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EMPLOYMENT CHANGE AND COMPETITIVENESS FOR THE MEXICAN REGIONS.A SHIFT-SHARE ANALYSIS*

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ABSTRACT

Regional competitiveness has had a major reconfiguration in the last 15 years in Mexico. This can be seen clearly in the employment creation. Those regions that were characterized by the best employment rates now seem to fall slightly behind. To test this, we used a shift-share analysis to decompose the change in employment in three effects: the national growth, the industry mix and the competitive component for the period 1999 to 2009. The results show that the states bordering the United States show the normalized employment growth slowing, while the two regions with the highest growth are located in the south of the country. It was identified, further, that for the former, the competitive component is the most influential in their poor performance.

Key words: Regional economics; Employment; Shift-share.

INTRODUCTION

Globalization's effects on industry location have been impressive lately (Revenga, 1997, Hanson, 1998A, Hanson, 2002A). Industries in Mexico have been no exception to this effect (Perez and Sierra, 2004, Benita and Gaytan, 2011). As a consequence, there have been important adjustments in the economic activity of different regions. These adjustments have come as industry relocation, changes in wages, employment adjustments, different levels of economic integration and development (Revenga, 1997, Hanson 1998B, Revenga and Montenegro, 1998, Hanson, 2001, Robertson, 2001, Benita and Gaytan, 2011).

Regional competitiveness has had a major reconfiguration in the last 15 years in Mexico. While some regions used to have higher rates of growth, lower rates of unemployment, and higher living standards in the past, now those regions are losing ground compared to those once underdeveloped regions. In the 1980's, the northern region of Mexico had developed into an industrial belt close to the border with the USA mainly because of the manufacturing industry (particularly the "Maquiladora", assembly lines of previously imported goods that are re exported). Included in that region are the States of Baja California, Sonora, Chihuahua, Coahuila, Nuevo Leon and Tamaulipas. However, research made in the mid 2000's on the maquiladora industry showed that the States located in the center of the country were gaining in terms of competitiveness (Najera and Santana, 2005). These regions showed to be more attractive to investors and to assembly lines, mainly in the textile industry.

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This paper uses the traditional Shift-share technique to analyze the growth and changein the distribution of employment for the 32 Mexican States and Mexico City from 1999 to 2009in order to illustrate the loss of competitiveness of the Northern region of Mexico.These results are relevant because they can be of use for policy makers to evaluate policies, make forecasts, and for strategic planning (Mayor et al, 2007).

The rest of the paper is divided as follows. Section two presents the shift-share methodology. Section three introduces the data sets used and includes a description of employment in Mexico. Section four shows the main results and a discussion. Finally, section five concludes.

Shift-Share

Shift-share analysis has been widely used in regional economic studies (Acs and Ndikumwami, 1998, Neri et al, 2005, Mayor et al, 2007, Benita and Gaytan, 2011) because of its simplicity and ease of interpretation. Even though it has been mainly utilized to analyze employment changes, it has also been applied to other economic issues, such as exports, production, added value, or productivity (Herschede, 1991). The essential idea is to analyze the extent to which the difference in growth between each region and the national average is due to the region performing uniformly better than average on all industries or to the fact that the region happens to be specialized in fast growing sectors (Esteban, 2000).

With the shift –share technique, the growth in a determined variable can be broken into (and thus is the addition of) three components: the National Growth Effect, the Industry Mix Effect, and the Competitive or Regional Share Effect. Adapting from Barff and Knight III (1988), these three effects take the following form:

- National Growth Effect (NGE) for sector i in region $=E^r_i\, g^n$
- Industry Mix Effect (IME) for sector i in region*r* $= E^r_i\,(g^n_i - g^n)$
- Competitive Effect (CE) for sector I in the region*r* $= E^r_i\,(g^r_i - g^n)$

Where,

E^r_i isemployment in sector i of country r at the beginning period;

g^n is the total growth rate of total national employment over the time period;

g^n_i is the total growth rate of national employment in sector i during the period of study;

g^r_i is thetotal growth rate of employment in sector i of region r.

The actual employment variation is simply the addition of the NGE, IME and CE components.

National Growth Effect explains that the variation of employment of a region is given by the total national growth of employment; the Industrial Mix shows the changes in employment that a region would have if it industries had grown at the same rate of the total national employment, subtracting the NGE; the CE shows the difference between the actual change in employment, and the variation that should be expected, had its industries grown at the country's industries employment.

Some regions are more populated than others. This may cause results to be somehow distorted. To control for the size of a region, a new variable is introduced, labor force,which is defined as the average of the labor force in each region in 1999 and 2009. Formally, the Controlled National Growth Effect remains as follows:

$$CNGE_j = NGE_j \,/\, LF_j \qquad (1)$$

The IME measure is adjusted to the size of the region in the following equation:

$$CIME_j = IME_j \,/\, LF_j \qquad (2)$$

And the Controlled Competitive Effect:

$$CCE_j = CE_j \,/\, LF_j \qquad (3)$$

Controlled NGE, IME and CE are introduced in the study to remove any bias that may due to the size of the region (Acs and Ndikumwami, 1998).

DATA

Data from the Economic Census of 1999 and 2009 from the Instituto Nacional de Estadística y Geografía (INEGI) was used for this application. Data in the INEGI contains annual information on industry employment at the two-digit level for 19 industries and the 31 Mexican states and the Mexico City.

According to the Economic Census of 2009, in Mexico there were 20,123,257 employees. The states with the highest employed population were Mexico City (Federal District), Mexico state, Jalisco, and Nuevo Leon, all of them with more than one million, followed by Veracruz and Guanajuato with over 900,000.

With respect to 1999, twelve out of the 33 regions considered remained in the same position in the employment rank (see table 1), including the top four states (Mexico City, Mexico State, Jalisco and Nuevo Leon). Ten regions moved up on the rank. Quintana Roo a southern State located in the Yucatan Peninsula had the largest movement, going from the 26th position in 1999 to the 22nd in 2009. Guerrero and Chiapas (also southern regions) moved 3 positions placing in the 15th and 16th positions respectively in 2009. By the other hand, ten regions lost positions on the rank of employment. The largest drop is on Durango (northern region), falling from the 22nd to the 26th position. Chihuahua (border State) and San Luis Potosi (northern region) lost three positions dropping to the 8th and 19th respectively. Table 1 shows rankings in 1999 and 2009 for the 33 regions considered.

TABLE 1

Employment rank for the Mexican regions in 1999 and 2009

	1999	2009	Movement		1999	2009	Movement
Mexico City	1	1	0	Oaxaca	15	17	-2
Mexico	2	2	0	Yucatan	17	18	-1
Jalisco	3	3	0	San Luis Potosi	16	19	-3
Nuevo Leon	4	4	0	Queretaro	20	20	0
Veracruz	6	5	1	Hidalgo	21	21	0
Guanajuato	7	6	1	Quintana Roo	26	22	4
Puebla	8	7	1	Morelos	23	23	0
Chihuahua	5	8	-3	Tabasco	25	24	1
Baja California	9	9	0	Aguascalientes	24	25	-1
Tamaulipas	10	10	0	Durango	22	26	-4
Michoacan	13	11	2	Zacatecas	28	27	1
Coahuila	11	12	-1	Tlaxcala	27	28	-1
Sonora	12	13	-1	Campeche	30	29	1
Sinaloa	14	14	0	Nayarit	29	30	-1
Guerrero	18	15	3	Baja California Sur	31	31	0
Chiapas	19	16	3	Colima	32	32	0

The two most important industries in Mexico in 2009 in terms of employment are retail trade (25% of total employment) and manufacturing (23%). In twenty out of 33regions, retail trade is the largest employer industry, whereas manufacturing is in eleven states. Quintana Roo has the largest share of employment in the Accommodation and food and drinks preparation services. This states hosts one of the largest tourism infrastructures of the country.

Northern states of Baja California, Sonora, Chihuahua, Coahuila, Nuevo Leon and Tamaulipas, all bordering with the United States, had a 10-year employment growth of 35%, going from 3.4 million to 4.5 million workers. The biggest portion of employment for all these States is in the manufacturing industry, which reflects the strong presence and importance of Maquiladora industry for these states, with the exception of Nuevo Leon, which features an important share of domestic manufacturing industry.

All the northern borderingStates are below the national average growth rateof employment (45.54%). The top two states are southern: Quintana Roo (125.28%) and Campeche (97.3%). Of the 11 states that had an employment growth rate lower than the national average, 7 are considered to be northern, and 10 of the top 15 are southern states. Table 2 shows the percentage growth of total employment in the 32 regions considered.

TABLE 2
Total employment growth rates for the period 1999 – 2009

State	Employment growth	State	Employment growth
Quintana Roo	125.28%	Veracruz	50.27%
Campeche	97.30%	Mexico	50.10%
Baja California Sur	87.95%	Jalisco	48.25%
Colima	79.91%	Guanajuato	47.34%
Nayarit	76.01%	National Average	45.54%
Guerrero	73.61%	Sonora	45.52%
Chiapas	73.21%	Puebla	45.17%
Queretaro	73.12%	Tlaxcala	44.74%
Morelos	71.83%	Nuevo Leon	41.41%
Hidalgo	65.94%	Aguascalientes	41.41%
Michoacan	61.64%	Tamaulipas	38.10%
Oaxaca	60.11%	Baja California	37.62%
Yucatan	59.93%	Coahuila	30.67%
Tabasco	56.48%	Mexico City	28.25%
San Luis Potosi	56.24%	Durango	24.13%
Zacatecas	53.14%	Chihuahua	18.73%
Sinaloa	51.37%		

With respect to industries, the largest growth in employment was given in the Support Services to Business and Residuals Handling and Cleaning (123.45%), followed by Real Estate (106.22%), and Health and Social Services (104.69%). Retail Commerce, the industry with the highest employment in Mexico in 1999 (24.98% of total employment) had a 70.97%

growth, while the manufacturing industry, the second largest employment industry (23.16%), only had a 11.63% growth, below the national average and the fourth lowest growth rate among all the industries. Table 3 shows the percentage growth of employment in the 19 industries considered, at the national level.

TABLE 3

Employment growth by industry for the period 1999 – 2009

56 Support services to business and residuals handling and cleaning	123.45%
53 Real Estate	106.22%
62 Health and social services	104.69%
52 Financial services and insurances	98.64%
72 Accommodation and food and drinks preparation services	85.30%
71 Cultural, sports, and other recreational services	83.60%
61 Education Services	74.69%
46 Retail commerce	70.97%
51 Information in massive media	51.22%
54 Professional, scientific, and technical services	50.56%
National Average	45.54%
81 Other services except government activities	43.25%
43 Wholesale commerce	29.97%
21 Mining	25.74%
22 Electricity, water, gas supply	24.02%
48 - 49 Transports, post, and warehouse	20.32%
31 -33 Manufacturing industries	11.63%
23 Construction	8.17%
11 Agriculture, cattle, forestry, fishing, and hunting	3.42%
55 Corporate management	-37.06%

RESULTS

Table 4 presents the shift-share results for the 1999 – 2009 period. The Net Growth Effect shows the number of jobs moved in and out controlling for the size of the state. The Industry Mix Effect illustrates the performance of a region due to its Industry Mix, while the Competitive Effect captures the number of jobs gained or lost because the region is competitive (Acs and Ndikumwami, 1998).

17 of the 32 regions presented an industrial mixture of employment lower than the national average. The results imply that this element reduced the generation of jobs. Cases in which this contraction was greater are the States of Chihuahua, Sonora, Baja California, Tamaulipas, Coahuila, Nuevo Leon and Guanajuato. All of them, with the exception of Guanajuato, are bordering with the United States. The result of Chihuahua indicates that this State has lost, by the concentration of its economy, 70,910 jobs. At the other end, Mexico City had the strongest employment growth by the mixture of their industries, providing with 168,206 new positions. From the second to the eighth place in the generation of jobs attributed to this element, are States located in the South of the country (Quintana Roo, Michoacan, Guerrero, Chiapas, Morelos, Oaxaca and Veracruz), but with an employment generation significantly lower than Mexico City´s. With respect to the competitive effect, 25 of the 32 regions presented positive variations in employment as a result. Above all the

regions, the States of Quintana Roo (located in the South of the country, with 83,451 generated jobs), Mexico (in the center of the country, with 73,962 generated jobs) and Querétaro (also in the Centre of the country, with 73,601 jobs created) show the largest variation that is explained by this effect.

TABLE 4
Net Growth Effect (NGE), Industry Mix Effect (IME), Competitive Effect (CE) and Total variation (TV) for the period 1999-2009

	NGE	IME	CE	TV
National	6,296,232.00	0.00	0.00	6,296,232.00
Mexico City	1,171,404.40	168,205.80	-612,782.20	726,828.00
Mexico	590,318.84	-14,757.22	73,962.38	649,524.00
Jalisco	457,385.57	2,348.79	24,955.63	484,690.00
Nuevo Leon	397,357.68	-22,082.23	-13,896.45	361,379.00
Veracruz	286,801.11	8,719.75	21,069.14	316,590.00
Guanajuato	280,590.04	-20,187.94	31,329.90	291,732.00
Puebla	259,308.48	-11,461.06	9,378.58	257,226.00
Michoacan	171,324.41	20,862.35	39,746.24	231,933.00
Baja California	233,338.56	-44,240.16	3,682.60	192,781.00
Tamaulipas	226,005.95	-32,390.52	-4,517.43	189,098.00
Guerrero	111,156.73	20,620.23	47,917.04	179,694.00
Sonora	178,907.47	-19,743.76	19,695.29	178,859.00
Chiapas	108,312.57	12,288.42	53,533.00	174,134.00
Quintana Roo	62,352.03	25,743.61	83,451.36	171,547.00
Queretaro	100,656.20	-12,618.42	73,601.22	161,639.00
Sinaloa	136,424.49	6,949.31	10,526.20	153,900.00
Oaxaca	115,246.75	10,571.60	26,318.65	152,137.00
Yucatan	112,867.05	-8,418.73	44,095.67	148,544.00
Coahuila	211,465.95	-24,094.13	-44,952.82	142,419.00
San Luis Potosi	113,331.52	-526.11	27,177.59	139,983.00
Hidalgo	91,468.46	-6,835.38	47,811.91	132,445.00
Morelos	81,164.19	11,838.52	35,028.29	128,031.00
Chihuahua	301,729.99	-70,909.94	-106,685.05	124,135.00
Tabasco	77,569.60	-3,182.66	21,821.06	96,208.00
Campeche	38,986.30	820.83	43,494.87	83,302.00
Baja California Sur	36,801.04	6,165.55	28,113.41	71,080.00
Aguascalientes	78,155.65	-5,527.99	-1,557.66	71,070.00
Nayarit	41,631.46	3,610.26	24,248.28	69,490.00
Zacatecas	51,849.22	5,817.43	2,836.35	60,503.00
Colima	32,628.60	4,402.84	20,226.56	57,258.00
Tlaxcala	53,147.90	-9,328.99	8,402.09	52,221.00
Durango	86,543.78	-2,660.07	-38,031.70	45,852.00

On the other hand, the States of Aguascalientes, Tamaulipas, Nuevo León, Durango, Coahuila, Chihuahua and Mexico City (all of them, with the exception of Aguascalientes and Mexico City are northern States) had contractions in employment due to a loss of competitiveness. The most extreme cases are those of Mexico City (612,783 lost jobs) and Chihuahua (106,685 lost jobs).

TABLE 5

Controlled Net GrowthEffect (CNGE), Controlled Industry MixEffect (CIME), Controlled Competitive Effect (CCE) and Controlled Total variation (CTV) for the 1999-2009 period

	CNGE	CIME	CCE	CTV
Quintana Roo	0.2800	0.1156	0.3747	0.7703
Campeche	0.3063	0.0064	0.3418	0.6545
Baja California Sur	0.3163	0.0530	0.2416	0.6109
Colima	0.3254	0.0439	0.2017	0.5710
Nayarit	0.3300	0.0286	0.1922	0.5508
Guerrero	0.3328	0.0617	0.1435	0.5381
Chiapas	0.3333	0.0378	0.1648	0.5359
Queretaro	0.3334	-0.0418	0.2438	0.5355
Morelos	0.3350	0.0489	0.1446	0.5285
Hidalgo	0.3425	-0.0256	0.1790	0.4959
Michoacan	0.3481	0.0424	0.0808	0.4712
Oaxaca	0.3501	0.0321	0.0800	0.4622
Yucatan	0.3504	-0.0261	0.1369	0.4611
Tabasco	0.3551	-0.0146	0.0999	0.4404
San Luis Potosi	0.3554	-0.0016	0.0852	0.4390
Zacatecas	0.3598	0.0404	0.0197	0.4198
Sinaloa	0.3623	0.0185	0.0280	0.4087
Veracruz	0.3639	0.0111	0.0267	0.4017
Mexico	0.3641	-0.0091	0.0456	0.4007
Jalisco	0.3668	0.0019	0.0200	0.3887
Guanajuato	0.3682	-0.0265	0.0411	0.3828
National Average	0.3709	0.0000	0.0000	0.3709
Sonora	0.3709	-0.0409	0.0408	0.3708
Puebla	0.3715	-0.0164	0.0134	0.3685
Tlaxcala	0.3721	-0.0653	0.0588	0.3656
Nuevo Leon	0.3772	-0.0210	-0.0132	0.3431
Aguascalientes	0.3773	-0.0267	-0.0075	0.3430
Tamaulipas	0.3825	-0.0548	-0.0076	0.3200
Baja California	0.3833	-0.0727	0.0060	0.3166
Coahuila	0.3948	-0.0450	-0.0839	0.2659
Mexico City	0.3990	0.0573	-0.2087	0.2476
Durango	0.4063	-0.0125	-0.1786	0.2153
Chihuahua	0.4164	-0.0978	-0.1472	0.1713

These results may be, however, biased by the size of each region. Table 5 presents the results considering how big each State, according to equations 1 to 3 above. 21 of the 32 regions perform better than the national average of 0.3709 new jobs created. The top two are

southern States located in the Yucatan Peninsula, and all the bordering States with the United States performed worse than the National average. The State of Chihuahua has the worst result, with an index of 0.1713 new jobs per employee during the 1999-2009.

Additionally, 14 States perform better than the National average for the three effects: Quintana Roo, Campeche, Baja California Sur, Colima, Nayarit, Guerrero, Chiapas, Morelos, Michoacan, Oaxaca, Zacatecas, Sinaloa, Veracruz and Jalisco. All of them outperform the National average on the total variation of employment. Mexico City, on the other hand, is the only region under the national average that has positive CNGE and CIME.

This un-biased analysis of the effects on employment is important, because, by removing the effect of the labor force in the region, it can be more clearly identified which are the States that have the most important actual growth. These outcomes are very different from those found on the absolute values. Table 6 shows the ranking of total employment variation and the Controlled Total Variation. As it can be clearly seen, the Entities classified within the first seven places in total variation of employment are below the national average when the size is corrected. Only the State of Durango is maintained in the last two positions for the two scales.

TABLE 6
Ranking of Total Variation and Controlled Total Variation for the 1999-2009 period

	TV	CTV		TV	CTV
Quintana Roo	14	1	Sinaloa	16	17
Campeche	25	2	Veracruz	5	18
Baja California Sur	26	3	Mexico	2	19
Colima	30	4	Jalisco	3	20
Nayarit	28	5	Guanajuato	6	21
Guerrero	11	6	Sonora	12	22
Chiapas	13	7	Puebla	7	23
Queretaro	15	8	Tlaxcala	31	24
Morelos	22	9	Nuevo Leon	4	25
Hidalgo	21	10	Aguascalientes	27	26
Michoacan	8	11	Tamaulipas	10	27
Oaxaca	17	12	Baja California	9	28
Yucatan	18	13	Coahuila	19	29
Tabasco	24	14	Mexico City	1	30
San Luis Potosi	20	15	Durango	32	31
Zacatecas	29	16	Chihuahua	23	32

CONCLUSIONS

Employment growth and distribution has changed dramatically in Mexico in the last decades. This paper showed the effects of jobs creation and localization for the period 1999 – 2009 using a traditional shift-share analysis. Results show that the traditionally industrialized highly employed regions of the country, mainly those on the border with the United States, have lost relative employment to other regions, such as the southern States of Quintana Roo and Campeche. Also, some of those northern States are the biggest jobs losers.

There can be several explanations for these effects. In the first place, some national programs aimed to encourage industrial development into the center and south of the country introduced in the first years of the 21st century could have hurt the investment and job creation in the north of the country; second, a reduction in the restriction for maquiladoras to

establish in other regions of the country rather than the northern states might have caused relocation; third, northern states have been more exposed to international economic crises because their production is very highly dependent on the demand of foreign-based companies, specially in the United States; fourth, insecurity and violence due to organized crime and drug cartels that prevails mainly in the northern region of Mexico, has damaged the perception of security, has scared investments away, and is hurting the local economies.

The results of this paper show that these bordering regions are lacking both a dynamic industry mix and competitiveness, when compared to the rest of the country. Further research is needed at least in two directions: first, to dig deeper into the specific industries, within each region that have the biggest lacks of employment. This would give some light into specific policies to boost them; second, to provide light on the causes of this shift–share results. Policies that help to improve economic growth and jobs creation in the less favored regions and to maintain low levels of unemployment in the most developed ones are needed.

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