WORKING PAPER

Document Nº 199
Working Group: Territorial Cohesion for Development Program

Internal Migration and Convergence in Mexico 2000-2010

Chiara Cazzuffi and Mariana Pereira-Lopez

June, 2016

RIMISP
Centro Latinoamericano para el Desarrollo Rural

30 AÑOS RIMISP
Centro Latinoamericano para el Desarrollo Rural

This document is a product of the Territorial Cohesion for Development Program, coordinated by Rimisp Latin American Center for Rural Development and funded by the International Development Research Centre (IDRC, Canada). The content of this paper is of exclusive responsibility of its authors.

Cita

Cazzuffi, C. Pereira-Lopez, M. 2016. Internal Migration and Convergence in Mexico 2000-2010, Working Paper Series N° 199, Working Group Territorial Cohesion for Development Program. Rimisp. Santiago. Chile.

Autores

Chiara Cazzuffi: economist, Rimisp- Latin American Center for Rural Development. Santiago, Chile.

Mariana Pereira-Lopez: World Bank Group & Universidad Iberoamericana Ciudad de México.

Rimisp en América Latina www.rimisp.org | Rimisp in Latin America www.rimisp.org

Chile: Huelén 10, 6th Floor, Providencia, Santiago, Región Metropolitana
| Tel. +(56-2)2 236 45 57 / Fax +(56-2) 2236 45 58
Ecuador: Pasaje El Jardín N-171 y Av. 6 de Diciembre, Edificio Century Plaza II, Piso 3, Oficina 7 | Quito
| (+ 593 2) 382 3916 - 382 3882
México: Yosemite 13 Colonia Nápoles Delegación Benito Juárez, México, Distrito Federal
| Tel/Fax +(52) 55 5096 6592
Colombia: Calle 75 No 8 - 34 piso 2, Bogotá
| Tel.: +(57-1)3837523

INDEX

WORKING PAPER

Internal Migration and Convergence in Mexico 2000-2010

ABSTRACT

This paper investigates whether internal migration has long-term effects on conditional convergence across functional territories in Mexico. We use an instrumental variable approach based on the predictions a gravity model of internal migration between pairs of territories. Alternatively, we use networks interacted with distance between territories as an exogenous estimate of internal migration inflows. Preliminary results show that controlling for migration inflows does not appear to affect the convergence term. However, when we interact migration inflows with initial income in our growth equations appropriately instrumenting migration, results indicate that migration flows not only lead to lower growth, but they have a divergent effect as the convergence term is lower for territories that exhibit higher migration inflows. Furthermore, there appears to be heterogeneity across the territory growth distribution which could be an indicator of clubs convergence.

JEL Classifications: O15, O4, R1
Keywords: convergence, migration, growth

INTRODUCTION

Regional inequalities are a concern for policy-makers, because they affect the wellbeing and opportunities of dwellers of marginalized territories, and may also hinder the aggregate economic growth of a country (Cerina and Mureddu, 2014). Internal migration is sometimes considered as a mechanism of adjustment towards regional convergence in incomes and wellbeing (World Bank Group, 2009). If migration is induced by income differentials, it can be expected, other things being equal, to reduce those differentials by mitigating the relative labor scarcity that caused the differentials in the first place, thereby accelerating regional income convergence (Barro and Sala-i Martin, 1992a). This may not occur, however, if an economy is characterized by increasing returns and positive externalities from skill accumulation, and if migrants are predominantly drawn from the more skilled population of the sending region (defined by Borjas (1987) as positive selection). In this case, migration has a size and composition effect on sending and receiving regions that may lead to a process of interregional divergence, and not convergence: an inflow of skilled labor to a richer region increases real wage at destination by making everyone more productive, and reduces real wages at origin.

Internal migration is an important phenomenon in Mexico. According to the Population Census, almost twenty million people (17.6 percent of the population) were living in 2010 in a different state from where they were born, versus about 12 percent of the population who migrated internationally (UN-DESA and OECD, 2013). Mexico is also characterized by severe regional inequalities, which appear to have widened over the last three decades, after a period of regional convergence between 1940 and 1985 (Esquivel, 1999; Esquivel and Messmacher, 2002; Rodríguez-Oreggia, 2007). The most notable difference is between the North and Capital regions, with high growth rates since the 1990s, and the South, which consistently lags behind. At a lower level of spatial aggregation, spatial inequalities remain striking: between 2005 and 2010, national growth averaged 1.7 percent, but only two percent of municipalities increased their levels of consumption, and only three percent reduced poverty (Yunez Naude et al., 2013).

This paper investigates whether internal migration has any long-term effects on conditional convergence across regions in Mexico. The spatial unit of analysis is functional territories, that is, relatively self-contained spaces in which people live and work, and where there is a high frequency of economic and social interaction among inhabitants, organizations or businesses. We estimate a conditional regional convergence equation, measuring the impact of internal migration on income growth in a panel of functional territories for the period 2000-2010. The critical identification problem complicating the analysis of the impact of internal migration and regional convergence is posed by the two-way causality between growth and migration rates: the decision on whether and where to migrate is based, at least in part, on expectations about future regional growth, which can be self-fulfilling in the case of selective migration (e.g. if the destination grows faster because more skilled migrants moved there).We address this simultaneity bias by using an instrumental variable approach.

Studies of internal migration in Mexico are scarce compared to the vast literature on international migration, and most of them focus on characterizing migration flows and their determinants (Soloaga and Lara, 2006; Wendelspiess Chávez Juárez and Wanner, 2012; Soloaga et al., 2010, among others). Analyses of the effects of internal migration typically focus on inter-state migration, but this level of aggregation may hide intra-state patterns of internal migration, spatial inequality and convergence.

The main contributions of this study are, firstly, the use of functional territories as the unit of observation, which allows avoiding the problems generated by commuting when municipalities are used. Secondly, the use of alternative outcome variables such as income estimated through Small Area Estimates (SAEs), which combine the geographical detail of Census data, with the measurement accuracy of surveys and night light data, which according to recent literature have proven to be good proxies of economic activity and welfare.

The rest of the paper is organized as follows: section 2 reviews the different strands of literature related to this study, section 3 details the methodology, and section 4 presents the data and descriptive statistics. The results are discussed in section 5, and section 6 concludes.

1. THE DEBATE ON THE RELATIONSHIP BETWEEN INTERNAL MIGRATION AND REGIONAL CONVERGENCE

Different theoretical growth models lead to different theoretical predictions for the relationship between migration and regional convergence. In neoclassical growth models, which assume homogeneous technology and labor characteristics, diminishing returns to capital and labor, no barriers to labor and capital mobility, and migration from poorer to richer regions, internal migration is an adjustment mechanism which can lead to an equalization of the capital to labor ratio, labor productivity and income per capita across regions, thereby accelerating regional income convergence (Barro and Sala-i Martin, 1992a). From this perspective, long run persistent real income differentials across regions simply reflect differential costs of migration, whether natural or policy induced.

Endogenous growth models, on the other hand, allow for increasing returns and positive externalities from skill accumulation (Romer, 1990), and for the possibility that migration induces inter-regional divergence and self-sustaining underdevelopment traps (Bénassy and Brezis, 2013). If positive selection of emigrants prevails, the skill composition in sending and receiving regions after migration will not be the same as before (Kanbur et al., 2005). An inflow of skilled labor to a richer region increases, rather than decreasing, real wage at destination, due to positive externalities that make everyone more productive. In contrast, where the skilled population is low to begin with, skilled wage is also low, pushing emigration of higher human capital. This reduces productivity and wages further in the sending regions, leading to further emigration, and so on (Bénassy and Brezis, 2013).

The effect of migration on the skill composition of sending regions is the subject of a theoretical and empirical debate on the competing hypotheses of “brain drain” versus “brain gain (See for example Beine et al., 2008; Docquier and Rapoport, 2012). In a brain drain scenario, any depletion of a place's human capital stock is detrimental to its current and future economic performance (Bhagwati and Hamada, 1974; Miyagiwa, 1991; Reichlin and Rustichini, 1998). In contrast, the brain gain hypothesis suggests that the possibility of emigrating and earning higher incomes in another region provides an incentive to acquire human capital, thereby promoting growth in the sending region (Mountford, 1997; Stark et al., 1997). Beine et al. (2001) argue that migration can have an ex ante gain effect and an ex post drain effect, with a positive net effect only if the first dominates the second. In the model developed by (Bénassy and Brezis, 2013), brain drain prevails, unless the government intervenes in human capital formation.

Empirical results on the relationship between migration and convergence are not conclusive, partly due to differences in the measurement of migration (net versus gross migration, homogeneous versus heterogeneous labor). A positive but negligible effect of internal migration on the speed of regional convergence is found, among others, by Barro and Sala-i Martin (1992a) for Japan and the US, Cárdenas and Pontón (1995) for Colombia, and Shioji (2001) for Japan. Stronger evidence that internal migration contributes to regional convergence is found by Maza (2006) for Spain, Ø¬stbye and Westerlund (2007) for Sweden, and DiCecio and Gascon (2010) for the US. In contrast, studies finding evidence that internal migration leads to increasing regional divergence, most of which take into account the heterogeneity of labor, include Ø¬stbye and Westerlund (2007) for Norway, Kirdar and Saracoğlu (2008) for Turkey, Peeters (2008) for Belgium, and Fratesi and Percoco (2014) for Italy.

For the case of Mexico, Guajardo et al. (1997) concludes that internal labor mobility, even when adjusted for human capital differences, does not contribute to decreasing regional inequality in the long run. Esquivel (1999) suggests that historically low regional convergence rates can be explained, in part, by low sensitivity of inter-state migration to inter-state income differentials. Mendoza and Calderon (2013) find that, although remittances have increased as share of GDP in lower income regions, they are not contributing to regional convergence. Aguilar-Ortega (2011) argues that, although remittances have been useful in integrating traditionally marginalized areas into the national economy, they did not translate into the generation of a more dynamic regional economy that decreases its dependence from remittances.

2. EMPIRICAL STRATEGY AND DATA SOURCES

2.1 Methodology

In order to analyze if migration has effects on growth at the same time as how convergence changes once we control for migration, we start by estimating a standard growth equation that analyzes β convergence (See for example Mankiw et al., 1992). We then develop this baseline model to account for the potential endogeneity of growth and migration. We measure growth as the difference of logarithms of our outcome variables (SAEs estimates and night lights) between t and $t-1$ for two ten-year periods (1990-2000 and 2000-2010). Internal migration data refer to the periods 1995-2000 and 2005-2010, as they rely on a question from the Census asking where the individual lived five years before.[1]

$$\Delta lny_{it} = \beta_0 + \beta_1 lny_{it-1} + \delta migration_i + \gamma X_i + u_i \tag{1}$$

[1] This question appears for the first time in the 2000 Census, which prevents us from using information from the 1990 Census.

Where:

Δlny_{it}=Functional territory growth rate

lny_{it-1} =Income level at the initial period

$migration_i$ =ln(migration inflows functional territory i)

X_i = Control variables, such as education, institutions, etc.

u_i = Stochastic shock

β_1 stands for the classic convergence term, where a negative term indicates that states with higher income or GDP levels experience a lower growth, which is an indicator of convergence. The coefficient of interest here is δ, which indicates the effect of migration on growth. This specification allows us to analyze convergence conditional on migration. As mentioned by Barro and Sala-i Martin (1992b), if once we include migration into the growth equation a lower value of β_1 is observed, it is an indicator that there is indeed a role for migration on convergence.

Additionally, considering that the main interest of this paper is the role that migration plays on regional convergence we will test whether the convergence term is higher for states that receive higher relative inflows of migrants using a split regression. That is, estimating the growth equation separately for states that have high migration (above the median) and low migration below the median.

Finally, we will estimate an alternative specification in which we include an interaction between migration and initial income. This allows to test whether migration indeed enhances convergence:

$$\Delta lny_{it} = \beta_0 + \beta_1 lny_{it-1} + \delta\, migration_i + \beta_2 lny_i\, migration_i + \gamma\, X_i + u_i \qquad (2)$$

2.2 Instrumental variables

Considering the endogeneity and selectivity that characterize migration decisions (McKenzie and Sasin, 2007), as is not clear whether migration enhances growth and convergence or growth generates incentives for migration, we will use an Instrumental Variable approach.

Previous literature has relied on lagged variables on previous migration (McKenzie and Rapoport, 2007), distances (McKenzie et al., 2010), cities densities, natural shocks, communications, distances to railway stations in the 1900s (Woodruff and Zenteno, 2007), etc. In some of this cases the validity of the instruments is questionable as the variable can be directly related to economic activity.

The first instrumental variable we use is based on a gravity model for migration based on Soloaga and Lara (2006). In this case we estimate migration inflows at the functional territory level by aggregating the predicted values of a gravity model that analyzes bilateral migration flows. This is similar to Frankel and Romer (1999) and Dollar and Kraay (2003) do in order to construct an instrument for trade.

Additionally, we test a type of instrumental variable that has been used in previous work regarding international migration and that is related to networks (See for example McKenzie and Rapoport, 2007) . That is, it is based on the idea that people are more prone to migrating to a different country or region if they have a group of people they already know. In this sense, we take advantage of a variable regarding origin that is included in the Census, which is the state of origin. Thus, we construct an instrumental variable by interacting the stock of migrants in a functional territory that come from each of the other functional territories with the distance between the two of them.

$$IV2migration_{st} = \sum_{i=1}^{R} Stockmigrants_{st-1}^{-R} * Distance_{sR} \quad (3)$$

2.3 Outcome variables

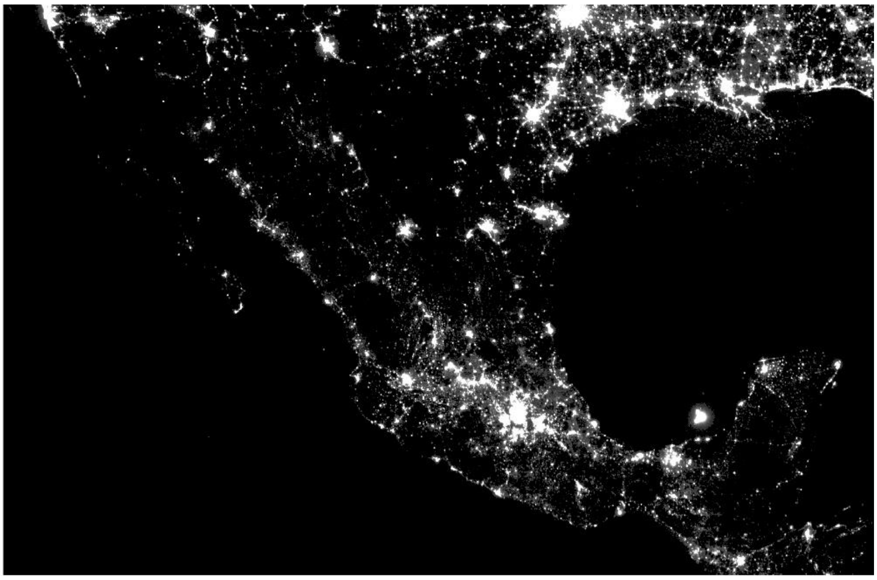
An important factor in growth equations is the outcome variable. The choice of outcome variable is directly related to the geographical unit. In most of the studies regarding β-convergence the outcome variable is GDP or value-added. However, this information is not available at the municipality level. Therefore, in this study we test a different set of outcome variables. First of all, we use Small Area Estimates (SAEs), a methodology developed by Elbers et al. (2002, 2003) that improves the accuracy of survey estimates, by combining them with other sources such as population censuses through econometric non-linear models.

Additionally, recent studies have found that the density of lights at night measured through satellite images is a very good proxy for economic activity and welfare. As mentioned by Henderson et al. (2011, 2012) measuring growth using this variables yields small difference against national accounts and allows to measure growth in countries with relatively poor data and to use more disaggregated geographical units of analysis. In Figure ***1*** are shown the images that were used to construct this outcome variable following the steps suggested by Lowe (2014).

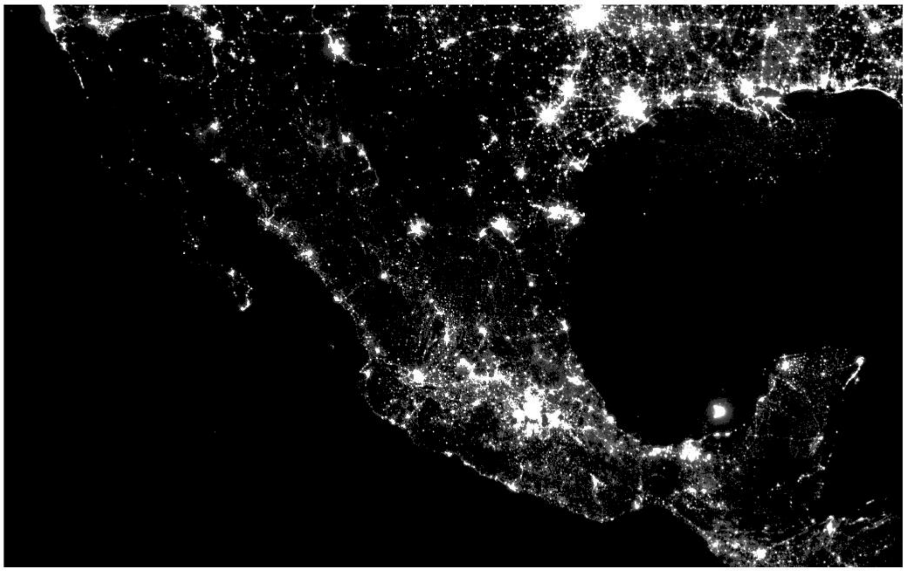
Figure 1 Night lights

(a) 1992

(b) 2000



(c) 2010



Source: U.S. National Oceanic and Atmospheric Administration.

3. DESCRIPTIVE STATISTICS AND DATA SOURCES

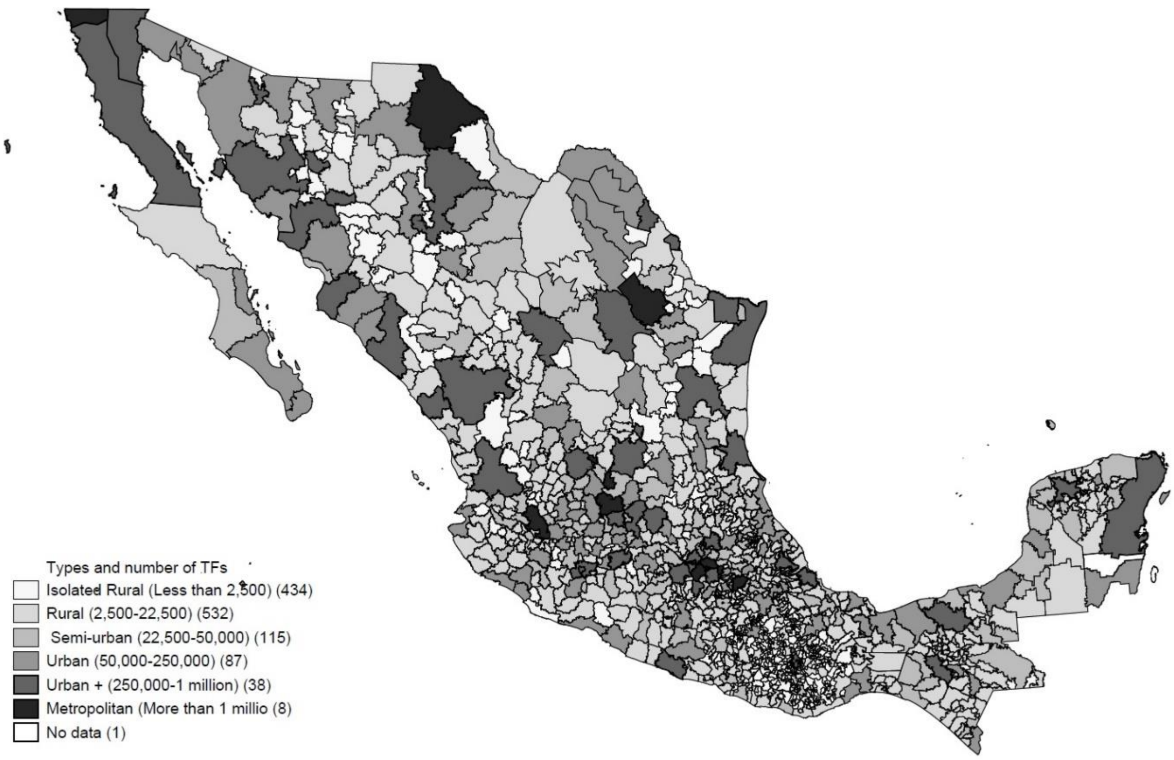
3.1 Data Sources

Data regarding internal migration other characteristics such as years of schooling were obtained from the sample of the 2000 and 2010 Mexico's Population and Housing Censuses. In order to characterize migration flows, the information regarding where the individual lived five years ago was used. This allows us to analyze migration flows that occurred between 1995 and 2000 and between 2005 and 2010.[2] Other information regarding municipality characteristics for the gravity model estimated in order to construct our instrumental variable was obtained from the State and Municipality Database System, INEGI.

Following Soloaga and Yunez Naude (2013), we use 1,215 functional territories instead of the 2,456 municipalities as our observation unit. These functional territories are defined using commuting flows between municipalities and applying cluster analysis. In this sense, the use of this units will allow us to avoid problems related to commuting as an individual could move from one municipality to another without really changing his economic environment or migrating. Figure 2 shows the functional territories by type (metropolitan, urban, rural, etc.). As the figure shows, more than half of the territories are rural territories. Therefore, it is important to consider a conditional convergence framework instead of an absolute one, considering that it is not expected that all the functional territories converge to a same steady state given the huge differences in their initial characteristics.

SAEs estimates were obtained from the World Bank at the municipality level and a weighted average using population was used in order to aggregate the data into functional territories.

Figure 2 Type of functional territories



Source: Soloaga and Yunez Naude (2013)

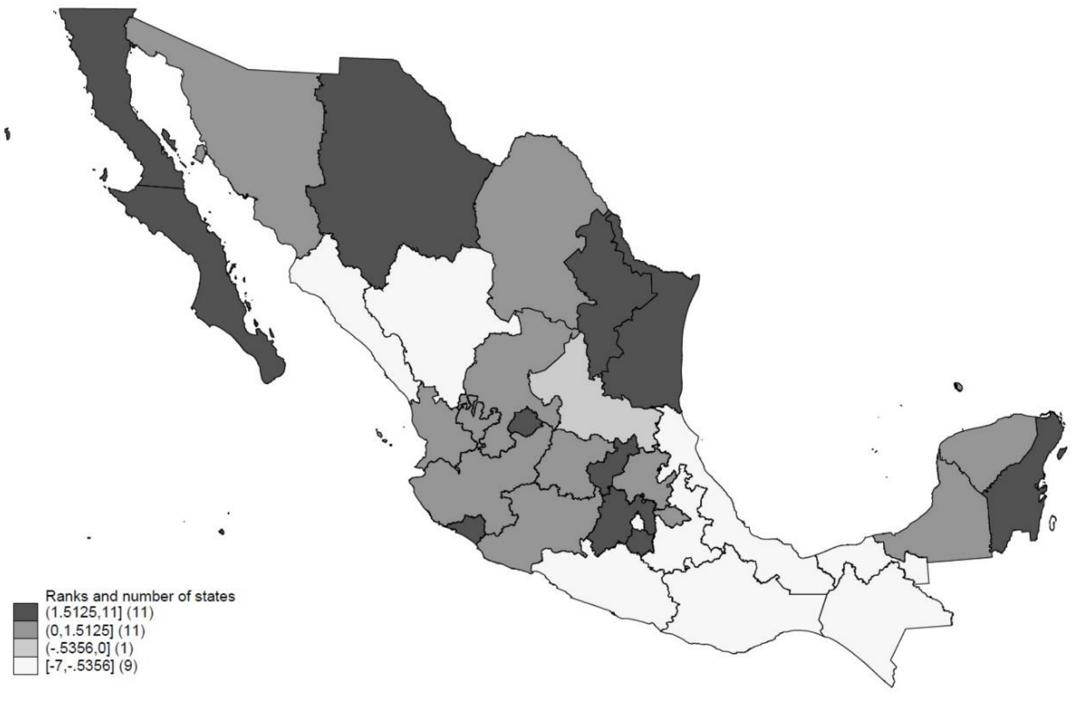
[2] Even though INEGI conducted Population Counts for 1995 and 2005, this information was not used considering that it includes only a subset of relevant variables and that this Counts do not include all the information needed for our analysis.

3.2 State level

First of all, we used state data from the 2000 and 2010 Population and Housing Census in order to characterize the migration flows and how they are related to growth. Between 1995 and 2000, 4.2 million people changed their state of residence. However, this figure reduced for the period of 2005-2010 with around 3.5 million people migrating, which represent 3 percent of Mexico's total population in 2010. From these, 52 percent were aged 25-65, which means that are individuals that are not likely to change their schooling level and are in the labor force.

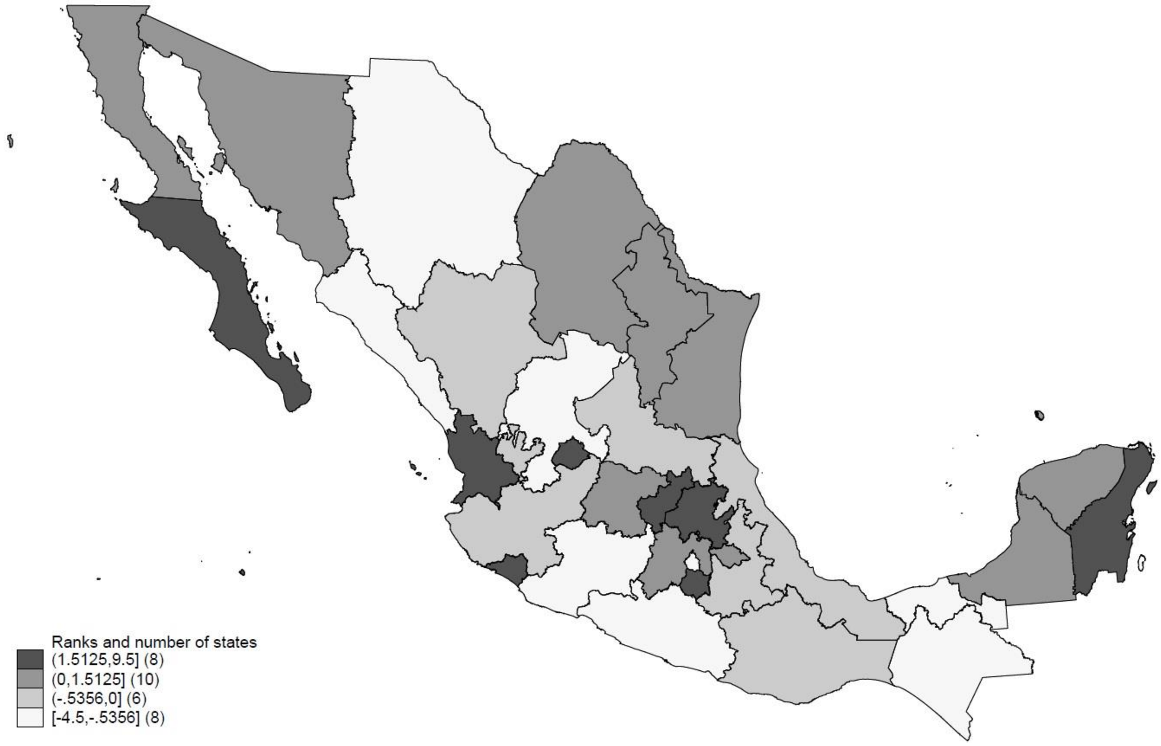
Considering the geographical dimension of this phenomenon, if we analyze net migration between 1995 and 2000, ten states had net migration outflows and the highest relative levels were observed in the case of Puebla, Distrito Federal, Veracruz and Guerrero, while the states with the highest levels of net inflows during this period were Quintana Roo, Baja California, Baja California Sur and Chihuahua (See Figure 3). It is worth noting that these patterns are very different from the ones observed in 2005-2010. For this last period we find that there are 14 states that exhibited net outflows and the highest levels of outflows relative to their population are observed in Distrito Federal, Guerrero and Chiapas. On the other hand, the states with the highest relative inflows are Baja California Sur, Quintana Roo, Colima, Nayarit and Queretaro (SeeFigure ***4***).

Figure 3 Net migration flows 1995-2000



Source: Authors' calculations using data from the 2000 Population and Housing Census, INEGI

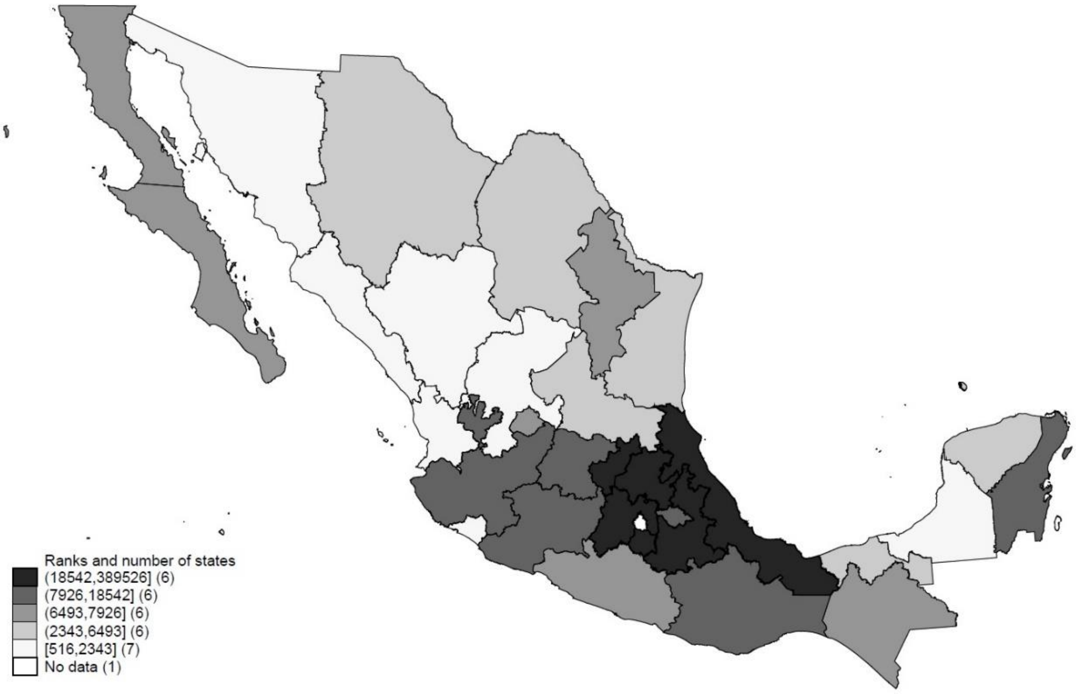
Figure 4 Net migration flows 2005-2010



Source: Authors' calculations using data from the 2010 Population and Housing Census, INEGI

In the case of Distrito Federal, which concentrates eight percent of the national population, it is important to note that even though it is the state with the highest level of migration outflows, it is surrounded by states with high inflows. Furthermore, if we analyze the destination of its outflows, most of the migrants move to neighbor states. (Figure 5). This indicates that the spatial dimension is an important factor to take into consideration in the estimations. Additionally, agglomeration forces could be playing a role in migration flows, generating incentives for people to move to the periphery.

Figure 5 Migration outflows from Distrito Federal

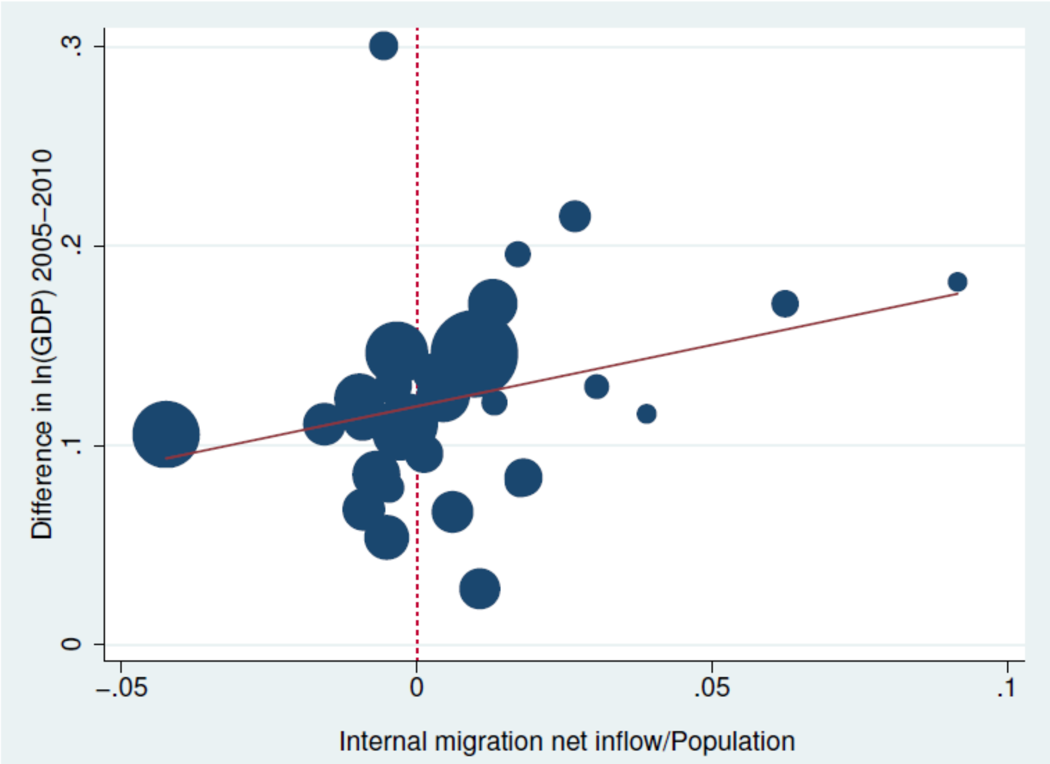


Source: Authors' calculations using data from the 2010 Population and Housing Census, INEGI

As

Figure ***6*** shows, those states that received larger inflows of internal migration, experienced a higher growth rate. Thus, there appears to be indeed a strong correlation between internal migration and GDP growth without controlling for any other characteristic.

Figure 6 GDP growth vs. Share of migration inflows



Source: Authors' calculations using data from the 2010 Population and Housing Census and from the National Accounts System, INEGI
Note: Following Chiquiar (2005) Campeche and Tabasco are excluded from the sample.

3.3 Functional territory level

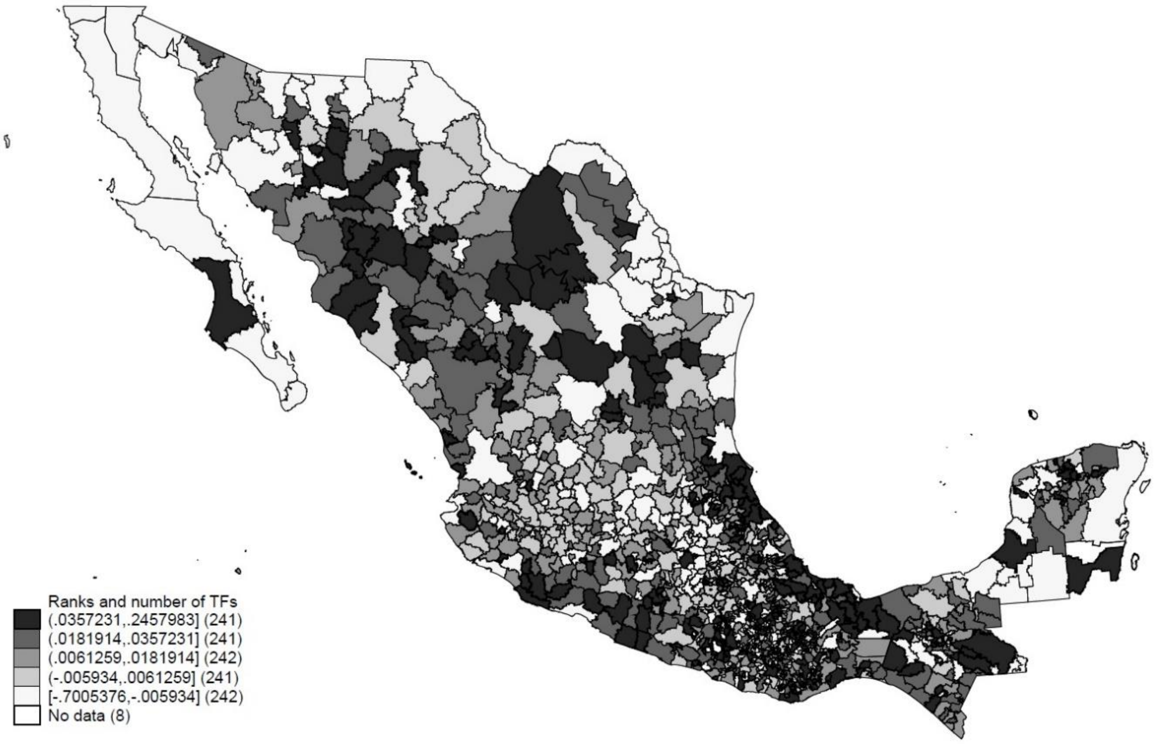
Once we consider functional territories, the number of migrants between 1995 and 2000 increases to 4.3 million. This figure is similar for 2005 and 2010. In order to analyze these flows geographically, we divided the functional territories in quintiles according to the net flows relative to population for 1995-2000. As

Figure *7* shows, territories located in the Northern region, but not the ones in the border exhibit the highest relative net inflows, along with some coastal territories. On the contrary, there is a region in the Center of the country where net outflows are observed.

Using the same thresholds for the 2005-2010 period, we observe a totally different distribution as now there are some territories in the border that exhibit net inflows, there are less territories that exhibit high net inflows and they are no longer in the coast, but there still is a region in the Center of the country with net outflows (See

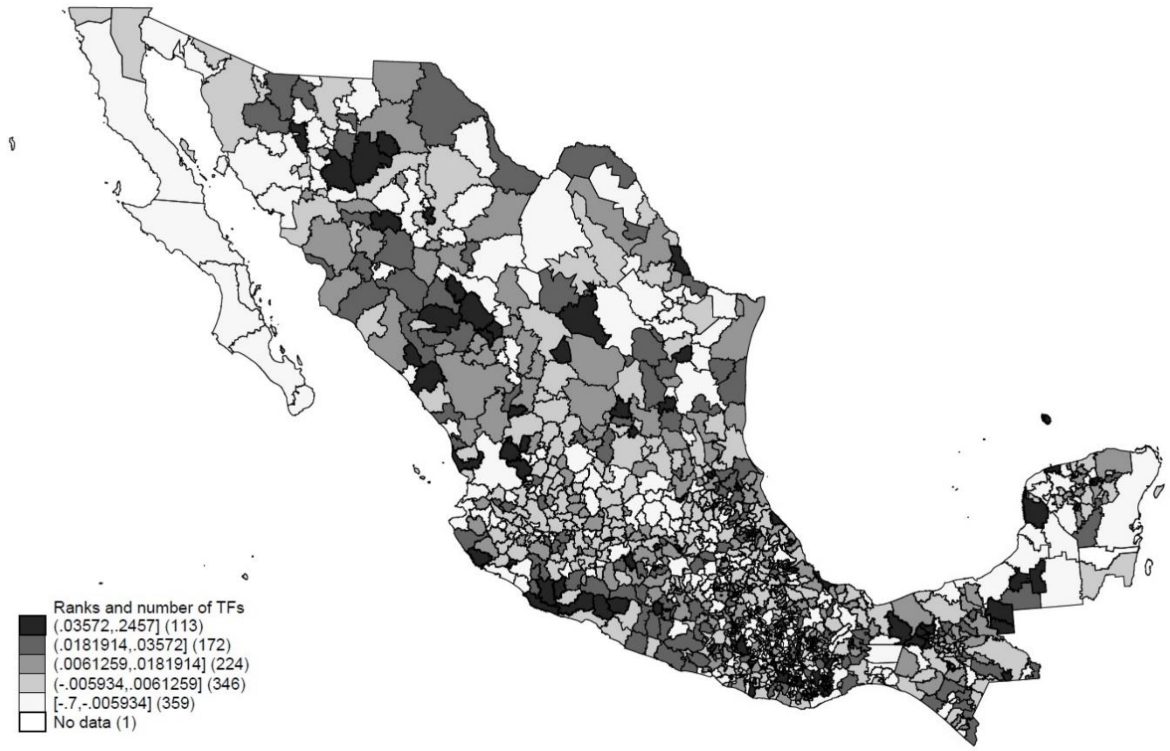
Figure *8*).

Figure 7 Net migration flows 1995-2000: Functional territories



Source: Authors' calculations using data from the 2000 Population and Housing Census and from the National Accounts System, INEGI

Figure 8 Net migration flows 2005-2010: Functional territories



Source: Authors' calculations using data from the 2010 Population and Housing Census and from the National Accounts System, INEGI

3.4 Characteristics of migrants

Regarding the personal characteristics of migrants, we find that they are relatively younger than non-migrants and that this differences are statistically significant. The evidence, as shown in Tables 1 and 2, points towards positive selection as migrants have a higher level of education. Non-migrants are on average below junior high-school, while migrants have on average finished this level. Analyzing this at the state level allows us to analyze if this only applies to inflows. In most of the cases people who left the state between 2005 and 2010 were more highly educated that the ones who stayed in the state. A similar pattern is observed when we compare migrants with non-migrants in the same state. That is, on average, migrants have more years on schooling than both people who stayed in their state of origin and people in the recipient state (See Appendix A, Table A8).

Considering the educational dynamics of migrants, as we observe in Appendix A, Figure A10, migrants became more highly educated in the period between 2000 and 2010, which is an expected outcome as since 1993 junior high-school is mandatory so the level increased for the whole population.

Finally, considering the occupational distribution of migrants, we observe that in activities such as agriculture and craftsmen, there is a much higher proportion of non-migrants regardless of the period considered and the geographical definition. On the contrary, there is a higher proportion of migrants among professionals and technicians, fixed machinery operators, support activities and protective services as well as managers and directors.

Table 1 Characteristics of internal migrants 2000

	Non-migrants	Migrants	Diff
Age	40.14	36.19	-3.94***
Schooling	7.49	9.13	1.69***
% male	0.47	0.52	0.05***

Source: Authors' calculations using data from the Population and Housing Census 2000, INEGI
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2 Characteristics of internal migrants 2010

	Non-migrants	Migrants	Diff
Age	41.39	37.40	-3.99***
Schooling	8.72	10.64	1.92***
% male	0.47	0.51	0.03***

Source: Authors' calculations using data from the Population and Housing Census 2010, INEGI
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3.5 Characteristics of the sample

Table 3 shows descriptive statistics for the functional territories included in the sample. As the table shows, and as mentioned before, even though both measures are used in logarithms and their magnitude should be comparable, the growth rates have different characteristics depending on the outcome measure selected (SAEs or night lights). The SAEs measure for the 1990-2000 period has a negative mean, indicating that on average, the incomes of the territories have decreased, while in the case of night lights, the mean is positive indicating an increase in economic activity. On the other hand, for 2000-2010, both measures have positive means, but they differ in the magnitudes of the growth rate.

In the case of the average years of schooling the means are really low, even though we are calculating this measure for individuals between 25 and 66, for whom education should not change. This could be due to the fact that our unit of observation are functional territories and we are calculating a simple mean and some of the functional territories are rural and their education level is low.

Table 3 Descriptive statistics Functional Territories 1990-2010

Variable	mean	p5	p10	p50	p90	p95	sd	N
				2000				
$ln(Y_t) - ln(Y_{t-1})$	-0.52	-1.19	-1.02	-0.52	-0.02	0.13	0.42	1,141
$ln(Lights_t) - ln(Lights_{t-1})$	0.69	0.09	0.19	0.59	1.35	1.59	0.47	1,141
$ln(Y_{t-1})$	7.52	6.78	6.94	7.54	8.09	8.20	0.46	1,141
$ln(Lights_{t-1})$	0.98	0.00	0.00	0.66	2.48	2.90	0.99	1,141
$Average\ Schooling_{t-1}$	3.35	1.22	1.61	3.20	5.37	6.06	1.43	1,141
$Urbanization\ rate_{t-1}$	19,699.50	0.00	0.00	0.00	32,680.11	82,683.85	83,844.47	1,141
$Average\ Population_{t-1}$	70,908.26	1,280.00	1,990.00	15,920.00	124,910.00	243,420.00	343,866.60	1,141
$Migration\ inflows_{t-1}$	1,721.60	5.00	9.00	154.00	2,458.00	6,477.00	8,377.82	1,141
				2010				
$ln(Y_t) - ln(Y_{t-1})$	0.09	-0.45	-0.31	0.08	0.52	0.63	0.35	1,180
$ln(Lights_t) - ln(Lights_{t-1})$	0.22	-0.12	-0.01	0.20	0.51	0.67	0.25	1,180
$ln(Y_{t-1})$	6.97	6.01	6.17	6.99	7.71	7.93	0.58	1,180
$ln(Lights_{t-1})$	1.65	0.12	0.30	1.69	2.87	3.28	1.00	1,180
$Average\ Schooling_{t-1}$	4.72	2.20	2.71	4.62	6.96	7.79	1.63	1,180
$Urbanization\ rate_{t-1}$	24,837.31	0.00	0.00	0.00	39,335.10	105,944.43	104,960.21	1,180
$Average\ Population_{t-1}$	81,993.72	1,199.00	1,940.00	16,340.00	136,595.50	288,011.50	382,382.39	1,180
$Migration\ inflows_{t-1}$	1,883.45	9.00	17.00	177.50	2,908.00	7,791.50	8,498.82	1,180

Authors' calculations with data from the 1990, 2000 and 2010 Population and Housing Censuses, INEGI, World Bank SAE Estimates and the U.S. National Oceanic and Atmospheric Administration

4. RESULTS

As the focus of this paper is on convergence, first of all we estimate a simple absolute convergence equation following the growth literature in which the dependent variable is growth and the independent variable is the lagged value of income. As the first column of Table 4 shows, the results indicate that there is absolute convergence as the coefficient of this regression is negative regardless of the outcome measure used. Once we analyze conditional convergence, by including the lagged value of schooling, the convergence term gets even a more negative value, indicating that there is a higher level of convergence once we control for education.

When we estimate a split regression (not shown here) separating the functional territories between the ones that received inflows of migrants above the median and the ones that received flows below the median, we find that the convergence rate is always higher for territories that received low inflows. This could be an indicator that migration inflows hinder growth convergence. However, we cannot test if the coefficients are significantly different so this result is just descriptive. This is observed for both of the outcomes used in this analysis (SAEs and night lights).

As columns (3) and (4) of Table 4 show, when we include migration inflows in the equation, regardless of the outcome variable, the convergence term gets slightly higher in absolute terms, which could be an indicator of migration contributing to increasing convergence. However, once we include the interaction between migration and the lag of income, we find that its coefficient is positive, indicating that migration reduces the convergence rate and furthermore, the coefficient of migration inflows becomes negative in some specifications, which means that it does not contribute to growth.

When we instrument for migration using the results of the gravity model, we observe similar results. In the case of the SAEs outcome, migration has a divergent effect as it reduces the convergence coefficient, and the logarithm of migration flows by itself has a negative effect over growth. However, when we analyze night lights, migration flows still have a positive effect over growth, but they reduce the convergence rate. These results hold in the case of an overidentified model (

Table 5) in which we instrument migration using the two instrumental variables constructed.

It is important to note that for migration flows alone, mixed results are observed as in some specifications using night lights, it has a positive and significant sign while in other specifications its coefficient is negative. Therefore, this effect is not clear, but what is robust across specifications is that migration reduces convergence.

Considering the mixed results observed regarding migration inflows in the case of the night lights outcome, we estimated quantile regressions (not shown here but available upon request) in order to analyze if the effects vary with the growth distribution. The quantile regression estimates indicate heterogeneity, depending on the distribution of growth, as the effects of this variable are positive in the left tail of the distribution and negative on the right tail of the growth distribution.

Table 4 Pooled regression OLS estimates of the Convergence equation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Outcome: SAEs income estimates				
$ln(Y_{t-1})$	-0.431***	-0.666***	-0.716***	-0.708***	-0.777***	-0.795***	-0.904***
	(0.0134)	(0.0117)	(0.0127)	(0.0233)	(0.0324)	(0.0329)	(0.0374)
$ln(migration\ inflows_t)$			0.0539***	0.0541***	-0.0722*	-0.0719*	-0.232***
			(0.00472)	(0.00476)	(0.0369)	(0.0377)	(0.0452)
$ln(Y_{t-1}) * ln(mig\ inflows_t)$					0.0171***	0.0206***	0.0421***
					(0.00506)	(0.00518)	(0.00625)
R^2	0.270	0.590	0.619	0.619	0.621	0.623	0.636
			Outcome: Night lights				
$ln(Lights_{t-1})$	-0.123***	-0.0561***	-0.0861***	-0.0411***	-0.0945***	-0.0878***	-0.105***
	(0.00783)	(0.00723)	(0.00750)	(0.00694)	(0.0196)	(0.0192)	(0.0203)
$ln(migration\ inflows_t)$			0.0594***	0.0249***	0.0130*	-0.0191	-0.0229*
			(0.00494)	(0.00514)	(0.00730)	(0.0121)	(0.0125)
$ln(Lights_{t-1}) * ln(miginflows_t)$					0.00946***	0.00786***	0.0106***
					(0.00303)	(0.00293)	(0.00309)
R^2	0.0865	0.198	0.243	0.344	0.347	0.352	0.354
Controls							
$Schooling_{t-1}$	No	Yes	Yes	Yes	Yes	Yes	Yes
Time effect	No	No	No	Yes	Yes	Yes	Yes
$Urbanization\ rate_{t-1}$	No	No	No	No	No	Yes	Yes
$Average\ Population_{t-1}$	No	No	No	No	No	Yes	Yes
Type of FT dummies	No	No	No	No	No	No	Yes
R^2	0.270	0.590	0.619	0.619	0.621	0.623	0.636
N	2,321	2,321	2,321	2,321	2,321	2,321	2,321

Source: Authors' calculations with data from the 1990, 2000 and 2010 Population and Housing Censuses, INEGI, World Bank SAE Estimates and the U.S. National Oceanic and Atmospheric Administration

Table 5 IV estimates of the Convergence equation IV gravity model

	(1)	(2)	(3)	(4)	(5)
			Outcome: SAEs income estimates		
$ln(Y_{t-1})$	-0.707***	-0.703***	-0.787***	-0.779***	-0.909***
	(0.0130)	(0.0233)	(0.0290)	(0.0308)	(0.0346)
$ln(migration\ inflows_t)$	0.0445***	0.0448***	-0.111***	-0.120***	-0.301***
	(0.00532)	(0.00539)	(0.0399)	(0.0429)	(0.0513)
$ln(Y_{t-1}) * ln(mig\ inflows_t)$			0.0211***	0.0200***	0.0458***
			(0.00535)	(0.00574)	(0.00691)
F-first stages					
Migration inflows	9,133.98	10,030.18	6,187.12	634.55	646.05
Migration inflows* $ln(Y_{t-1})$			6,762.18	696.70	702.78
			Outcome: Night lights		
$ln(Lights_{t-1})$	-0.0984***	-0.0524***	-0.0912***	-0.111***	-0.127***
	(0.00788)	(0.00734)	(0.0200)	(0.0212)	(0.0225)
$ln(migration\ inflows_t)$	0.0838***	0.0434***	0.0346***	0.0702***	0.0725***
	(0.00566)	(0.00597)	(0.00800)	(0.0210)	(0.0208)
$ln(Lights_{t-1}) * ln(mig\ inflows_t)$			0.00690**	0.0106***	0.0132***
			(0.00311)	(0.00320)	(0.00343)
F-first stages					
Migration inflows	9368.46	6968.77	3534.08	357.21	370.27
Migration inflows* $ln(Y_{t-1})$			3302.38	1858.01	1547.50
Controls					
$Schooling_{t-1}$	Yes	Yes	Yes	Yes	Yes
Time effect	No	Yes	Yes	Yes	Yes
$Urbanization\ rate_{t-1}$	No	No	No	Yes	Yes
$Average\ Population_{t-1}$	No	No	No	Yes	Yes
Type of FT dummies	No	No	No	No	Yes
N	2,321	2,321	2,321	2,321	2,321

Source: Authors' calculations with data from the 1990, 2000 and 2010 Population and Housing Censuses, INEGI, World Bank SAE Estimates and the U.S. National Oceanic and Atmospheric Administration

Table 6 IV estimates of the Convergence equation IV2

	(1)	(2)	(3)	(4)	(5)
			Outcome: SAEs income estimates		
$ln(Y_{t-1})$	-0.720***	-0.711***	-0.807***	-0.845***	-0.961***
	(0.0132)	(0.0236)	(0.0375)	(0.0377)	(0.0452)
$ln(migration\ inflows_t)$	0.0587***	0.0586***	-0.116**	-0.138***	-0.303***
	(0.00647)	(0.00647)	(0.0517)	(0.0513)	(0.0642)
$ln(Y_{t-1}) * ln(mig\ inflows_t)$			0.0238***	0.0318***	0.0548***
			(0.00677)	(0.00646)	(0.00830)
F-first stages					
Migration inflows	1200.95	1233.62	733.98	239.18	242.10
Migration inflows* $ln(Y_{t-1})$			765.17	268.05	260.07
			Outcome: Night lights		
$ln(Lights_{t-1})$	-0.0762***	-0.0324***	-0.110***	-0.0932***	-0.116***
	(0.00782)	(0.00780)	(0.0232)	(0.0213)	(0.0231)
$ln(migration\ inflows_t)$	0.0399***	0.0105	-0.00309	-0.0537**	-0.0542**
	(0.00776)	(0.00832)	(0.0114)	(0.0235)	(0.0236)
$ln(Lights_{t-1}) * ln(mig\ inflows_t)$		0.0134***	0.00936***	0.0131***	
			(0.00404)	(0.00343)	(0.00374)
F-first stages					
Migration inflows	1229.88	1143.79	638.59	239.3	240.72
Migration inflows* $ln(Y_{t-1})$			684.19	842.25	624.08
Controls					
$Schooling_{t-1}$	Yes	Yes	Yes	Yes	Yes
Time effect	No	Yes	Yes	Yes	Yes
$Urbanization\ rate_{t-1}$	No	No	No	Yes	Yes
$Average\ Population_{t-1}$	No	No	No	Yes	Yes
Type of FT dummies	No	No	No	No	Yes
N	2,321	2,321	2,321	2,321	2,321

Source: Authors' calculations with data from the 1990, 2000 and 2010 Population and Housing Censuses, INEGI, World Bank SAE Estimates and the U.S. National Oceanic and Atmospheric Administration

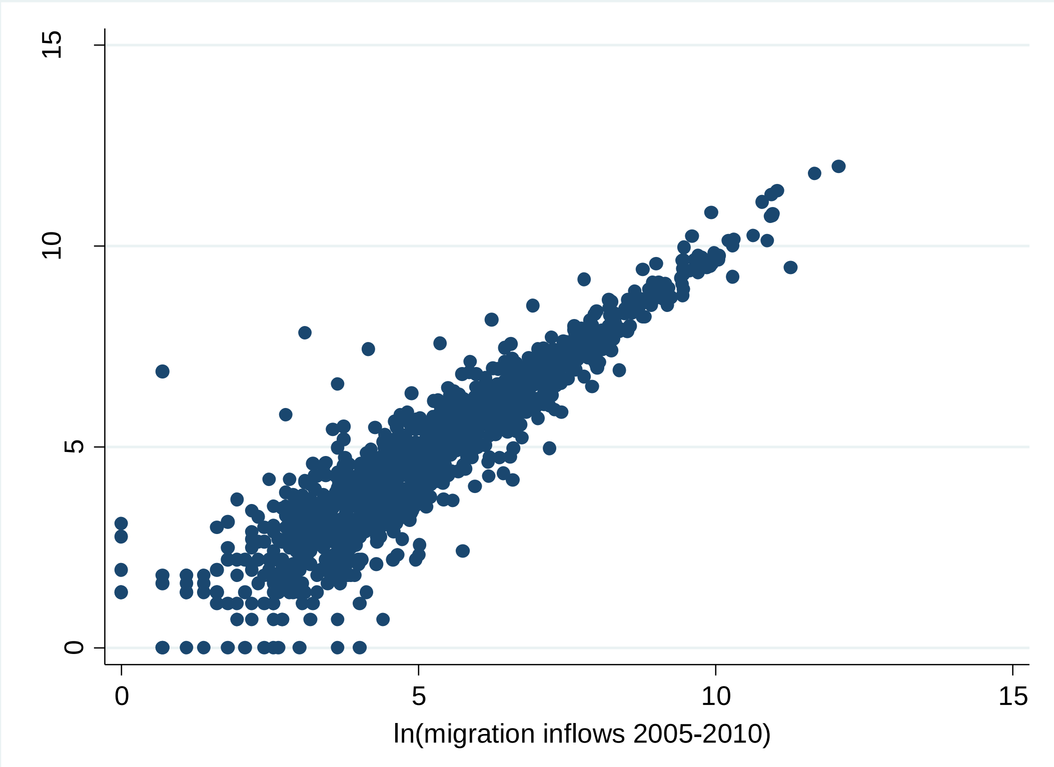
Table 7 IV estimates of the Convergence equation: Overidentified model

	(1)	(2)	(3)	(4)	(5)
	Outcome: SAEs income estimates				
$ln(Y_{t-1})$	-0.707***	-0.703***	-0.795***	-0.810***	-0.943***
	(0.0130)	(0.0233)	(0.0288)	(0.0315)	(0.0362)
$ln(migration\ inflows_t)$	0.0445***	0.0448***	-0.119***	-0.125***	-0.321***
	(0.00532)	(0.00539)	(0.0392)	(0.0444)	(0.0544)
$ln(Y_{t-1}) * ln(mig\ inflows_t)$			0.0225***	0.0253***	0.0525***
			(0.00526)	(0.00602)	(0.00741)
F-first stages					
Migration inflows	4573.07	5026.96	3659.44	499.38	509.19
Migration inflows* $ln(Y_{t-1})$			3978.55	533.02	538.87
Sargan	0.3300	0.3326	0.0000	0.000	0.000
	Outcome: Night lights				
$ln(Lights_{t-1})$	-0.0984***	-0.0524***	-0.0913***	-0.111***	-0.130***
	(0.00788)	(0.00734)	(0.0200)	(0.0212)	(0.0219)
$ln(migration\ inflows_t)$	0.0838***	0.0434***	0.0346***	0.0701***	-0.0529**
	(0.00565)	(0.00596)	(0.00799)	(0.0209)	(0.0235)
$ln(Lights_{t-1}) * ln(mig\ inflows_t)$			0.00690**	0.0106***	0.0155***
			(0.00311)	(0.00320)	(0.00341)
F-first stages					
Migration inflows	4573.0	4695.12	1781.15	189.82	128.63
Migration inflows* $ln(Y_{t-1})$			1834.48	1036.65	751.66
Sargan	0.3762	0.4681	0.3688	0.3424	0.1839
Controls					
$Schooling_{t-1}$	Yes	Yes	Yes	Yes	Yes
Time effect	No	Yes	Yes	Yes	Yes
$Urbanization\ rate_{t-1}$	No	No	No	Yes	Yes
$Average\ Population_{t-1}$	No	No	No	Yes	Yes
Type of FT dummies	No	No	No	No	Yes
N	2,321	2,321	2,321	2,321	2,321

Source: Authors' calculations with data from the 1990, 2000 and 2010 Population and Housing Censuses, INEGI, World Bank SAE Estimates and the U.S. National Oceanic and Atmospheric Administration

It is important to note that even though we have a panel, none of the regressions shown include fixed effects. The main reason behind this follows Barro (2012) is that we aim at estimating a coefficient over the migration variable with precision and as mentioned by this author, when there is little within variation in the explanatory variable, coefficients cannot be estimated with precision. As Figure 9 shows, this is the case of migration inflows, which are the main interest of this paper.

Figure 9 Relation between migration inflows 1995-2000 and 2005-2010



Source: Authors' calculations with data from the 2000 and 2010 Population and Housing Censuses

5. CONCLUDING REMARKS

Regional inequalities are a concern for policy-makers, because they affect the wellbeing and opportunities of dwellers of marginalized territories, and may also hinder the aggregate economic growth of a country. Internal migration is primarily induced by differences in living standards across space, but also has an impact on those differences over time. In neoclassical growth models, internal migration is an adjustment mechanism towards regional convergence in incomes and wellbeing. In endogenous growth and new economic geography models, on the other hand, which allow for increasing returns and positive externalities from skill accumulation, internal migration can be a mechanism of regional divergence instead of convergence. This is reinforced if, as is typically found, positive selection of migrants prevails, because an inflow of skilled labor to a richer region increases, rather than decreasing, real wage at destination, and reduces real wages at origin.

This paper investigated whether internal migration has any long-term effects on conditional convergence across regions in Mexico. Internal migration is an important phenomenon in Mexico, where in 2010 almost twenty million people (18 percent of the population) were living in a different state from where they were born, versus about 12 percent of the population who migrated internationally. Mexico is also characterized by severe regional inequalities, which appear to have widened over the last three decades, after a period of regional convergence between 1940 and 1985. We estimated a conditional regional convergence equation, measuring the impact of internal migration on income growth in a panel of functional territories for the period 2000-2010 instrumenting migration by estimating a gravity model of internal migration between pairs of territories and aggregating these data in order to construct a predicted migration inflow for each territory. Alternatively, we used networks interacted with distance between territories as an exogenous estimate of internal migration inflows.

The results show that controlling for migration inflows does not appear to affect the convergence term much. However, when we interact migration inflows with initial income in our growth equations appropriately instrumenting migration, results indicate that migration flows not only lead to lower growth, but they have a divergent effect as the convergence term is lower for territories that exhibit higher migration inflows. Furthermore, there appears to be heterogeneity across the territory growth distribution which could be an indicator of clubs convergence.

Possible extensions for this analysis includes generating a regression-adjusted measure of income based on wages, which could be more correlated with the labor market as well as analyzing further the heterogeneity found with quantile regressions. Finally, a different set of instruments based on variables such as communications should be tested in order to analyze the robustness of the results.

REFERENCES

Aguilar-Ortega, T. (2011). Migración y desarrollo en el noroeste de Michoacán, 1995-2005. Convergencia, 18(55):135-160.

Barro, R. J. (2012). Convergence and modernization revisited (No. w18295). National Bureau of Economic Research.

Barro, R. J. and Sala-i Martin, X. (1992a). Convergence. *Journal of political Economy*, pages 223-251.

Barro, R. T. and Sala-i Martin, X. (1992b). Regional growth and migration: A japan-united states comparison. *Journal of the Japanese and International Economies*, 6(4):312-346.

Beine, M., Docquier, F., and Rapoport, H. (2001). Brain drain and economic growth: theory and evidence. *Journal of development economics*, 64(1):275-289.

Beine, M., Docquier, F., and Rapoport, H. (2008). Brain drain and human capital formation in developing countries: Winners and losers*. *The Economic Journal,* 118(528):631-652.

Bénassy, J.-P. and Brezis, E. S. (2013). Brain drain and development traps. *Journal of Development Economics*, 102:15-22.

Bhagwati, J. and Hamada, K. (1974). The brain drain, international integration of markets for professionals and unemployment: a theoretical analysis. Journal of Development Economics, 1(1):19-42.

Borjas, G. J. (1987). Self-selection and the earnings of immigrants. The American Economic Review, pages 531-553.

Cárdenas, M. and Pontón, A. (1995). Growth and convergence in Colombia: 1950-1990. *Journal of Development Economics*, 47(1):5-37.

Cerina, F. and Mureddu, F. (2014). Is agglomeration really good for growth? Global efficiency, interregional equity and uneven growth. *Journal of Urban Economics*, 84:9-22.

Chiquiar, D. (2005). Why Mexico's regional income convergence broke down. *Journal of Development Economics*, 77(1):257-275.

DiCecio, R. and Gascon, C. S. (2010). Income convergence in the United States: a tale of migration and urbanization. *The Annals of Regional Science*, 45(2):365-377.

Docquier, F. and Rapoport, H. (2012). Globalization, brain drain, and development. *Journal of Economic Literature*, pages 681-730.

Dollar, D. and Kraay, A. (2003). Institutions, trade, and growth. *Journal of monetary economics*, 50(1):133-162.

Elbers, C., Lanjouw, J. O., and Lanjouw, P. (2002). Micro-level estimation of welfare, volume 2911. World Bank Publications.

Elbers, C., Lanjouw, J. O., and Lanjouw, P. (2003). Micro-level estimation of poverty and inequality. *Econometrica*, 71(1):355-364.

Esquivel, G. (1999). Convergencia regional en México, 1940-1995. *El trimestre económico*, pages 725-761.

Esquivel, G. and Messmacher, M. (2002). Sources of regional (non) convergence in Mexico. El Colegio de México y Banco de México, Mexico City.

Frankel, J. A. and Romer, D. (1999). Does trade cause growth? *American Economic Review*, pages 379-399.

Fratesi, U. and Percoco, M. (2014). Selective migration, regional growth and convergence: evidence from Italy. *Regional Studies,* 48(10):1650-1668.

Guajardo, J. A. T. et al. (1997). Migración interna, capital humano y crecimiento económico en México, 1970-1990. *Economía Mexicana Nueva Época*, 6(2):197-222.

Henderson, J. V., Storeygard, A., and Weil, D. N. (2012). Measuring economic growth from outer space. *American Economic Review*, 102(2):994-1028.

Henderson, V., Storeygard, A., and Weil, D. N. (2011). A bright idea for measuring economic growth. *American Economic Review*, 101(3):194-99.

Kanbur, R., Rapoport, H., et al. (2005). Migration selectivity and the evolution of spatial inequality. *Journal of Economic Geography*, 5(1):43-57.

Kirdar, M. G. and Saracoğlu, D. Ş. (2008). Migration and regional convergence: An empirical investigation for Turkey*. *Papers in Regional Science*, 87(4):545-566.

Lowe, M. (2014). Night lights and ArcGis: A brief guide. Available online: http://economics. mit.edu/_les/8945 (accessed on 22 August 2014).

Mankiw, N. G., Romer, D., and Weil, D. N. (1992). A contribution to the empirics of economic growth. *The Quarterly Journal of Economics*, 107(2):407-437.

Maza, A. (2006). Migrations and regional convergence: The case of Spain. Jahrbuch für Regionalwissenschaft, 26(2):191-202.

McKenzie, D. and Rapoport, H. (2007). Network effects and the dynamics of migration and inequality: theory and evidence from Mexico. *Journal of Development Economics*, 84(1):1-24.

McKenzie, D. and Sasin, M. J. (2007). Migration, remittances, poverty, and human capital: conceptual and empirical challenges. World Bank Policy Research Working Paper, (4272).

McKenzie, D., Stillman, S., and Gibson, J. (2010). How important is selection? experimental vs. non-experimental measures of the income gains from migration. *Journal of the European Economic Association*, 8(4):913-945.

Mendoza, J. E. and Calderón, C. (2013). Efectos de los flujos externos y las remesas en el crecimiento económico regional: Un análisis de datos de corte transversal. Revista Nicolaita de Estudios Económicos, 1(1):129-154.

Miyagiwa, K. (1991). Scale economies in education and the brain drain problem. *International Economic Review*, pages 743-759.

Mountford, A. (1997). Can a brain drain be good for growth in the source economy? *Journal of Development Economics*, 53(2):287-303.

Østbye, S. and Westerlund, O. (2007). Is migration important for regional convergence? Comparative evidence for Norwegian and Swedish counties, 1980-2000. *Regional Studies*, 41(7):901-915.

Peeters, L. (2008). Selective in-migration and income convergence and divergence across Belgian municipalities. *Regional Studies*, 42(7):905-921.

Reichlin, P. and Rustichini, A. (1998). Diverging patterns with endogenous labor migration. *Journal of Economic Dynamics and Control*, 22(5):703-728.

Rodríguez-Oreggia, E. (2007). Winners and losers of regional growth in Mexico and their dynamics. *Investigación Económica,* pages 43-62.

Romer, P. M. (1990). Endogenous technological change. Journal of Political Economy, 98(5 pt 2).

Shioji, E. (2001). Composition effect of migration and regional growth in Japan. *Journal of the Japanese and International Economies*, 15(1):29-49.

Soloaga, I. and Lara, G. (2006). The human development index as determinant of migration in Mexico: a gravity model approach. Background Paper for the Informe sobre Desarrollo Humano Mexico.

Soloaga, I., Lara, G., and Wendelspiess, F. (2010). Determinantes de la migración interestatal en México: 1995-2000 y 2000-2005. *Volumen Economía Regional*, Mexico City.

Soloaga, I. and Yunez Naude, A. (2013). Dinámicas del bienestar territorial en México basadas en los territorios funcionales: 2005-2010. Technical report, Mimeo. RIMISP.

Stark, O., Helmenstein, C., and Prskawetz, A. (1997). A brain gain with a brain drain. *Economics letters*, 55(2):227-234.

UN-DESA and OECD (2013). World migration in Figures. Technical report, OECD-UNDESA.

Wendelspiess Chavez Juarez, F. T. and Wanner, P. (2012). Determinants of internal migration in Mexico at an aggregated and a disaggregated level. Available at SSRN 1978806.

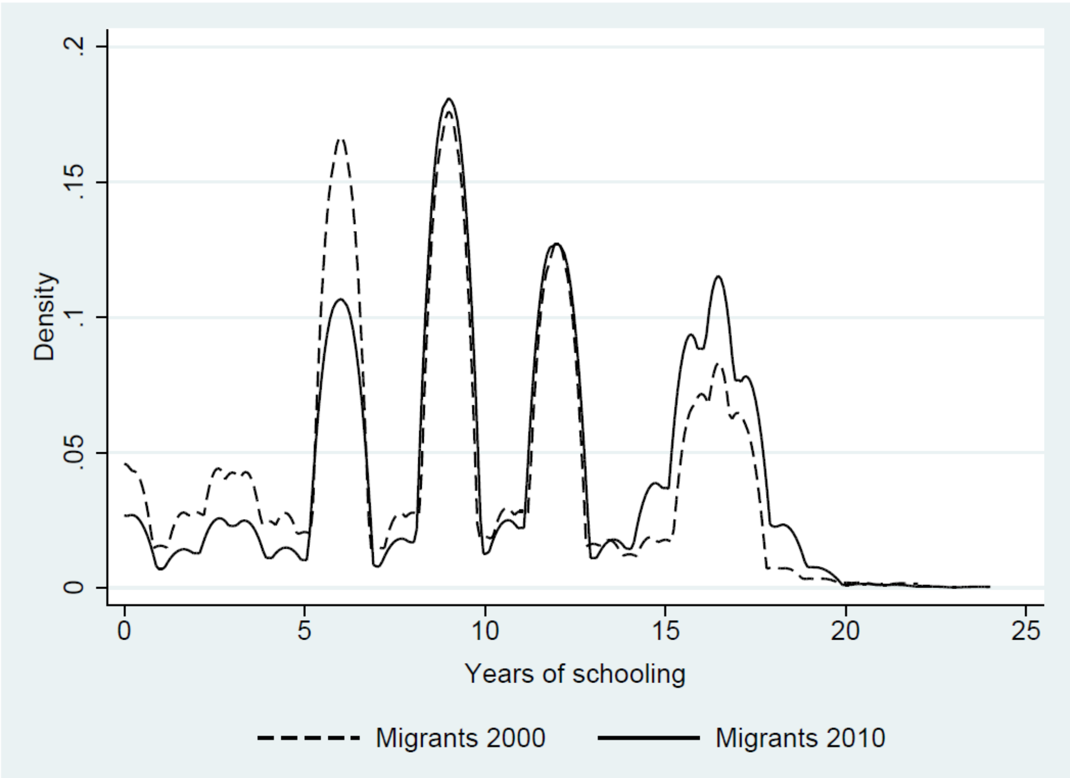
Woodruff, C. and Zenteno, R. (2007). Migration networks and microenterprises in Mexico. *Journal of Development Economics*, 82(2):509-528.

World Bank Group (2009). World development report 2009: Reshaping economic geography.

Yunez Naude, A., Arellano, J., and Jimena, M. (2013). Dinámicas del bienestar territorial en México basadas en municipios: 1990-2005-2010. Technical report, Documento de Trabajo N24. Serie Estudios Territoriales. Programa Cohesion Territorial para el Desarrollo. RIMISP, Santiago, Chile.

APPENDIX A: CHARACTERISTICS OF MIGRANTS

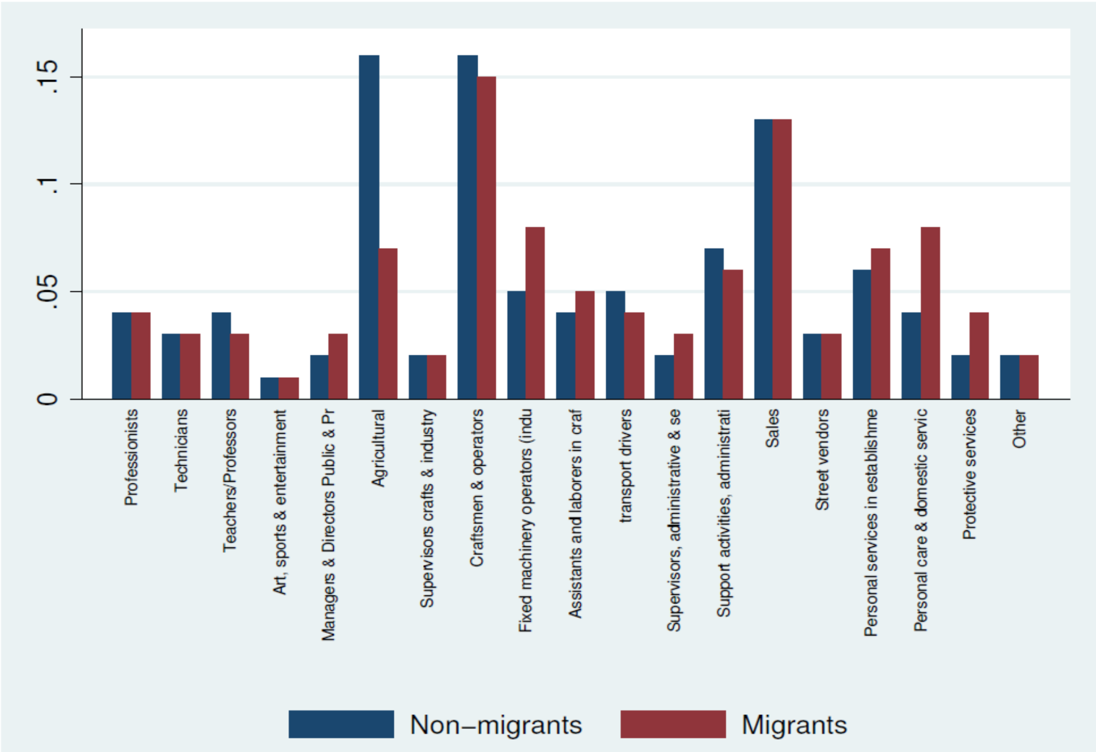
FIGURE A10: KERNEL DENSITY SCHOOLING OF MIGRANTS AGED 25-66



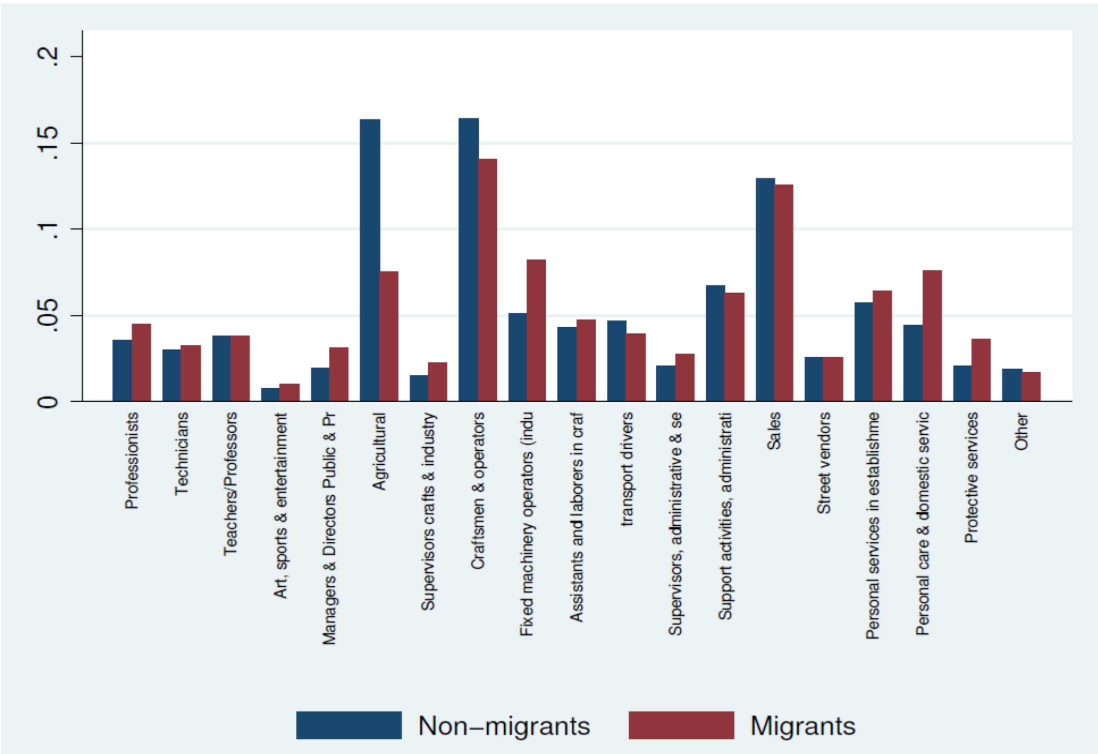
Source: Authors' calculations using data from the 2010 Population and Housing Census, INEGI

FIGURE A11: OCCUPATIONS DISTRIBUTION: 1995-2000

(a) STATE



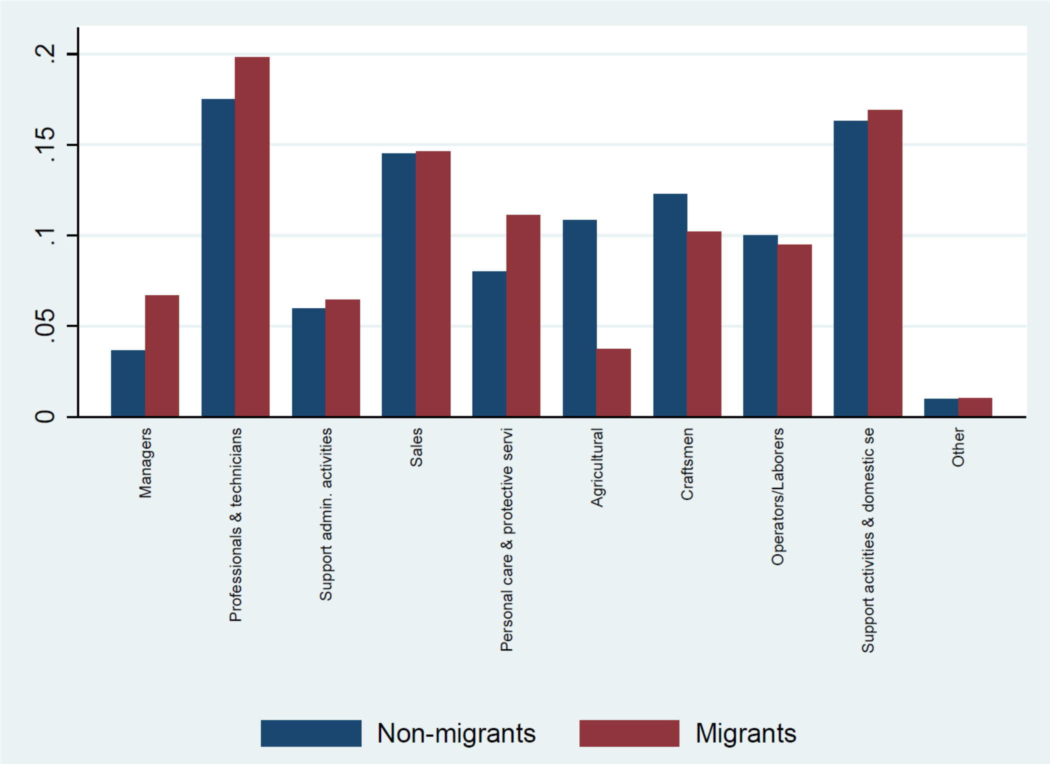
(b) Functional territory



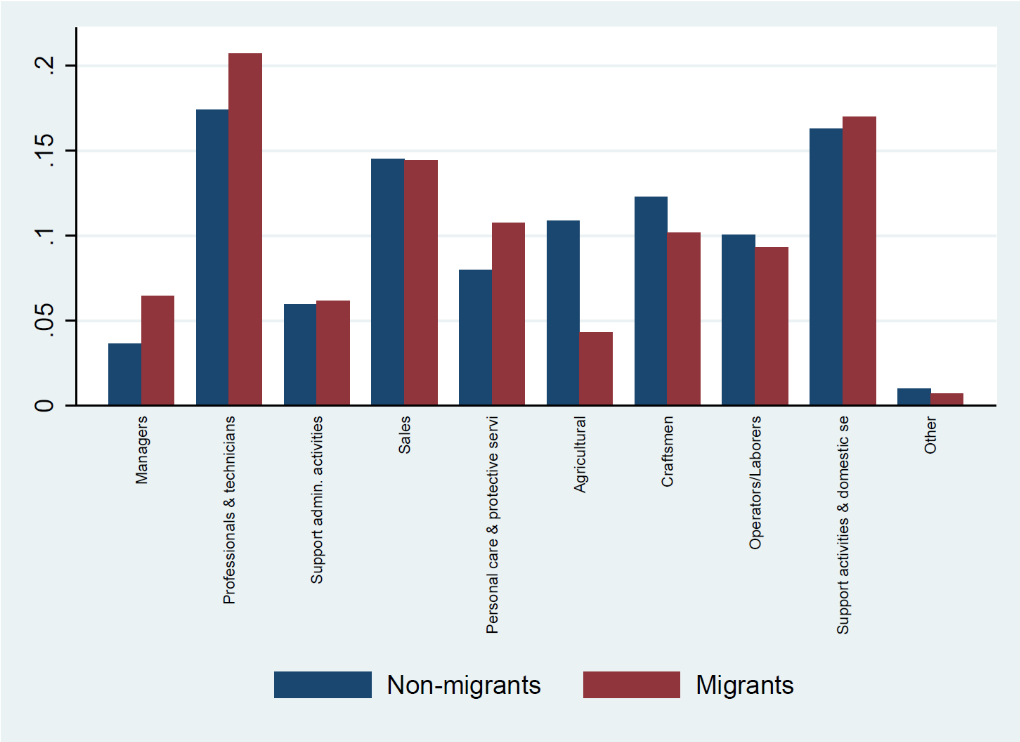
Source: Authors' calculations using data from the 2010 Population and Housing Census, INEGI

Figure A12: Occupations distribution: 2005-2010

(a) State



(b) Functional territory



Source: Authors' calculations using data from the 2010 Population and Housing Census, INEGI

Table A8: Characteristics of migrants: State level 2010

		Non-migrants (A)	Inflow (B)	Diff (B-A)		Outflow (C)	Diff (C-A)	
Aguascalientes	Age	40.93	37.28	-3.64	***	36.80	-4.13	***
	Schooling	9.25	11.51	2.26	***	11.41	2.16	***
	% Male	0.47	0.51	0.03	***	0.48	0.00	
Baja California	Age	40.78	36.68	-4.10	***	37.36	-3.42	***
	Schooling	9.44	9.11	-0.33	***	9.41	-0.03	
	% Male	0.50	0.51	0.01		0.55	0.05	***
Baja California	Age	41.35	36.75	-4.59	***	37.28	-4.07	***
Sur	Schooling	9.77	10.78	1.01	***	10.39	0.62	***
	% Male	0.50	0.57	0.07	***	0.59	0.08	***
Campeche	Age	41.02	36.13	-4.89	***	36.84	-4.18	***
	Schooling	8.58	11.23	2.65	***	10.68	2.10	***
	% Male	0.48	0.55	0.07	***	0.52	0.04	***
Coahuila	Age	41.32	37.63	-3.69	***	37.39	-3.93	***
	Schooling	9.56	11.41	1.85	***	10.89	1.33	***
	% Male	0.49	0.52	0.03	***	0.55	0.06	***
Colima	Age	41.43	38.32	-3.11	***	36.96	-4.48	***
	Schooling	9.15	10.14	0.99	***	10.98	1.83	***
	% Male	0.49	0.51	0.02	*	0.53	0.04	***
Chiapas	Age	40.58	35.95	-4.63	***	35.33	-5.25	***
	Schooling	6.17	10.44	4.27	***	8.88	2.70	***
	% Male	0.48	0.54	0.06	***	0.50	0.02	***
Chihuahua	Age	41.32	37.88	-3.44	***	37.12	-4.20	***
	Schooling	8.93	10.41	1.49	***	9.77	0.85	***
	% Male	0.48	0.53	0.05	***	0.55	0.07	***
Distrito Federal	Age	42.40	36.80	-5.60	***	39.08	-3.32	***
	Schooling	11.03	12.40	1.36	***	11.31	0.28	***
	% Male	0.46	0.49	0.03	***	0.50	0.04	***
Durango	Age	41.58	37.25	-4.34	***	36.60	-4.98	***
	Schooling	8.70	9.24	0.54	***	9.69	0.99	***
	% Male	0.48	0.55	0.07		0.47	0.00	
Guanajuato	Age	40.99	37.97	-3.02	***	37.08	-3.91	***
	Schooling	7.71	11.30	3.59	***	10.85	3.15	***
	% Male	0.46	0.53	0.07	***	0.49	0.02	***

Source: Authors' calculations using data from the Population and Housing Census 2010, INEGI
** $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$*

Table A8: Characteristics of migrants: State level 2010 *(continued)*

		Non-migrants (A)	Inflow (B)	Diff (B-A)		Outflow (C)	Diff (C-A)	
Guerrero	Age	41.50	37.34	-4.16	***	36.44	-5.06	***
	Schooling	7.26	9.58	2.31	***	9.72	2.45	***
	% Male	0.47	0.54	0.07	***	0.49	0.03	***
Hidalgo	Age	41.56	37.77	-3.79	***	36.48	-5.07	***
	Schooling	8.01	10.12	2.11	***	10.23	2.22	***
	% Male	0.46	0.49	0.03	***	0.50	0.03	***
Jalisco	Age	41.23	37.32	-3.92	***	36.81	-4.42	***
	Schooling	8.87	10.96	2.08	***	11.23	2.36	***
	% Male	0.47	0.51	0.04	***	0.52	0.05	***
Mexico	Age	41.03	37.96	-3.08	***	37.90	-3.14	***
	Schooling	9.06	10.64	1.58	***	10.82	1.75	***
	% Male	0.47	0.49	0.02	***	0.50	0.02	***
Michoacan	Age	41.51	39.11	-2.40	***	36.61	-4.89	***
	Schooling	7.37	10.01	2.64	***	10.01	2.65	***
	% Male	0.47	0.51	0.04	***	0.52	0.05	***
Morelos	Age	42.20	40.63	-1.57	***	37.72	-4.49	***
	Schooling	9.19	11.00	1.81	***	11.08	1.89	***
	% Male	0.46	0.50	0.04	***	0.48	0.02	**
Nayarit	Age	41.80	36.95	-4.85	***	37.11	-4.69	***
	Schooling	8.72	9.83	1.11	***	10.02	1.30	***
	% Male	0.48	0.52	0.04	***	0.50	0.02	
Nuevo León	Age	41.17	36.02	-5.15	***	36.27	-4.90	***
	Schooling	10.09	11.17	1.08	***	12.10	2.01	***
	% Male	0.50	0.49	0.00		0.55	0.06	***
Oaxaca	Age	41.75	37.41	-4.35	***	36.42	-5.34	***
	Schooling	6.77	9.04	2.27	***	9.04	2.27	***
	% Male	0.46	0.51	0.05	***	0.48	0.02	***
Puebla	Age	41.15	37.69	-3.46	***	35.61	-5.54	***
	Schooling	7.86	9.93	2.06	***	10.49	2.63	***
	% Male	0.46	0.49	0.03	***	0.51	0.05	***
Queretaro	Age	40.48	38.21	-2.27	***	36.68	-3.80	***
	Schooling	9.00	12.24	3.25	***	12.36	3.36	***
	% Male	0.47	0.47	0.00		0.51	0.03	***
Quintana Roo	Age	39.59	35.84	-3.75	***	36.88	-2.71	***
	Schooling	9.00	10.66	1.66	***	10.53	1.54	***
	% Male	0.50	0.52	0.02	**	0.56	0.05	***

Source: Authors' calculations using data from the Population and Housing Census 2010, INEGI
** p < 0.10, ** p < 0.05, *** p < 0.01*

Table A8: Characteristics of migrants: State level 2010 *(continued)*

		Non-migrants (A)	Inflow (B)	Diff (B-A)		Outflow (C)	Diff (C-A)	
San Luis Potosí	Age	41.62	37.15	-4.47	***	36.32	-5.30	***
	Schooling	8.36	10.74	2.38	***	10.22	1.86	***
	% Male	0.47	0.49	0.02	***	0.48	0.01	
Sinaloa	Age	41.90	37.06	-4.84	***	36.90	-5.00	***
	Schooling	9.17	10.09	0.92	***	10.19	1.02	***
	% Male	0.49	0.53	0.04	***	0.50	0.02	*
Sonora	Age	41.55	37.57	-3.97	***	37.64	-3.91	***
	Schooling	9.55	10.35	0.80	***	10.59	1.04	***
	% Male	0.49	0.56	0.06	***	0.52	0.03	***
Tabasco	Age	40.86	36.20	-4.66	***	36.28	-4.58	***
	Schooling	8.77	11.28	2.51	***	10.59	1.83	***
	% Male	0.48	0.51	0.03	**	0.54	0.06	***
Tamaulipas	Age	41.38	36.93	-4.45	***	36.59	-4.78	***
	Schooling	9.35	9.80	0.46	***	10.63	1.29	***
	% Male	0.48	0.51	0.03	***	0.52	0.04	***
Tlaxcala	Age	40.68	37.50	-3.18	***	36.89	-3.78	***
	Schooling	8.84	10.30	1.46	***	10.46	1.62	***
	% Male	0.46	0.50	0.04	***	0.46	0.00	
Veracruz	Age	42.17	37.20	-4.97	***	36.58	-5.59	***
	Schooling	7.67	9.74	2.07	***	9.92	2.25	***
	% Male	0.46	0.52	0.06	***	0.49	0.03	***
Yucatán	Age	41.42	37.91	-3.51	***	36.32	-5.09	***
	Schooling	8.10	11.24	3.13	***	11.10	3.00	***
	% Male	0.48	0.53	0.05	***	0.51	0.03	***
Zacatecas	Age	41.42	37.02	-4.39	***	37.00	-4.41	***
	Schooling	8.05	9.88	1.83	***	9.95	1.90	***
	% Male	0.47	0.51	0.04	***	0.50	0.02	***

Source: Authors' calculations using data from the Population and Housing Census 2010, INEGI
** p < 0.10, ** p < 0.05, *** p < 0.01*

APPENDIX B GRAVITY MODEL OF MIGRATION FLOWS RESULTS

As Table B9 shows, the gravity model has the expected signs in the case of distance as when the distance increases, migration reduces but at an increasing rate, but at an increasing rate. On the other hand, the effects of initial income is counter intuitive as a higher income in the functional territory of origin increases migration flows while the opposite occur with the income of the territory of destination. This result could be due to our unit of observation as individuals could prefer moving to the periphery instead of living in territories where economic activity is high.

The rest of the variables have the expected effects over migration flows. An interesting result is the one observed for the Mexico City dummy as results change from the 2000 regression to the 2010 regression. This could be due to the fact that there are incentives to decentralize activity from the Capital of the country to other cities.

Table B9: Gravity model migration flows 2000- 2010

Dependent variable: migration flows	2000	2010
ln(distance)	-0.905***	-0.947***
	(0.0374)	(0.0473)
$ln(distance)^2$	0.0397***	0.0430***
	(0.00345)	(0.00429)
$ln(per-capita\ income\ destination_{t-1})$	-0.527***	-0.495***
	(0.00517)	(0.00624)
$ln(per-capita\ income\ origin_{t-1})$	0.274***	0.132***
	(0.0195)	(0.0235)
ln(stock of migrants)	0.0244***	0.0168***
	(0.00221)	(0.00254)
Neighbors dummy	0.299***	0.231***
	(0.0498)	(0.0607)
Schooling destination	0.223***	0.234***
	(0.00444)	(0.00614)
Income real growth destination	0.0778***	-0.0246***
	(0.00470)	(0.00577)
Income real growth origin	-0.0381***	0.00587
	(0.00608)	(0.00652)
Mexico city is the origin	-0.0404*	0.0907***
	(0.0231)	(0.0271)
Mexico city is the destination	-0.283***	-0.339***
	(0.0284)	(0.0280)
Dummy U.S. border destination	0.418***	0.455***
	(0.0229)	(0.0240)
Dummy U.S. border origin	0.205***	0.0430*
	(0.0214)	(0.0250)
$ln(Population_{t-1}\ origin)$	0.603***	0.491***
	(0.0163)	(0.0199)
Temperature destination	0.0292***	0.0353***
	(0.00218)	(0.00260)
Temperature origin	0.0252***	0.0441***
	(0.00226)	(0.00267)
ln(precipitations destination)	-0.327***	-0.271***
	(0.0177)	(0.0187)
ln(precipitations origin)	-0.158***	-0.159***
	(0.0157)	(0.0183)
R^2	0.476	0.371
N	47739	39166

Source: Authors' calculations with data from the 1990, 2000 and 2010 Population and Housing Censuses, SIMBAD, INEGI, World Bank SAE Estimates and the U.S. National Oceanic and Atmospheric Administration