentage of GDP, and the expected sign is not clear since it will depend on how they are used by remittance recipients in the states and municipalities in Mexico. If households use remittances to purchase goods to alleviate poverty and meet basic needs, there would be no effect on economic growth. In some cases, remittances could generate incentives to reduce productive efforts and thereby negatively affect economic growth. On the contrary, if these households use these resources to invest in physical and human capital, there could be a positive effect on both economic growth and economic development. Given that, remittances can boost aggregate demand and thus economic growth.[25] Remittances may also promote development if recipients spend them on education or healthcare or invest in entrepreneurial activities.

The analysis of economic growth and convergence can add other variables of trade, such as FDI. Trade liberalization can have positive effects not only in short-term but also in long-term economic growth.[26] A vital factor in this liberalization and economic growth is the FDI. These resources can be used to buy better technologies that increase the capital stock or its efficiency and thereby generate growth. Hence, there should be a positive relationship between FDI and the growth rate of per capita income.[27] In addition, investment can reduce disparities between states and cause the flow of productive factors to generate convergence.

In equation (2), the variables used to test convergence and the impact of remittances on economic growth of Mexican states are the growth rate of state GDP per capita (dependent variable), initial level of state GDP per capita, proportion of FDI with respect to state GDP,

remittances with respect to state GDP, public investment with respect to state GDP, initial state population, and marginalization index by state.[28] These six variables are used as independent variables for the state econometric model and other regional variables are added later. For the state economic development model, GDP is replaced with HDI and the same independent variables are used except for the initial level of state GDP per capita. To estimate their parameters there are different approaches such as NLS (for cross sectional data), SUNR (for panel data), and OLS. This paper uses the last approach to estimate those parameters.

Regarding the regressions of municipalities, these change slightly due to a lack of data. Instead of using municipal GDP, the gross census value added (VACB) by municipality is used as a proxy variable. The variables added to the growth regression are the growth rate of municipal VACB per capita (dependent variable), the initial level of municipal VACB per capita, remittances with respect to municipal VACB, public investment with respect to municipal VACB, initial municipal population, marginalization index by municipality, regional variables, and dummy variables that establish if a municipality receives remittances and if it has more than 90% of its population living in poverty. As in the state case, for the economic development model, VACB is replaced with the municipal HDI and the independent variables previously mentioned are used.

Data

In this section, the nature of the data used is explained. Some key points on the main variables are clarified and less known variables are also made clear.

The variable GDP (base year 2013) by state is obtained from the National Institute of Statistics and Geography (INEGI).[29] In the case of municipalities, the variable VACB provided by INEGI is used as a proxy for GDP since there is no data on GDP of the municipalities for the period analyzed.[30] INEGI does provide data on public investment by state and municipality since 1989.[31] The HDI variables by state and municipality are obtained from United Nations Development Programme (UNDP) and Global Data Lab.[32] The HDI is a measurement to evaluate the level of individual human development in a state and a municipality. It combines key variables for its measurement: life expectancy at birth, literacy and school enrollment rates, and GDP per capita.[33] The indices for each of these dimensions are aggregated with equal weights in a simple average to estimate the HDI.

On demographic data, Mexico's National Population Council (CONAPO) has calculated the index of marginalization (IM) by state and municipality since 1990.[34] IM provides data on

Mexican states and municipalities according to the impacts suffered by the population as result of the lack of access to education, adequate housing, sufficient income, and the distribution of population in small localities.[35] The National Council for the Evaluation of Social Development Policy (CONEVAL) estimates the population living in poverty and extreme poverty by state and municipality.[36] CONEVAL and INEGI also estimate the population by state and municipality.[37]

Banco de Mexico (BANXICO) estimates the number of remittances by state since 2003 and by municipality since 2013.[38] The Mexican Secretariat of Economy (SE) provides information on FDI by state since 1999, but not for municipalities.[39] Finally, INEGI has generated data on the public resource expenditures by state and municipal governments. In this case, it provides information for public investment since 1989 for all states and most municipalities (78%).[40] The econometric models studied states from 2005 to 2019 and municipalities from 2013 to 2018.[41] In the case of municipalities, fewer years are used because the information on remittances for municipalities began in 2013.

HDI and IM

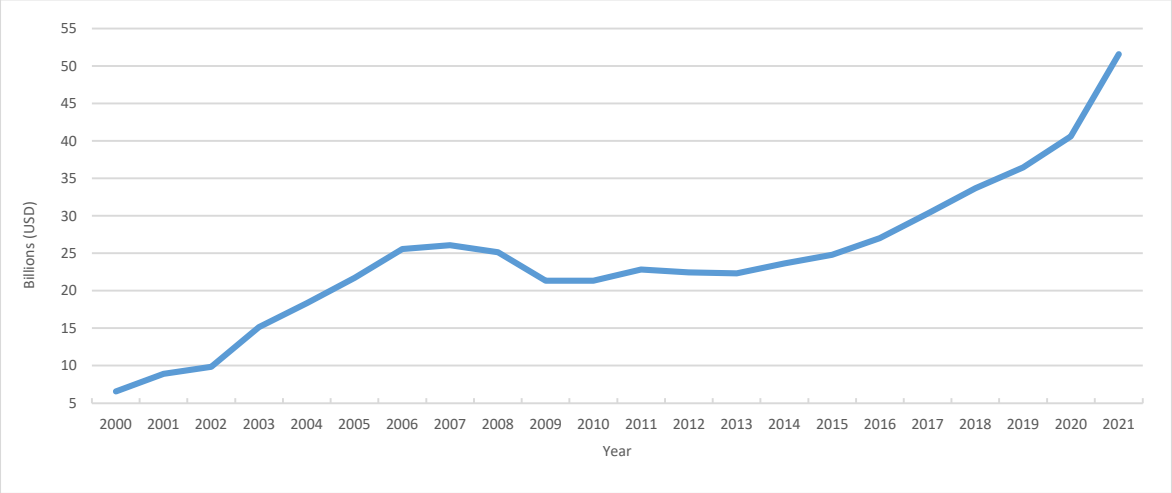
Mexico has 32 states and 2,469 municipalities—a county equivalent.[42] The state with the highest number of municipalities is Oaxaca with 570 and the state with the lowest number is Baja California Sur with only five. Guerrero, Chiapas, and Oaxaca have been the states with the lowest HDI compared to other states in recent years. Alternatively, the states with the highest human development have been Mexico City and Nuevo Leon.[43] The municipalities with the lowest HDI have been Cochoapa el Grande (Guerrero), San Martín Peras (Oaxaca), Batopilas (Chihuahua), Santos Reyes Yucuná (Oaxaca), and Coicoyán de las Flores (Oaxaca).[44] Oaxaca has five of the municipalities with the lowest HDI, while Mexico City has 6 with the highest HDI. The IM also shows Guerrero, Chiapas, and Oaxaca with very high marginalization rates between 2005 and 2020. These three states have 10.5 % of the national population (13.2 million people). The fact that these states with persistently high levels of marginalization over the last 15 years tells the story of a marginalization trap. If a state is marginalized, it appears doomed to be so for a long time. The states with the lowest marginalization rates were México City, Nuevo León, and Coahuila. These three states represent 14.4% of the total population (18.1 million people). In the case of municipalities, this index shows that one third of municipalities has a high or very high marginalization, where approximately 9.1% of the national population live (more than 11.4 million people).[45] The municipalities with the worst economic and social conditions in 2013 and 2020

were Batopilas de Manuel Gómez Morín (Chihuahua), Mezquital (Durango), and Del Navar (Nayarit). The municipalities with low and very low levels of marginalization represent 83% of the total population (more than 105.2 million). These municipalities are located in the center and north of the country and include Benito Juárez (Mexico City), San Nicolás de los Garza (Nuevo León), Cuauhtémoc (Mexico City), and Apodaca (Nuevo León).[46]

Remittances

Remittances sent to Mexico have grown since 2013 (Figure 1), reaching a historic high in 2021 with about $51.6 billion. That is an increase of 27% over 2020 and 131.3% over 2013. Remittance income as a percentage of the GDP in Mexico has also grown considerably since 2013. In 2021, it made up 4.0% of the country's GDP, a 2.3 percentage point increase over 2013 (Figure 2). These numbers show how important remittances have been to the Mexican economy in recent years.

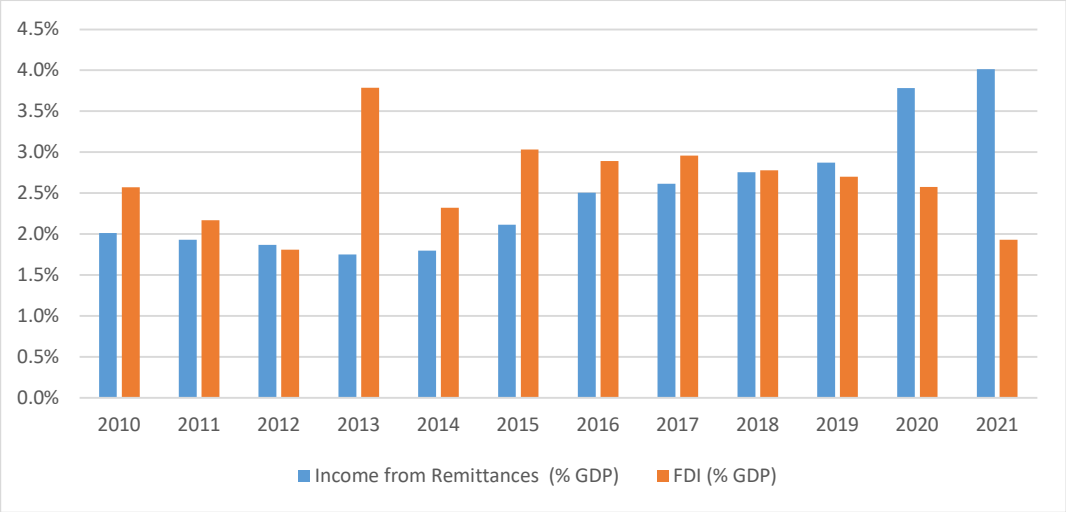
Figure1 - Remittances (Billions of Dollars).



Source: Data from Banco de México, author's own elaboration.

Remittances have become so important to Mexico that they are as large as or larger than FDI flows to the country (Figure 2). Moreover, whereas remittances have grown in recent years as a percentage of GDP, FDI has decreased since 2017. In 2020, remittances became the second largest source of income in the country, only behind auto and auto parts exports. FDI is in third place.

Figure 2 – Income from Remittances and FDI's as a Percentage of Mexico's GDP, 2010-2021.



Source: Data from Banco de México and the World Bank, elaborated by the author.

Most remittances to Mexico come from the U.S. In 2021, they amounted to more than $48.9 billion (94.9% of the total) and the states of the United States sending the most remittances to Mexico were California ($16.2 billion) and Texas ($7.7 billion).[47] The Mexican states that receive the majority of these remittances are those that have sent more migrants in recent years. The main recipients were Jalisco, Michoacán, and Guanajuato. In 2021, Jalisco was in the first position of 32 states with a total of $5.2 billion and its remittances increased 26.1% with respect to 2020.[48] Michoacán was second with a total of $4.9 billion and an increase of 22.9% compared to 2020. Regarding the Mexican municipalities, Tijuana, Baja California; Guadalajara, Jalisco; and Alvaro Obregon, Mexico City were the three main recipients of remittances with a combined total of $1.9 billion in 2021.[49]

Remittances represent a major part of state and municipal income. The states with the highest level of remittances as a percentage of their GDP were Michoacán (16%), Guerrero (12%), Zacatecas (10.2%), and Oaxaca (10.1%) in 2005. This distribution is almost identical in 2019: Michoacán (17.1%), Zacatecas (14.8%), Guerrero (14.6%) and Oaxaca (14.5%). In all these cases the percentages increased compared to 2005. Given this, it seems that for these states, remittances have become a structural pillar of their economies. The municipalities that received most remittances were Tijuana, Baja California ($327 million), Puebla, Puebla ($345 million), and Guadalajara, Jalisco ($306 million) in 2013. As with the states, the top municipalities that received remittances is similar to 2019 and increased with Tijuana, Baja California ($481 million), Puebla, Puebla ($461 million), and Morelia, Michoacán ($442 million).

FDI

Regarding FDI, the states that received most of these resources in 2005 and 2019 were Mexico City, Nuevo Leon, and the State of Mexico.[50] These three states received more than 52% of the total FDI in 2005 and more than 42% in 2019. The states that received less FDI in 2005 were Durango, Colima, and Zacatecas (0.4% of total FDI), and Campeche, Oaxaca, and Colima in 2019 (0.7% of the total FDI).

Public Investment

States in Mexico invest, on average, very little of their public resources as a percentage of their GDP. In 2005, it was 0.63% and in 2019, it was 0.42%. The states with the highest levels of public investment were Hidalgo, Tlaxcala, and Chihuahua with an average of public investment with respect to their GDP of 1.2% in 2005. In 2019, those states were Tlaxcala, State of Mexico, and Sinaloa with 0.96%. The states with the lowest levels of public investment were Campeche, Tabasco, and Mexico City (on average 0.06% of GDP) in 2005. For 2019, the states were Baja California, Nuevo León, and Yucatán (on average 0.06% of GDP).[51]

Results

In this section, results of the econometric models for the states and municipalities are presented.[52] The convergence hypothesis is examined first for both types (absolute and conditional). Then, differentials in growth and development models are estimated using remittances and other control variables. Given that, it is possible to assess whether remittances affect economic growth and economic development for the two scenarios.

States

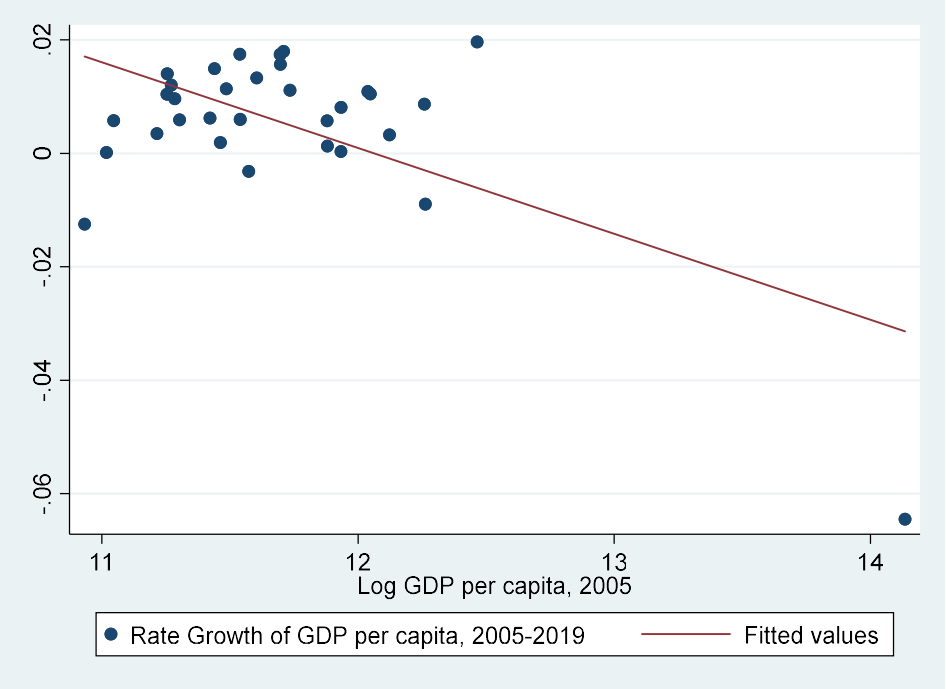
Economic Growth

The states with the highest economic growth from 2005 to 2019 were Mexico City (2.0%), Aguascalientes (1.8%), San Luis Potosí (1.7%) and Chihuahua (1.7%). Meanwhile, the states with the lowest economic growth were Campeche (-6.4%), Chiapas (-1.2%), Tabasco (-0.9%) and Morelos (-0.3%). In this period, the growth rate of GDP per capita for all 32 states averaged 0.5%. An interesting case is Campeche. It has the highest GDP per capita of any state. However, its level of economic activity has deteriorated significantly. In 2019, its GDP per capita was 59% lower than in 2005. It represents an annual average drop of approximately 6.4%.

Figure 3 shows the growth rate of per capita income between 2005 and 2019 relative to the logarithm of per capita income in 2005 for all Mexican states. If there is evidence of absolute

convergence, the relationship between these variables should be negative. As it is clear from the figure, there is absolute convergence between Mexican states as shown by the fitted line. [53]

Figure 3 – Absolute Convergence in the States of Mexico using GDP, 2005-2019.



Absolute convergence is tested using equation (1). Table 1 statistically confirms, at 10%, the existence of absolute convergence that seemed apparent in Figure 3; hence, poor states are growing faster than the rich states in Mexico and should therefore converge with them in the long term.

Table 1 – Results of absolute convergence in the States of Mexico, 2005-2019.[54]

Variable	Coefficient	Robust Standard Error
Constant	0.18235*	0.09828
Log GDP per capita 2005	-0.01512*	0.00847
R^2	0.3597	
Observations	32	

Note: * denotes 10% level of significance

Adding control variables to model helps verify if there is conditional convergence among Mexican states. To do so regional dummy variables are added to check for differences among Mexican regions.[55] Esquivel's definition of regions is followed.[56] His regional classification is in Table 2. More control variables will be added in the next subsections.

Table 2 – Definition of Regions.

Region	States
Capital	State of Mexico and Mexico City
Center	Hidalgo, Morelos, Puebla and Tlaxcala
Center-North	Aguascalientes, Durango, Guanajuato, Querétaro, San Luis Potosí and Zacatecas
Gulf	Campeche, Quintana Roo, Tabasco, Veracruz and Yucatán
North	Baja California, Chihuahua, Coahuila, Nuevo León, Sonora and Tamaulipas
Pacific	Baja California Sur, Colima, Jalisco, Nayarit and Sinaloa
South	Chiapas, Guerrero, Michoacán and Oaxaca

The results of adding these dummy variables are shown in Table 3.[57] The convergence result is still present, but now at a level of 1% of significance. In this case, keeping the initial per capita income constant, the states belonging to the Capital, Center-North, North and Pacific regions tend to grow faster than the states belonging to the South region. Hence, there are differences between those regions and adding other control variables helps explain these differences.

Table 3 – Results of convergence in the States of Mexico classified by region, 2005-2019.

Variable	Coefficient	Robust Standard Error
Constant	0.23061***	0.06513
Log GDP per capita 2005	-0.02075***	0.00586
Capital	0.03158*	0.01535
Center-North	0.02263***	0.00734
North	0.02523***	0.00873
Pacific	0.02296**	0.00828
Center	0.00883	0.00666
Gulf	0.01339	0.00818
R^2	0.7030	
Observations	32	

Note: *** denotes 1% level of significance, ** denotes 5% level of significance and * denotes 10% level of significance.

Remittances

This section analyzes the impact of remittances on the economic growth of Mexican states. The variable *remittances* as a percentage of GDP is added to the model of absolute convergence (model A). Then, other control variables are added (model B). This should provide the results for the econometric models.

Table 4 shows the results of conditional convergence models A, B and C. The first model shows the existence of convergence. This means that poor states grow faster than rich states. Hence, all Mexican states will tend to converge towards the same steady state in the long term. This result is robust given that adding more control variables does not change the statistical significance and sign of the relationship. Regarding remittances, these resources have a negative impact on the growth rate of per capita income. However, this result is not robust since adding more control variables makes this variable not statistically significant.

Model B establishes that remittances are not statistically significant. Therefore, there is no statistical evidence to support the impact of remittances (as a percentage of GDP) on economic growth. The index of marginalization is statistically significant and robust. There is a negative relationship between marginalization and economic growth. States with high levels of marginalization have lower per capita income growth rates. This reinforces the earlier discussion of the marginalization trap and shows that it does exist at the state level.[58]

FDI, as a percentage of GDP, is statistically significant at 10%. At the state level, this variable affects economic growth. The higher a state's FDI, the higher its per capita income growth rate for the period of study. Finally, population and public investment per capita are not statistically significant. Hence, the resources spent by state governments do not translate into economic growth. Model C includes the regional dummy variables. In this case, not all of them are statistically significant, but those significant in the previous model are still significant. Given the results on remittances, remittances do not affect economic growth at the state level for the period analyzed.

Table 4 – Results of conditional convergence in the States of Mexico, 2005-2019.

	A		**B**		**C**	
Variable	**Coefficient**	**Robust Standard Error**	**Coefficient**	**Robust Standard Error**	**Coefficient**	**Robust Standard Error**
Constant	0.25662**	0.11097	0.28539***	0.04909	0.27092***	0.05708
Log GDP per capita 2005	-0.02092**	0.00928	-0.02372***	0.00401	-0.02348***	0.00446
Remittances 2005 (% GDP)	-0.14032*	0.07937	0.04399	0.04858	0.05976	0.09407
IM 2005			-0.00911***	0.00196	-0.00726**	0.00281
FDI 2005 (% GDP)			0.05345*	0.02875	0.07250*	0.03607
Public Investment 2005 (% GDP)			-0.90757	0.58867	-0.29867	0.77054
Population 2005			-1.67e-10	7.16e-10	-4.08e-10	9.62e-10

Capital					0.01611	0.02040
Center-North					0.01098	0.00923
North					0.00840	0.01351
Pacific					0.00830	0.01188
Center					-0.00089	0.00882
Gulf					0.00942	0.01165
R^2	0.4360		0.7546		0.8014	
Observations	32		32		32	

Note: *** denotes 1% level of significance, ** denotes 5% level of significance and * denotes 10% level of significance. The regional dummy variables in model B lose their statistical significance, which was shown in Table 3. In this case, we now have specific variables that differentiate the Mexican states and are, therefore, statistically significant.

Economic Development

It is assumed that the model of convergence described before can be applied to the model of economic development. So, GDP is substituted with HDI. Given the data, the period will be from 2005 to 2018. During this period, the growth rate of HDI for all states averaged 0.4%, a very low rate that reveals the lack of development in education and health in the states of Mexico.

Figure 4 shows the growth rate of HDI between 2005 and 2018 in relation to the logarithm of HDI in 2005 for all Mexican states. As can be seen from the figure, there is absolute convergence between Mexican states, since the relationship is negative between these variables as established by the fitted line.

Figure 4 – Absolute convergence in the States of Mexico using HDI, 2005-2018.

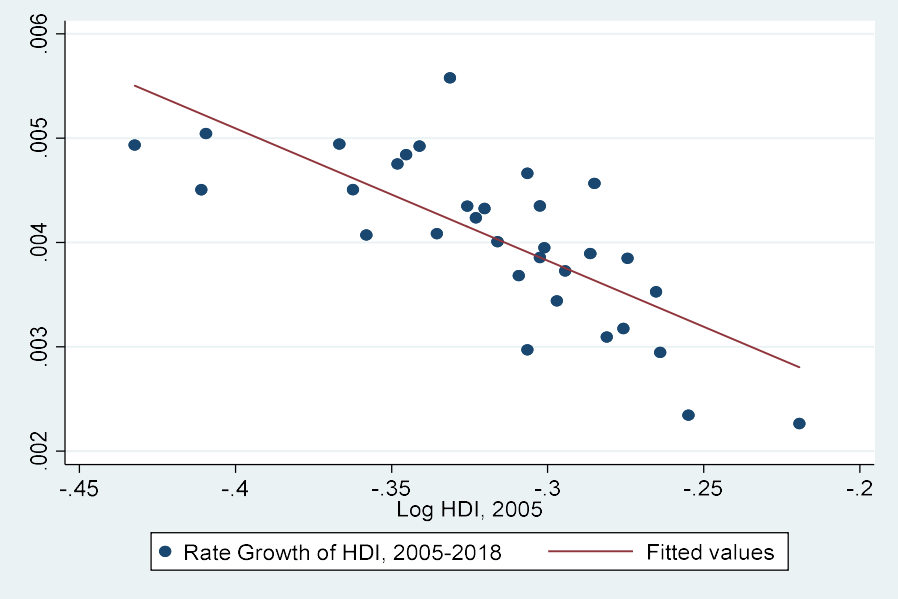


Table 5 statistically confirms, at 1%, the existence of absolute convergence that seemed apparent in Figure 4. Therefore, the less developed states are developing faster than the more developed states in Mexico, indicating they will catch up in the long term.

Table 5 – Results of absolute convergence in the States of Mexico, 2005-2018.

Variable	Coefficient	Robust Standard Error
Constant	0.00002	0.00068
Log HDI 2005	-0.01268***	0.00211
R^2	0.5627	
Observations	32	

Note: *** denotes 1% level of significance, ** denotes 5% level of significance and * denotes 10% level of significance.

Adding control variables to the above model helps verify if there is conditional convergence among states. As in the previous subsection, regional dummy variables are added to check for differences between Mexican regions (Table 6). The convergence result is still present as before at the same level of significance. All the coefficients associated with the dummy variables of the states belonging to the Center-North and Pacific regions are statistically significant and positive. In this case, keeping the initial level of HDI constant, the states belonging to the Center-North and Pacific regions tend to develop faster than the states belonging to the South region. As a result, there are differences between some Mexican regions.

Table 6 – Results of convergence in the States of Mexico classified by region, 2005-2018.

Variable	Coefficient	Robust Standard Error
Constant	-0.00032	0.00061
Log HDI 2005	-0.01296***	0.00170
Capital	-0.00017	0.00025
Center-North	0.00056**	0.00024
North	-0.00003	0.00029
Pacific	0.00080**	0.00036
Center	0.00020	0.00029
Gulf	0.00008	0.00028
R^2	0.7373	
Observations	32	

Note: *** denotes 1% level of significance, ** denotes 5% level of significance and * denotes 10% level of significance.

Remittances

This section analyzes the impact of remittances on the economic development of the Mexican states. First, the variable remittances as a percentage of GDP is added to the model of absolute convergence (model D). Then, other control variables are added to the previous case (model E and F) and provide the main results of these econometric models (Table 7). The first model shows that convergence is still present (model D). Hence, all Mexican states will tend to converge towards the same steady state in the long term. This result is robust since adding more control variables does not change the statistical significance and sign of this relationship. Regarding remittances, these resources have a positive impact on the growth rate of development. However, this result is not robust since adding more control variables makes this variable not statistically significant.

Model E establishes that there is no statistical evidence to support the impact of remittances (as a percentage of GDP) on economic development. All other control variables are not statistically significant, except for population. However, if we add the regional dummy variables, they continue to be statistically significant, and the population loses significance (model F). Keeping the initial level of HDI constant, the states belonging to all regions but the South tend to develop faster than the states in the South region. Some other factors are not included in the model, for example, the abundance of human capital in the sates. Given the results on remittances, we can say that remittances do not affect economic development at the state level for the period analyzed.

Table 7 – Results of conditional convergence in the States of Mexico, 2005-2018.

	D		**E**		**F**	
Variable	**Coefficient**	**Robust Standard Error**	**Coefficient**	**Robust Standard Error**	**Coefficient**	**Robust Standard Error**
Constant	0.00049	0.00064	0.00043	0.00070	-0.00138	0.00068
Log HDI 2005	-0.01049***	0.00200	-0.01086***	0.00206	-0.01119***	0.00160
Remittances 2005 (% GDP)	0.00474**	0.00199	0.00497	0.00294	0.00836	0.00383
IM 2005			-0.00011	0.00009	0.00006	0.00011
FDI 2005 (% GDP)			-0.00021	0.00307	0.00230	0.00182
Public Investment 2005 (% GDP)			0.02079	0.03249	0.07306	0.03622
Population 2005			-5.83e-11**	2.74e-11	-3.69e-11	3.45e-11
Capital					0.00140**	0.00059
Center-North					0.00127**	0.00031
North					0.00103*	0.00052
Pacific					0.00162***	0.00041
Center					0.00058*	0.00029
Gulf					0.00145***	0.00040
R^2	0.5980		0.6668		0.8469	
Observations	32		32		32	

Note: *** denotes 1% level of significance, ** denotes 5% level of significance and * denotes 10% level of significance.

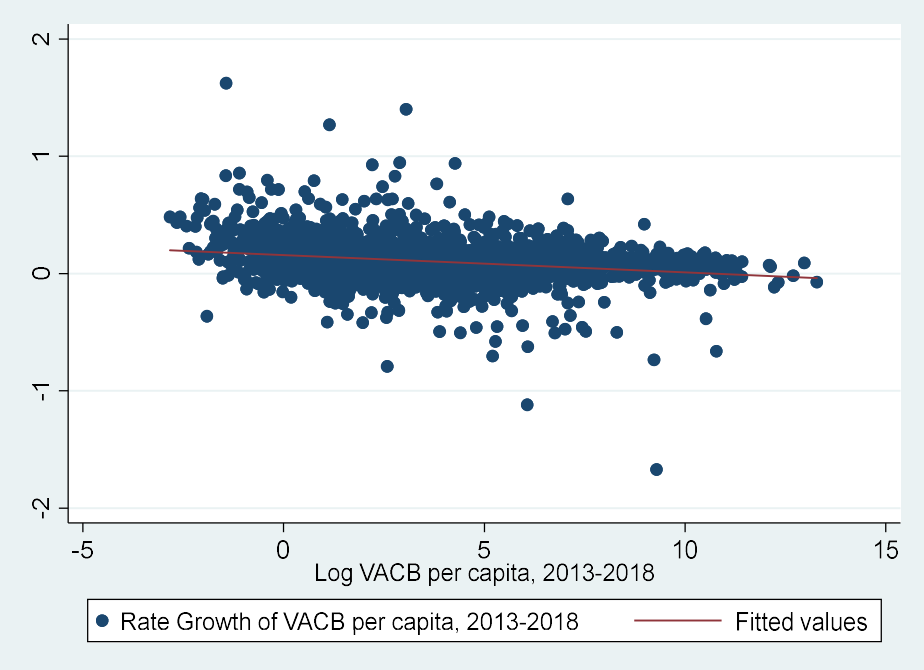
Municipalities

Economic Growth

Given that there is no data on municipal GDP from 2013 to 2018, it is necessary to use a different variable. VACB is a component of GDP and INEGI establishes that, technically, VACB represents GDP before taxes.[59] So, in this paper, it is assumed that VACB is equivalent to GDP and use it as a proxy variable. These two variables are highly correlated, and they should provide the same results with respect to the relationship of the variables analyzed. In the case of the states, the Pearson's correlation coefficient estimated between GDP per capita and VACB per capita is 0.9883 for 2005 and 0.9654 for 2019.[60]

In the period analyzed, municipalities had high volatility in terms of the growth rate of VACB per capita. In this case, if I adjust and estimate the average growth rate of GDP per capita, it would be around 0.8%. Figure 5 shows the growth rate of VACB per capita between 2013 and 2018 in relation to the logarithm of VACB per capita in 2013 for all Mexican municipalities. The relationship between these two variables appears to be negative, which means that there may be evidence of absolute convergence.

Figure 5 – Absolute convergence in the Municipalities of Mexico using VACB, 2013-2018.



Now, the existence of absolute convergence in this case is tested. Table 8 shows that there is statistical evidence supporting this convergence with a significance level of 1%. Therefore, poor

municipalities are growing faster than the rich municipalities in Mexico and will catch up to them in the long term.

Table 8 – Results of absolute convergence in the Municipalities of Mexico, 2013-2018.

Variable	Coefficient	Robust Standard Error
Constant	0.15717***	0.00657
Log VACB per capita 2013	-0.01481***	0.00135
R^2	0.0596	
Observations	2,421	

Note: *** denotes 1% level of significance, ** denotes 5% level of significance and * denotes 10% level of significance.

As in the case of Mexican states, regional dummy variables are added to verify differences between Mexican regions defined as before (Table 9). All the coefficients associated with the dummy variables of the municipalities belonging to the Capital, Center, Center-North and Pacific regions are statistically significant and positive. The convergence result is still present with the same level of significance as before. In this case, keeping the initial level of VACB per capita constant, the municipalities belonging to the above regions tend to grow faster than the municipalities belonging to the South region. Therefore, differences between regions are again present.

Table 9 – Results of convergence in the Municipalities of Mexico classified by region, 2013-2018.

Variable	Coefficient	Robust Standard Error
Constant	0.15006***	0.00646
Log VACB per capita 2013	-0.01672***	0.00156
Capital	0.04102***	0.01120
Center-North	0.03681***	0.01196
North	0.01631	0.01609
Pacific	0.02602**	0.01173
Center	0.03176***	0.01036
Gulf	-0.00205	0.01012
R^2	0.0679	
Observations	2,421	

Note: *** denotes 1% level of significance, ** denotes 5% level of significance and * denotes 10% level of significance.

Remittances

This section analyzes the impact of remittances on the economic growth of the Mexican municipalities. First, the variable remittances as a percentage of VACB is added to the model of absolute convergence (model G). Both municipalities receiving remittances and municipalities that do not receive remittances are considered, so a dummy variable is established if the municipality receives or does not receive remittances to the model of absolute convergence. Then other control variables are added to the previous case (model H) to provide the main results of the econometric model of conditional convergence. It is important to mention that there is no information on FDI for municipalities, so this variable cannot be included in this analysis. Finally, model I is based on the previous model but includes the regional dummy variables.

Table 10 shows the results of the conditional convergence models G, H, and I. The first model again shows the existence of convergence, and the result is robust: Poor municipalities grow faster than rich municipalities and in the long run they will tend to catch up with them into the steady state. Regarding remittances, this variable has a positive impact on the growth rate of per capita income. This result is not robust, since adding more control variables change the sign and statistical significance of remittances. Model H establishes that the index of marginalization is statistically significant and robust.

Again, there is a negative relationship between marginalization and economic growth. Municipalities with high levels of marginalization have lower per capita income growth rates. This further reinforces the earlier discussion of the marginalization trap and shows that it does exist at all levels. The population and public investment (as a percentage of VACB) are positive and statistically significant. The greater the population a municipality has, the greater its economic growth. Besides, the resources spent on public investment by municipal governments translate into economic growth for the period analyzed. In this case, remittances have no impact on economic growth. However, those municipalities that receive remittances have higher economic growth than those that do not receive remittances. Two more dummy variables are added to this model. The first one assigns a value of 1 if the municipality has more than 90% of its population living in poverty and 0 otherwise.[61] The second variable assigns a value of 1 if the municipality has more than 90% of its population living in poverty and receives remittances, and 0 otherwise.

As seen, these two variables are not statistically significant for the municipalities. Given the results on remittances, it can be said that remittances do not have an impact on municipal economic growth for the period analyzed. However, municipalities that receive remittances have

higher economic growth compared to those that do not receive remittances. Adding the regional dummy variables do not change the results just mentioned, so in model I the results are the same as in model H.

Table 10 – Results of conditional convergence in the States of Mexico, 2013-2018.

	G		H		I	
Variable	**Coefficient**	**Robust Standard Error**	**Coefficient**	**Robust Standard Error**	**Coefficient**	**Robust Standard Error**
Constant	0.15514***	0.00654	0.13724***	0.01076	0.13692***	0.01122
Log VACB per capita 2013	-0.01456***	0.00134	-0.01996***	0.00281	-0.02033***	0.00291
Remittances 2013 (% VACB)	0.00087**	0.00033	0.00045	0.00032	0.00044	0.00032
IM 2013			-0.02283***	0.00506	-0.02284***	0.00584
Public Investment 2013 (% VACB)			0.00527***	0.00089	0.00524***	0.00089
Population 2013			1.18e-07***	2.57e-08	1.20e-07***	2.65e-08
Remittances (Dummy)			0.04161***	0.01222	0.02941**	0.01243
Municipalities with more than 90% of poor population (Dummy)			0.00946	0.01820	0.01043	0.01881
Municipalities with more than 90% of poor population and receive remittances (Dummy)			-0.02899	0.02304	-0.02681	0.02326
Capital					0.01086	0.01123
Center-North					0.01574	0.01345
North					-0.01730	0.01854
Pacific					0.00690	0.01310
Center					0.01989	0.01308
Gulf					-0.00358	0.01116
R^2	0.0622		0.1056		0.1096	
Observations	2,421		1,903		1,903	

Note: *** denotes 1% level of significance, ** denotes 5% level of significance and * denotes 10% level of significance.

Municipalities by State

Regarding municipalities by state, the same model cannot be used for all Mexican states since some states do not have enough municipalities to run an econometric model. However, the three states with the highest poverty levels in 2015 are examined as well as those with the highest number of municipalities: Oaxaca, Chiapas, and Guerrero. The objective is to know if remittances have an impact on the economic growth of these poor municipalities. So, the variables analyzed

on are those related to remittances since the other control variables yield nearly the same results as before. The variables remittances as a percentage of VACB is not significant for the three cases.

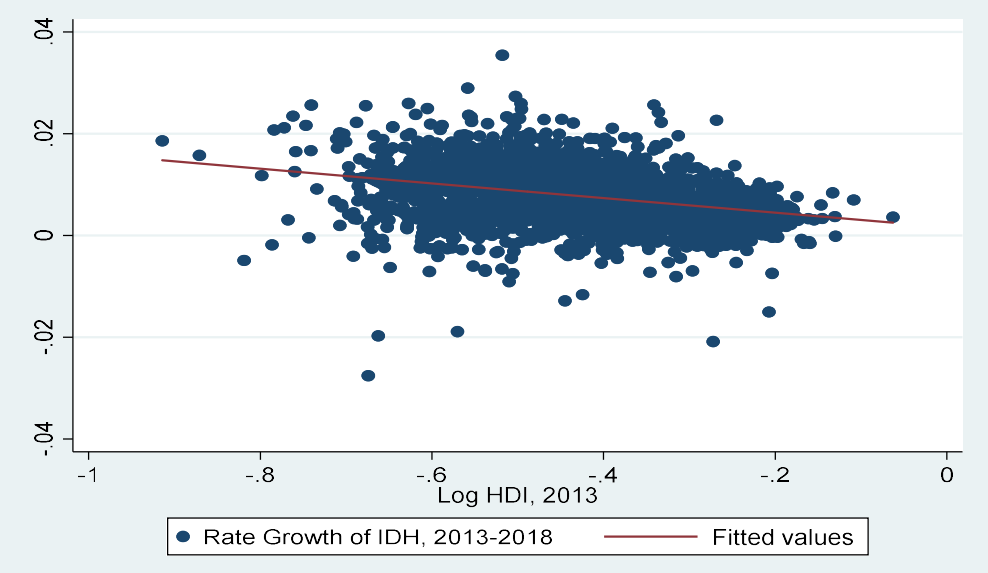
For Oaxaca and Chiapas, the municipalities that receive remittances grow faster than those that do not. But there is no statistical evidence for the other dummies. In the case of Guerrero, the dummy variable for remittances alone is not statistically significant. Nevertheless, its municipalities with more than 90% of their population living in poverty and receiving remittances have a higher economic growth rate than those municipalities without these characteristics. In addition, its municipalities with more than 90% of their population living in poverty have lower economic growth than the excluded group.[62]

Economic Development

As in the analysis of states, it is assumed that the convergence model can be applied to the economic development model. Hence, I substitute GDP with HDI and focus on the period from 2013 to 2018. The growth rate of HDI for all municipalities averaged 0.06% during this period, a very low rate that tells us the lack of human development in all municipalities of Mexico.

Figure 6 shows the growth rate of HDI between 2013 and 2018 in relation to the logarithm of HDI in 2013 for all Mexican municipalities. This figure establishes a negative relationship between these variables, confirming the existence of absolute convergence between Mexican municipalities.

Figure 6 – Absolute convergence in the municipalities of Mexico using HDI, 2013-2018.



As in the previous cases, the existence of absolute convergence is statistically confirmed (Table 11); therefore, the less developed municipalities are growing faster than the more developed municipalities in Mexico and will reach them in the long term at the steady state.

Table 11 – Results of absolute convergence in the Municipalities of Mexico, 2013-2018.

Variable	Coefficient	Robust Standard Error
Constant	0.00159***	0.00040
Log HDI 2005	-0.01443***	0.00102
R^2	0.1014	
Observations	2,412	

Note: *** denotes 1% level of significance, ** denotes 5% level of significance and * denotes 10% level of significance.

Now control variables are added to test for conditional convergence in Mexican municipalities. First, regional dummy variables are considered to verify the differences between Mexican regions defined as before (Table 12) and in the next subsection, then other control variables are added. The convergence result is still present as it was before at the level of significance of 1%. All the coefficients associated with the dummy variables of the municipalities belonging to the Capital, Center-North, North, Pacific, Center, and Gulf regions are statistically significant and positive. In this case, keeping the initial level of HDI constant, the municipalities belonging to those regions tend to develop faster than the municipalities belonging to the South region. Hence, we have differences between those regions.

Table 12 – Results of convergence in the Municipalities of Mexico classified by region, 2013-2018.

Variable	Coefficient	Robust Standard Error
Constant	-0.00167***	0.00056
Log HDI 2013	-0.01799***	0.00114
Capital	0.00087***	0.00043
Center-North	0.00473***	0.00035
North	0.00254***	0.00039
Pacific	0.00136***	0.00043
Center	0.00227***	0.00030
Gulf	0.00353***	0.00027
R^2	0.1833	
Observations	2,412	

Note: *** denotes 1% level of significance, ** denotes 5% level of significance and
* denotes 10% level of significance.

Remittances

This section discusses the main results of including the variable remittances to the absolute convergence model and its impact on the economic development of Mexican municipalities. After that, I will add other control variables to this scenario and analyze the main results of these conditional convergence models (Table 13).

The first model confirms the existence of convergence, and this result is robust for all other cases (model J). Regarding remittances, these resources have no impact on the economic development of Mexican municipalities. However, this result changes for the other 2 cases as it will be explained later. Model K establishes that the index of marginalization is statistically significant and robust. There is a negative relationship between marginalization and economic development at the municipal level. As in the other cases, the marginalization trap exists in this scenario. The population and public investment variables are not statistically significant. So, there is no statistical evidence to affirm that the resources allocated to public investment by municipal governments have an impact on their economic development for the period analyzed. The more remittances (as a percentage of VACB) a municipality receives, the less economic development it has. However, the municipalities that receive remittances develop more than those that do not receive remittances. It means that municipalities that depend more on remittances use those resources to meet the basic needs of their inhabitants and not to promote human development. But on average, municipalities that receive remittances develop more than their counterparts. The other dummy variables are also statistically significant. If municipalities have more than 90% of their population living in poverty, they develop economically less than the other municipalities. The next result is crucial, if municipalities have more than 90% of their population living in poverty and receive remittances, they will develop more than the other excluded municipalities. In other words, these poor communities are using these resources for economic development since it is the only way to promote education and health. The results on dummy remittances reinforce their importance in the economic development of Mexican municipalities, particularly in the poorest municipalities that receive these resources.

Adding regional dummy variables to the above model produces the same results, but the result of regional disparities between municipalities is still present, at least for the Center, Center-

North, Gulf and North (model L). These variables are positive and statistically significant. So, if a municipality is located in the aforementioned regions, it will develop more than the municipalities that are in the excluded region: The South.

Table 13 – Results of conditional convergence in the Municipalities of Mexico, 2013-2018.

	J		K		L	
Variable	**Coefficient**	**Robust Standard Error**	**Coefficient**	**Robust Standard Error**	**Coefficient**	**Robust Standard Error**
Constant	0.00158***	0.00040	-0.01116***	0.00115	-0.01442***	0.00122
Log HDI 2013	-0.01448***	0.00102	-0.04302***	0.00262	-0.04693***	0.00268
Remittances 2013 (% VACB)	-7.65e-06	5.18e-06	-0.000018***	5.96e-06	-0.000015***	5.10e-06
IM 2013			-0.00316***	0.00032	-0.00356***	0.00035
Public Investment 2013 (% VACB)			-9.86e-06	0.00003	8.06e-06	0.00002
Population 2013			5.26e-10	4.43e-10	1.30e-09***	4.90e-10
Remittances (Dummy)			0.00122***	0.00031	0.00108***	0.00029
Municipalities with more than 90% of poor population (Dummy)			-0.00227***	0.00055	-0.00114***	0.00055
Municipalities with more than 90% of poor population and receive remittances (Dummy)			0.00225***	0.00073	0.00225***	0.00071
Capital					-0.000015	0.00046
Center-North					0.00354***	0.00037
North					0.00133***	0.00043
Pacific					-0.00012	0.00050
Center					0.00262***	0.00041
Gulf					0.00383***	0.00030
R^2	0.1016		0.2056		0.2933	
Observations	2,412		1,897		1,897	

Note: *** denotes 1% level of significance, ** denotes 5% level of significance and * denotes 10% level of significance.

Municipalities by State

Regarding municipalities by state, the impact of remittances in the same states as before is analyzed, that is, in the states of Chiapas, Oaxaca, and Guerrero. In Chiapas, the remittance variable (as a percentage of VACB) is not statistically significant, as it is in Guerrero. In Oaxaca, this variable is negative and statistically significant. Meanwhile, in Chiapas and Oaxaca, the municipalities that receive remittances develop more than those that do not. In the case of Guerrero, this variable is not statistically significant, so remittances have no effect on the economic

development of its municipalities. In all these states, there is no statistical evidence that municipalities with more than 90% of their population living in poverty and receiving remittances have an impact on the economic development of these municipalities. Hence, it is possible that poor municipalities in Chiapas and Oaxaca are using remittances only as income to purchase goods and services essential for survival, but not for education and health, that is, not for their economic development. Recalling the previous section, it can be said that remittances in poor municipalities in Guerrero foster economic growth, but not economic development.

Conclusion

The level of remittances received in Mexico has increased to record levels since 2013. The objective of this paper is to analyze whether these resources have affected the economic growth and economic development in Mexico's states and municipalities. This study provides information on how remittance recipients use those resources. If these resources reduce growth and increase dependence on remittances, a remittance trap could exist. This paper analyzes only the relationship between economic growth and remittances, but not if there is a greater emigration treadmill, so the presence of this trap in Mexico cannot be verified.

Mexico has had an average economic growth rate of around 1.9% per annum for the last decade, that is, very low economic growth. From 2019 to 2021, the Mexican economy contracted an average of 1.2%, but remittances could help reduce this contraction if they were used for productive activities. On the contrary, remittances could provide resources to households only to satisfy their basic needs, but not to generate productive activities. If that were the case, remittances would not generate growth. Remittances can also foster economic development if they are used for education and health. If this were not the case, remittances would have no effect, or their impact would be negative on the economic development of the states and municipalities of Mexico.

This research finds that there is no statistical relationship between remittances (as a percentage of GDP) and economic growth in Mexican states for the period of 2005 to 2019. The same result is obtained for remittances and economic development in Mexican states for the period of 2005 to 2018. These results depend on the methodology and the number of observations used. In the case of Mexican states, there is no statistical evidence to say that remittances affect these economies and their development. However, in the case of municipalities, the results provide important information about how remittances are used. The regression results express a positive

relationship between remittances (as a percentage of VACB) and economic growth for Mexican municipalities, but this result is not robust. However, the results for the dummy variable of remittance are robust and with a positive sign, that is, the municipalities that receive remittances have higher economic growth than those that do not receive remittances for the period of 2013 to 2018. These municipalities are using those resources not only to meet their basic needs, but also in productive activities that favor economic growth. In the case of economic development, there is a negative relationship between remittances (as a percentage of VACB) and economic development. The more remittances (as a percentage of VACB) a municipality receives, the less economic development it has. The magnitude of its coefficient is quite small, for example, an increase of one unit in the variable of remittances (as a percentage of VACB) is associated with a reduction of 0.0018 percent change in economic development. The municipalities that receive the most remittances are not using them in education and health. However, on average, the municipalities that receive these resources develop more than those that do not receive remittances. But if these municipalities receive large amounts of remittances relative to their GDP, a point is reached where these resources are no longer invested in their economic development. Therefore, it can be concluded that, if a municipality receives remittances, it uses this income to generate economic growth and development. In the case of municipalities with more than 90% of their population living in poverty and receiving remittances, they will develop more than the other excluded municipalities. These poor municipalities are allocating these resources to their economic development. This paper finds that in the case of municipalities, remittances seem to have a positive effect on their economies and development. These relationships could be problematic since these resources depend on the countries where the remittance senders live and not on the economic strategies and public policies of the Mexican government. It cannot be stated that these individuals will continue to send this money to Mexico permanently, despite the fact that this has been the case in recent years. The best way to grow and develop in the long term is to invest in human and physical capital. Therefore, better public policies must be established, improving education, health, and security in Mexico with a better economic strategy that allows creating new firms and jobs and thereby reducing poverty and inequality throughout Mexico. Of course, resources from abroad can be used, but they cannot be relied upon as a driver of the Mexican economy.

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[23] Robert Joseph Barro and Xavier Sala-i-Martin, "Technological Diffusion, Convergence, and Growth," *Journal of Economic Growth* 2 (1995):1-26.
[24] Remittances, estimated by Banco de Mexico, include money orders, personal checks, electronic transfers, cash, and kind. Therefore, these estimates include formal and informal remittances channels.
[25] The goal of this paper is to analyze how Mexicans, in municipalities and states, use remittances, and see if these resources generate economic growth and development. There could be a causality from economic growth to remittances, but that is not the objective of this paper and therefore, I will not analyze this causality.
[26] Jorge Eduardo Mendoza Cota and Cuauhtémoc Calderón, "Impactos regionales de las remesas en el crecimiento económico de México," *Papeles de* Población, no. 50 (December 2006):197-221, https://www.researchgate.net/publication/26462725_Impactos_regionales_de_las_remesas_en_el_crecimiento_economico_de_Mexico,
[27] Jorge Eduardo Mendoza Cota and Cuauhtémoc Calderón, "Impactos regionales de las remesas en el crecimiento económico de México," *Papeles de* Población, no. 50 (December 2006): 197-221, https://www.researchgate.net/publication/26462725_Impactos_regionales_de_las_remesas_en_el_crecimiento_economico_de_Mexico.
[28] I define the proportion of FDI with respect to state GDP as: Indicator of FDI = (State FDI) / (State GDP).
For the cases of remittances and public investment with respect to state GDP, the formulas are the same, dividing the variable with respect to the state GDP. GDP is in constant 2013 prices.
[29] "Producto Interno Bruto por Entidad Federativa, Año base 2013," Instituto Nacional de Estadística, Geografía e Informática (INEGI), https://www.inegi.org.mx/app/tabulados/default.aspx?pr=17&vr=6&in=2&tp=20&wr=1&cno=2.
[30] The VACB measures the production value added during the economic activities and it is obtained by subtracting the value of total inputs from total gross output. It represents GDP before taxes. Francisco de Jesús Corona Villavicencio and Jesús López-Pérez, "Obteniendo indicadores de actividad económica municipal basados en información representativa de los Censos Económicos," *Realidad, Datos y Espacio Revista International de Estadística y Geografía* 10, no. 2 (August 2019): 62-81..
[31] "Estadística de finanzas públicas estatales y municipales," Instituto Nacional de Estadística, Geografía e Informática (INEGI), https://www.inegi.org.mx/sistemas/olap/proyectos/bd/continuas/finanzaspublicas/fpest.asp?s=est&c=11288&proy=efipem_fest.
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"Human Development Indices," *Global Data Lab*, https://globaldatalab.org/shdi/shdi/MEX/?levels=1&interpolation=0&extrapolation=0&nearest_real=0.
[33] Rodolfo de la Torre, "Ten Years of the Human Development Index in Mexico," *Realidad, Datos y Espacio Revista International de Estadística y Geografía* 3, no. 3 (September/December 2012):148-163 https://rde.inegi.org.mx/RDE_07/Doctos/RDE_07_Art11.pdf.
[34] http://www.conapo.gob.mx/es/CONAPO/Indices_de_Marginacion_Publicaciones.
[35] Consejo nacional de población, "Índice de marginación por entidad federativa y municipio 2020: Nota técnico-metodológica," *Secretaría de Gobernación*, May 2020, https://www.gob.mx/cms/uploads/attachment/file/634902/Nota_t_cnica_marginaci_n_2020.pdf.
This index has five categories of marginalization: very low (-1.52944, -1.15143), low (-1.15143, -0.39539), medium (-0.39539, -0.01738), high (-0.01738, 0.73866), and very high (0.73866, 2.25073).
[36] Consejo Nacional de Evaluación de la Política de Desarrollo Social, "Información de pobreza y evaluación en las entidades federativas y municipios,"

https://www.coneval.org.mx/coordinacion/entidades/Paginas/inicioent.aspx.
[37] "Censo de Población y Vivienda 2010," Instituto Nacional de Estadística, Geografía e Informática (INEGI), https://www.inegi.org.mx/programas/ccpv/2010/#Microdatos.
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[40] "Finanzas públicas estatales y municipales," Instituto Nacional de Estadística, Geografía e Informática (INEGI), https://www.inegi.org.mx/programas/finanzas/#Tabulados.
[41] I also use a period from 2013 to 2019 for the states, but the results are the same as for the period 2005 to 2019, so I only show these results in the document.
[42] "División territorial," Cuéntame de México, http://cuentame.inegi.org.mx/territorio/division/default.aspx?tema=T.
[43] Miriam de Regil, "Algunas entidades con bajo nivel de desarrollo en relación al DF: PNUD," *El Financiero*, March 4, 2015, https://www.elfinanciero.com.mx/nacional/algunas-entidades-con-bajo-nivel-de-desarrollo-en-relacion-al-df-pnud/.
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[46] Consejo nacional de población, "Índice de marginación por entidad federativa y municipio 2020: Nota técnico-metodológica," *Secretaría de Gobernación*, May 2020, https://www.gob.mx/cms/uploads/attachment/file/634902/Nota_t_cnica_marginaci_n_2020.pdf.
[47] BBVA Research, "México | Remesas crecieron 27.1% en 2021, llegan a nuevo máximo histórico," February 1, 2022, https://www.bbvaresearch.com/publicaciones/mexico-remesas-crecieron-271-en-2021-llegan-a-nuevo-maximo-historico/.
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[51] "Finanzas públicas estatales y municipales," Instituto Nacional de Estadística, Geografía e Informática (INEGI), https://www.inegi.org.mx/programas/finanzas/#Tabulados.
[52] I use Stata as the statistical software to perform the data analysis and run the regression models.
[53] Campeche is a unique state since it has an extraordinary income derived from oil activity and is very different from the rest of the Mexican states. Campeche is an outlier and excluding it causes the absolute convergence to be not significant. I will include Campeche as I do not have enough data (n = 32), but we have to keep in mind that this outlier could be causing a bias in this case.
[54] In this case, the R2 is low because more variables are missing in this regression. So, adding more independent variables that explain the dependent variable should increase this statistical measure as it happens in the following scenarios.
[55] Dummy variables can take any of two quantitative values, usually 1 or 0. Typically, 1 represents the presence of a qualitative attribute, and 0 the absence of that attribute.
[56] Gerardo Esquivel, "Convergencia Regional en México, 1940-1980," *El Trimestre Económico* 66 no 264(4) (1999): 725-761, https://www.jstor.org/stable/20857005?seq=1.

[57] The R2 improves as more related variables are added to the model.
[58] Since IM encompasses education, inequality (measured by the GINI coefficient) and poverty conditions, these variables do not have to be included in the econometric model. Indeed, there is a near perfect correlation between IM and those variables in the database.
[59] Francisco de Jesús Corona Villavicencio and Jesús López-Pérez, "Obteniendo indicadores de actividad económica municipal basados en información representativa de los Censos Económicos," *Realidad, Datos y Espacio Revista International de Estadística y Geografía* 10, no. 2 (August 2019): 62-81, https://rde.inegi.org.mx/index.php/2019/08/20/obteniendo-indicadores-de-actividad-economica-municipal-basados-en-informacion-representativa-de-los-censos-economicos/.
[60] These correlations are significant at 1% level (p = 0.0000). I have the same results for the econometric models using GDP and VACB in the case of Mexican states.
[61] CONEVAL measures the percentage of the poor population in the states and municipalities of Mexico. Consejo Nacional de Evaluación de la Política de Desarrollo Social, "Información de pobreza y evaluación en las entidades federativas y municipios," https://www.coneval.org.mx/coordinacion/entidades/Paginas/inicioent.aspx.
[62] The results for this case are not shown, since I focus only on the variables related to remittances and the other variables have the same results as before.