Regional Economic analysis of Internal Migration in Mexico

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Abstract

This paper studies adjustments in the labor market in response to trade openness. Specifically, I hope to assess whether migration to urban areas in the north increased after NAFTA. I also identify the characteristics of municipalities that experienced net inflows and net outflows of migration. I seek to answer the following questions: What characteristics of sending and receiving municipalities are associated with migration? Are there some characteristics that hinder migration even in the presence of economic benefits? Finally, did the migrants’ pattern change after NAFTA? The paper contributes by shedding light on the movements of labor supply caused by international trade and its effect on regional wage inequalities, and may lead to creation of regional development policies to address salient issues related to migration, employment, and poverty.
1. Introduction

Evaluating the characteristics of migration has important economic and social policy implications and can contribute to understanding the distribution of income poverty in Mexico (Todaro, 1976; Ravallion, 1996). The main causes of migration are the lack of jobs in the home region, the need for economic resources, such as income, and the lack of land. Kuznets (1964) proposes that internal migration is a result of people’s response to economic opportunities that arise as a result of economic growth.

Assume labor is an entirely movable factor in a two-region, two factor economy. As a response to interregional wage differentials, labor migrates from a low-wage region (L) to a high-wage region (H). This internal migration puts downward pressure in wages on region H and upward pressure on region L. If transportation costs are low and the cost of living in both regions is equivalent, this effect will continue until the wage prices are the same in both regions. Further, if capital flows are free to move then the effect of wage levels will be strengthened (Greenwood, 1978).

The Harris-Todaro (H-T) model (Harris, et al., 1970) explains some of these economic issues related to internal migration between rural and urban areas. In contrast to other models that describe wage differences between two regions, and the labor migration that resulted, the H-T model explains the expected income differences between the urban and rural regions. Another contribution of this model is the addition of an urban labor market in equilibrium with a rural-urban migration, even when urban areas experience unemployment. The model assumes that there is no rural unemployment and that rural-urban migration will stop when the expected rural income of a worker equals the expected urban income.

The H-T model suggests that the urban wage is higher than the rural wage due to exogenous causes such as labor union influences or governmental policies. The model also assumes that the rural marginal product is always positive but inversely proportional to the rural labor supply. Finally, some of the policies that the H-T model suggests as alternatives to improve the regional welfare are “intersectoral compensation requirements” and restrictions to free labor migration (Harris, et al., 1970 p. 127). Some of these restrictions are strong local workers’ unions, rigidities in nominal wages, lack of housing in fast-growing urban areas, and social, cultural, and linguistic barriers (Cashin, et al., 1996 p. 162). In the case of India, Cashin and Sahay (1996) show how significant barriers weaken the internal migration flow from poor to rich regions as a response to wage differentials.

In the case of Mexico, Greenwood (1978) finds that 9% of the total population migrated at least once from 1960 to 1970. He attributes this to the “widening interstate earnings differentials” (p. 18). More recent data reveals that little more than half of the agricultural labor in Mexico (55.6%) migrates in family groups every year (SEDESOL, 2004). Nearly 61.1% of farm workers’ children—between 6 and 14 years old—do not attend school. However, in general, little is known about these migrant workers and the effect they have in the sender and receiver municipalities.
Ten year INEGI population censuses show the number of people in a municipality that resided in another municipality 5 years previously. Table 1 shows the top ten municipalities in 2005 with the highest number of people who resided in another municipality in 2000. These results parallel the World Bank's findings (Walton, et al., 2004) demonstrating that regions that experience the most internal migration were those closer to the US-Mexican border and those in the tourist coastal areas (mainly in the Pacific and the Yucatan Peninsula).

Table 1: Municipalities with Highest Migration

<table>
<thead>
<tr>
<th>Code</th>
<th>Place</th>
<th>Total</th>
<th>Migrant</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>Solidaridad, Quintana Roo</td>
<td>91,563</td>
<td>23,977</td>
<td>0.26</td>
</tr>
<tr>
<td>20</td>
<td>Santo Domingo Ixcatlán, Oaxaca</td>
<td>1,444</td>
<td>305</td>
<td>0.21</td>
</tr>
<tr>
<td>15</td>
<td>Chicoloapan, Mexico</td>
<td>138,339</td>
<td>26,364</td>
<td>0.19</td>
</tr>
<tr>
<td>18</td>
<td>Bahía de Banderas, Nayarit</td>
<td>72,414</td>
<td>13,238</td>
<td>0.18</td>
</tr>
<tr>
<td>03</td>
<td>Las Casas, Baja California Sur</td>
<td>135,769</td>
<td>23,708</td>
<td>0.17</td>
</tr>
<tr>
<td>13</td>
<td>Tepoztlan, , Hidalgo</td>
<td>49,335</td>
<td>8,338</td>
<td>0.17</td>
</tr>
<tr>
<td>23</td>
<td>Benito Juárez, Quintana Roo</td>
<td>429,389</td>
<td>61,854</td>
<td>0.14</td>
</tr>
<tr>
<td>15</td>
<td>Ixtapaluca, Mexico</td>
<td>357,826</td>
<td>50,400</td>
<td>0.14</td>
</tr>
<tr>
<td>25</td>
<td>Elota, Sinaloa</td>
<td>39,756</td>
<td>5,323</td>
<td>0.13</td>
</tr>
<tr>
<td>21</td>
<td>Santa Catarina Tlaltenco</td>
<td>739</td>
<td>96</td>
<td>0.13</td>
</tr>
</tbody>
</table>

However, this data do not answer key questions around migration such as:

- What characteristics of the sending and receiving municipalities are associated with migration?
- Are there some characteristics that hinder migration even when there appears to be economic benefits?
- Did cross-municipality migration from poor to rich states respond to differentials in per capita incomes across the municipalities?
- Do internal migrants belong to a specific population group or are they more a random sample of the population?
- Has trade liberalization changed the internal-migration pattern?

In 2003, 3 million workers were employed in agricultural activities. Most of them were migrant workers coming from the states of Guerrero, Oaxaca, Veracruz, Puebla and Hidalgo (SEDESOL, 2004). The recipient states were primarily Sinaloa, Sonora, Baja California, and Baja California Sur (see Figure 1)
The hypothesis underlying this paper is that migration characteristics, often omitted in economical empirical research due to their frequently unobservable nature, play a key role in the regional economic growth process. Research aiming at providing relevant social policy recommendations should take them into consideration when identifying the best strategies to improve welfare and reduce poverty, decrease income inequality and lower regional disparities. The contribution of this paper is to shed light on the movements of labor supply caused by international trade and its effect on regional inequalities.
2. Migration in Mexico

a. Maquiladora Program

In 1965, the United States unilaterally ended the Bracero program, which had allowed Mexican workers into the United States for short periods as temporary farm labor. The maquiladora program was thus established to attract foreign direct investment and to create jobs for former Bracero workers and their families who had moved to the border area. This maquiladora (or foreign-owned assembly plant) industry is the largest industry on the Mexican side of the Mexico-US border. Maquiladoras are normally owned by foreigners that import raw material and components duty-free to Mexico, assemble them into finished goods and send them back to the U.S. (Martin, 2002). The maquiladora effect in terms of employment and exports are shown in Table 2. The most important effect is that they attract people from the interior of Mexico to the border to work, especially women.

<table>
<thead>
<tr>
<th>Year</th>
<th>Maquiladoras</th>
<th>Employment</th>
<th>Exports ($mil)</th>
<th>Exports (%)</th>
<th>Wage and Benefits Paid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>12</td>
<td>3,000</td>
<td>83</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>120</td>
<td>20,327</td>
<td>332</td>
<td>11</td>
<td>194</td>
</tr>
<tr>
<td>1975</td>
<td>454</td>
<td>67,213</td>
<td>119,546</td>
<td>5</td>
<td>456</td>
</tr>
<tr>
<td>1980</td>
<td>578</td>
<td>211,968</td>
<td>3,635</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>789</td>
<td>472,000</td>
<td>674,692</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>1,924</td>
<td>1,400,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>2,206</td>
<td>1,400,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>3,900</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: (Martin, 2002 p. 124)

In 1988-89 the U.S. Commissions for the Study of International Migration and Cooperative Economic Development undertook a large-scale maquiladora worker survey, interviewing 1,200 employers. The findings show that most have only an elementary school education and are completely untrained. Table 3 present the main reasons for migrating that the survey found.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seek a job</td>
<td>27</td>
</tr>
<tr>
<td>Accompany family</td>
<td>21</td>
</tr>
<tr>
<td>Seek a better life</td>
<td>14</td>
</tr>
<tr>
<td>Had a maquiladora offer before migrating</td>
<td>10</td>
</tr>
</tbody>
</table>

Source (Huerta Carillo, 1990)

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2 Under the Bracero program, Mexicans were given renewable six-month visas to work for approved agricultural growers, located mostly in the southwestern United States (Durand, et al., 2001 p. 110).

3 In 2000, 60 to 70% of the assembly-line workers in the maquiladoras were women (Martin, 2002)
These findings agree with Borts and Stein (1964) that when labor is more movable than capital, the high-wage region, in this case the northern region with maquiladoras, will see a rapid increase of both employment and capital accumulation.

b. NAFTA migration

NAFTA was expected to convert the migration relationship between Mexico and the U.S. into one of trade and investment (Martin, 1993). However, migration specialists had already predicted that labor movements would not decrease. Quite the opposite, in the first decade of the agreement, predictions were that it would actually increase, as the large number of Mexicans displaced by economic restructuring would lead temporarily to more migration (Audley, et al., 2004).

Initially, all sectors and regions of a country do not grow at the same time; sectors in some of the regions “take-off” first, abandoning peasant techniques and acquiring more productive economic processes in order to reach higher efficiency levels (Rostow, 1960). These leading regions require more labor to continue their development. Once the available labor supply is used up; these regions require migrant workers to satiate their demand. This creates internal migration from regions less developed to those leading productive regions that expanded earlier. This unequal growth is particularly stark in the case of trade which increases the market for exporting sectors but contracts those of import-competing industries. These industries are often located in different regions of the country.

Unfortunately, migration literature has not given importance to the relation between trade and migration (Borjas, 1999). Therefore, the main question this paper addresses is whether or not trade liberalization changed the internal-migration pattern.

c. Types of Migration, based on the skill level

After field work on two of the main recipient municipalities, studying the characteristics of migrants within Mexico, I observed that migration came from different parts of the states in the interior. However, it was possible to identify some states that contributed more in terms of migration, depending on the sector and skill level.

Most of the migration for high skilled labor was concentrated in Nuevo Leon, in the Banking and Consulting Sectors. This type of migration moves mainly from large cities such as Mexico City, Guadalajara, and Veracruz. In contrast to the low skilled labor, this group did not send remittances to their families.

The low skill workers moved mainly from rural areas in the south of Mexico (from the states of Oaxaca and Guerrero). Most came from small villages where they were working their land, but due to the economic crisis they decided to migrate north. The majority of these migrants work in the agriculture and service sectors, where skill requirements are low.
3. A Migration Model

The majority of studies that focus on migration concentrate on movements between countries, but a limited number of papers study internal migration. Some rural-urban migration studies have been done over the last few decades. Rural-urban migration is an important issue not only to the country’s economic growth but also to the development and expansion of urban areas since migration, together with capital, is one of the most important components in a region’s growth. Therefore, I will estimate a regional internal migration model at the municipal level using a Gravity Model to explore the decision to migrate and characteristics of senders and recipient municipalities. Following Molho (1986), the gravity model is

\[
M_{ij} = f(A_i; B_j; D_{ij})
\]

Where \(i\) and \(j\) are the areas of origin and destination, respectively. \(M\) denotes the number of migrants. \(D\) is a measure of distance between \(i\) and \(j\). \(A_i\) are the origin specific factors, pushing migrants to the corresponding areas. \(B_j\) are the destination specific factors pulling migrants from the corresponding areas. To respond the question this paper seeks to answer I adapt the model to the following form:

\[
M_{ijt} = f(S_{i,t-1}; C_{j,t-1}; D_{ij}; B_j; NAFTA_t; NAFTA_t \cdot S_{i,t-1}; NAFTA_t \cdot C_{j,t-1}; NAFTA_t \\
\cdot D_{ij}; NAFTA_t \cdot B_j)
\]

Where \(i\) and \(j\) are the areas of (State) origin and (County) destination respectively. \(M_{ijt}\) is the number of migrants that migrate from \(i\) to \(j\), 5 years ago. \(S_{i,t-1}\): State origin specific factors, pushing migrants to the corresponding areas in period \(t-1\). \(C_{j,t-1}\): County (Municipality) destination specific factors pulling migrants from the corresponding areas in period \(t-1\). \(D_{ij}\): Distance between \(i\) and \(j\) which affects migration according to some monotonic inverse function \(f(\cdot)\). This variable does not change through time. \(B_j\): Distance from the county destination to the nearest border crossing point of the US-Mexico border. \(NAFTA_t\): Dummy variable that is 1 for years after the NAFTA agreement and 0 otherwise.

I assume migration will be a function of various measures of productivity, such as education and local infrastructure, transportation costs to the United States, and local market size. I then test whether the influence of these variables changed after NAFTA to determine whether migration patterns changed with the trade agreement.
4. Data Sources

This paper uses data from the *Sistema Municipal de Base de Datos* (SIMBAD) generated by the Mexican National Institute of Statistics, Geography and Information (INEGI, 2005), and taken from the 1989, 1999 and 2004 economic censuses and 1990, 2000 and 2005 population censuses. The information on each census corresponds to the previous year. Overall, there are 230,592 observations related to 2,403 municipalities, 32 states and 3 years. Based on Sarra, et al. (2010), the determinants of migration flows can be classify into four main categories:

(1) Gravity variables
   a. Distance between the origin and destination (proxy for migration costs)
   b. Population (lagged) in sending and receiving regions as it affects the supply of “opportunities”. The bigger the place, the more number of opportunities will bring to the immigrants (Molho, 1986).

(2) Economic variables
   a. GDP per capita (lagged) of sending and receiving regions

(3) Labor market variables
   a. Unemployment (lagged) in sending and receiving regions
   b. Average Wage (lagged) in sending and receiving regions
   c. % of Agriculture Labor in sending and receiving regions
   d. % of Manufacturing Labor in sending and receiving regions

(4) Environmental variables
   a. Degree of Urbanization: Urban hard-surface roads per 100km²
   b. Number of Crimes
   c. Recreational Resources
   d. Number of dwellings per 1,000 of population in destination province

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4 Between the 1990 and 2004 censuses, 51 new municipalities were created. To analyze the same municipalities through the years, I merged the new municipalities back to their 1990 boundaries. I obtained the list of new municipalities and from where they were created (INEGI, 2006). For those created from more than one municipality, we allocate the new municipality data by the percentage of how many people (or how much land), in the new municipality, were taken from the former municipalities (information provided by SEGOB (2005)).
For this paper, I am planning to use all the factors mentioned above, in the sending and receiving regions, except from the environmental variables, which INEGI did not collect in any of the censuses. Thus, the matrixes of observations of specific factors, $C_{j,t-1}$ and $S_{i,t-1}$, include the following variables:

$$w_{it-1} - w_{jt-1} = \text{Average wage difference per worker per year in pesos between municipality } i \text{ and state } j, \text{ in time } t-1.$$  

$$Ym_{it-1}, Ym_{jt-1} = \text{income originating in manufacturing in municipality } i, \text{ state } j, \text{ in time } t-1.$$  

$$\delta_{it-1}, \delta_{jt-1} = \text{a measure of income dispersion in municipality } i, \text{ state } j, \text{ in time } t-1.$$  

$$g_{it-1}, g_{jt-1} = \text{growth rate of the per capita income, in municipality } i, \text{ state } j, \text{ in time } t-1.$$  

$$E_{it-1}, E_{jt-1} = \text{percentage of educated working population (18-65) years in municipality } i, \text{ state } j, \text{ in time } t-1.$$  

$$U_{it-1}, U_{jt-1} = \text{index of urbanization as measured by the percentage of population in cities with population of 5,000 or over in municipality } i, \text{ state } j, \text{ in time } t-1.$$  

$$d_{it-1}, d_{jt-1} = \text{density of population per square kilometer in municipality } k, \text{ municipality } j, \text{ in time } t-1.$$  

To observe how spatial patterns of migration have evolved, I use variables such as average wage difference and income dispersion, between regions. These numbers are deflated by the CPI. Therefore, wages and income are presented in real thousand pesos from 2005.

**Hypothesis**

Combining the different NEG, migration and the standard trade theory, I obtain the following testable hypotheses:

H1: Due to transportation costs, regions closer to the US-Mexico border received the majority of migrants.

H2: Also, due to transportation costs, regions closer to each other experienced more migration towards the region with more opportunities.

H3: Trade will increase agglomeration. Those regions with more dense population will be more attractive to migrants since they will provide more “job opportunities”

H4: Traded sectors will be more influenced by NAFTA and distance to the US market than non traded sectors. Thus regions that specialized in traded sectors will received more internal migration.
5. Anticipated Results

This paper will contribute to the understanding of the mechanisms of labor adjustment, an important aspect of economic development. It will also demonstrate how trade openness has influenced this labor adjustment; specifically, whether or not migration within Mexico, particularly to urban areas in the north, increased after NAFTA. Different from the previous chapter, this study seeks to answer the following questions: What characteristics of sending and receiving municipalities are associated with migration? Are there some characteristics that hinder migration even when there appear to be economic benefits? And finally, did the migration pattern change once NAFTA started? This research is important because it will contribute to the creation of regional development policies concerning migration, employment, and poverty alleviation.
6. Bibliography


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