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Chiapas, the South, and Mexico's Regional Inequality in the Context of Trade Openness

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Chiapas, the South, and Mexico's Regional Inequality in the Context of Trade Openness

By

Marcela González Rivas

Abstract

This paper studies the southern state of Chiapas in the context of Mexico's regional inequality, and particularly examines the effects of Mexico's trade policy. The paper shows that Chiapas is one of a group of southern states that have consistently performed worse than other states from 1940 to 2000, even during periods when regional inequality has improved. The paper demonstrates that Mexico's trade policies have affected states differently, depending on their endowments of infrastructure. This partly explains why Chiapas and its neighbors – states with exceptionally low values of infrastructure – consistently performed worse than other states over the entire time period, and particularly poorly in the open trade regime. Finally, the paper argues that these low levels of infrastructure have deep historical roots in the government policies implemented during the 20th century. I conclude that it is unlikely that the south will catch up without policies specifically addressing this infrastructure gap.

About the Author

Marcela González Rivas is a post-doctoral fellow in the Department of City and Regional Planning at Cornell University, where she teaches a class on regional planning and development in developing nations. Her principal interest is in the causes of sustained inequality in Latin America, with a goal of understanding how the inequality might be alleviated. To date her work has focused on regional inequality – that is, inequality between sub-national units – and particularly how trade policies have affected this inequality. However, she is beginning to work on individual-level inequality as well, with a recent paper on water access in indigenous communities in Mexico. She has a Ph.D. in city and regional planning from the University of North Carolina, Chapel Hill (USA); an M.Sc. in development studies from the London School of Economics (UK); and a B.A. in international relations from the University of the Americas (Mexico).

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Chiapas, the South, and Mexico's Regional Inequality in the Context of Trade Openness¹

I. Introduction

Fifteen years after the enactment of NAFTA and various other measures to free their trade regime, it is commonplace these days to hear that the promised results for most Mexicans have yet to be realized (see, for example, Malkin 2009). For example, economic performance indicators for the country before trade openness were much higher than afterwards: average annual per capita income grew by approximately 4 percent from 1960-1980 and at 0.8 percent since then. In fact, Mexico's performance is substantially lower even than the growth experienced by Mexico's partners in NAFTA.²

It is less commonplace, however, to hear how NAFTA has affected regional inequality in Mexico. Mexico is a highly unequal country by any measure. For example, the richest 10 percent of the population receives 43 percent of the country's income, and the poorest 60 percent of the population receives only 23 percent of the income.³ However, its regional inequality is nevertheless striking: the magnitude of the difference between north and south is such that in 2000, the southern state of Chiapas had an average income per capita roughly 24 percent of that of the richest northern state, and 16 percent of that of the Federal District, the richest "state" overall (see Appendix 1).⁴

As I will show in this paper, regional inequality in Mexico has in fact been rising since the 1980s. In this way, Mexico is actually similar to many countries around the world—both developed and developing—in which regional inequality has been rising in recent years.⁵ Since this latest increase in regional inequality has taken place during an era of increasing economic openness and international linkages, a number of researchers have proposed a link between

¹ This paper was prepared for the Panel: "Democratization, Decentralization and Liberalization in Mexico: Municipalities, States and Nation. Chiapas in Context." Conference "Fifteen Years after the Zapatistas: Social and Political Change in Mexico and Chiapas since 1994," Harvard University, April 10, 2009.

² Average annual per capita income growth in Canada and the USA during 1960-1980 was 2.8 and 2.4 percent respectively; and from 1980 to 2003 was 1.7 and 1.9 percent respectively. Data from World Bank, 2005.

³ Ferranti, et al 2004, p. 7. By comparison, in the average developed country, the top decile of the population receives 29 percent of the income, and the bottom 60 percent of the population receives 33.4 of the income (Ibid, p. 31).

⁴ This analysis of per capita income is based on data from Esquivel, et al. 2002. This inequality is substantial compared to the ratio of richest to poorest states' per capita income in other countries. For example in the USA the ratio is 2; in Germany 3; and in India, Brazil, and China 4, 7, and 12, respectively. Milanovic, 2004 and Lange, 2005.

⁵ See: Ferranti, et al (2005); Rodriguez Oreggia (2005); Markusen and Campolina Diniz (2005); Esquivel and Messmacher (2003); Mansori (2003); Duranton and Monastiriotis (2002); Gaetano and Mauro (2002); Hu (2002); Fujita and Hu (2001); Paluzie (2001); Webber and Weller (2001); Magrini (1999); Haaparanta (1998); Cragg and Epelbaum (1996); and Fuchs and Pernia (1987).

rising inequality and globalization.⁶ Yet this goes directly against what mainstream economic theorists have proposed: that increased economic openness actually serves to reduce spatial inequalities (Krugman and Venables, 1990; Krugman and Livas Elizondo, 1996).

This paper studies Chiapas in the context of Mexico's regional inequality and particularly examines how trade policy in Mexico has affected regional inequality and Chiapas (and its neighbors) especially. The next section examines how Chiapas has performed relative to other states in Mexico between 1940 and 2000, and it reveals two broad patterns. First, after establishing that Chiapas is one of a group of southern states that have consistently performed worse than other states, I use statistical methods to show that the probability of these states randomly being clustered in this way is highly unlikely. This indicates that there is likely some common aspect affecting all of them. And second, I show that while the south has been consistently the poorest region of the country across this time period, its relative wellbeing compared to other states has varied quite a bit. Using a variety of socioeconomic indicators, I show that regional inequality in Mexico as a whole diminished over the first forty years of the period and then rose over the last twenty.

The third section turns to the role of trade in explaining these overall patterns. Building on my recent work, I demonstrate that Mexico's trade policies—relatively closed through the beginning of the period and relatively open toward the end of it—have affected states differently depending on their endowments of infrastructure. States that were endowed well with infrastructure performed much better in the context of trade openness than those that did not. This partly explains why regional inequality tended to diminish in the rather closed trade regime of the early part of the period, and rose in the free trade era of the latter part of the period. It also sheds light on why Chiapas and its neighbors—states with exceptionally low values of infrastructure—consistently performed worse than other states over the entire time period, and particularly poorly in the open trade regime.

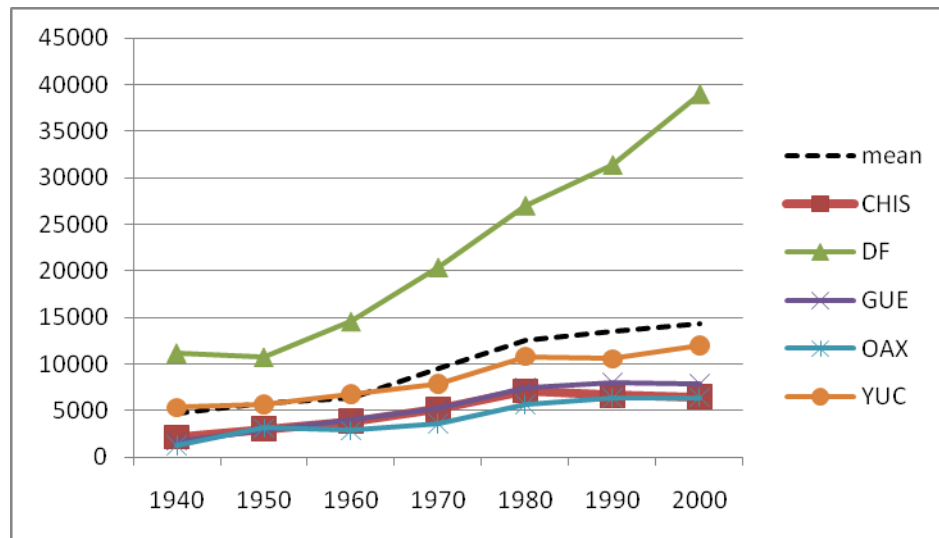
But why do these states have such low levels? In the fourth section, I turn to this question, briefly examining historically the development of infrastructure in Mexico in the early part of the 20th century. I argue that these low levels have deep historical roots in the policies of the state during that time, and this is plausibly one of the factors commonly affecting the entire south (therefore leading to the spatial cluster). I conclude that it is unlikely that the south will catch up without policies of the state that favor these states, instead of discriminating against them. A fifth section concludes.

⁶ For example, Rodriguez Oreggia (2005), Sánchez-Reaza and Rodríguez-Pose (2002), Chiquiar Cikurel (2002) and Puga (1999).

II. Chiapas, the South, and Mexico's regional inequality

Chiapas—and Mexico's south more broadly—have consistently performed worse than Mexico's other states along a variety of socio-economic dimensions. For example, Figure 1 compares the evolution of per capita income of the southern states to the Federal District and the mean state level over the period 1940-2000. The Federal District has the highest level of income over the entire period, and on the opposite extreme—i.e. the lowest ranking states for the entire period—are Guerrero, Oaxaca, and Chiapas. Oaxaca is at least 50% below the mean for almost the entire period, while Guerrero and Chiapas are around 50% of the mean for the entire period.

Figure 1: Per capita income for various states, 1940-2000



What are the chances that all these underperforming states would be so closely grouped together geographically? While Mexican observers often speak of the “south”, it is useful to remember that underperforming states are not always clustered together as they are in Mexico. And in fact, there are statistical techniques to determine the probabilities that states would be randomly distributed in a country in this way. If we can determine that the probabilities are very low, it indicates that while we should continue to focus on factors that affect states individually, we should also consider the factors that might be affecting the region as a whole.

This section therefore examines the extent to which we can consider the south a “cluster” in this statistical way. The indicators analyzed are the following: state per capita GDP

in 1993 pesos; the state share of labor occupied by the primary sector⁷; and the state share of population that lives in urban areas. All data come from the National Statistical Institute (INEGI) except per capita GDP, which are from Esquivel, et al 2003, and I examine how the indicators have evolved from 1940 to 1970 to 2000.

I use the Local Moran test (Anselin, 1995) to distinguish local spatial autocorrelation, which identifies local clusters as well as spatial outliers. Local clusters are regions where adjacent areas have very similar values compared to what one would expect in a random distribution, whereas spatial outliers are areas very distinct from their neighbors. The results of the test can be represented graphically, with cluster maps that indicate areas with statistically significant levels of spatial autocorrelation. . There are four types of areas: clusters of high values (shaded in red on the maps), clusters of low values (shaded in blue), outliers of high values (shaded in light-red) and outliers of low values (shaded in light-blue). I only report clusters and outliers statistically significant at least at the five percent level.⁸

In general, the results of the Local Moran tests show the existence of a southern spatial dynamic. This confirms that we can speak of the south as a cluster in a statistical sense, as the maps show a cluster of low values in the south for per capita income and urban population and a cluster of high values for agriculture employment.

The cluster map of states' per capita income, in Appendix 2, shows that although in the three years analyzed there are somewhat different spatial dynamics (such as a few outliers of states with dissimilar values compared to its neighbors—in lighter red and blue), the cluster of low values in the south is consistent throughout. Moreover, the cluster of low values in the south is the only spatial dynamic in 2000. The maps of the urban share of population show a cluster of low values in the south that coincides with the income variable cluster.

Not surprisingly, these two variables—per capita income and urbanization—follow a trend directly opposite to that of primary sector employment. The share of labor employed in the primary sector reveals a clear cluster of high values in the south. In general, this pattern of the labor share employed by primary sector is consistent with the regularities observed across countries regarding the sectoral composition of GDP and the level of development. During the period of 1940-1960 lower shares of labor were generally employed in the primary sector in states bordering the USA than elsewhere. Since 1970, however, the difference in states' shares

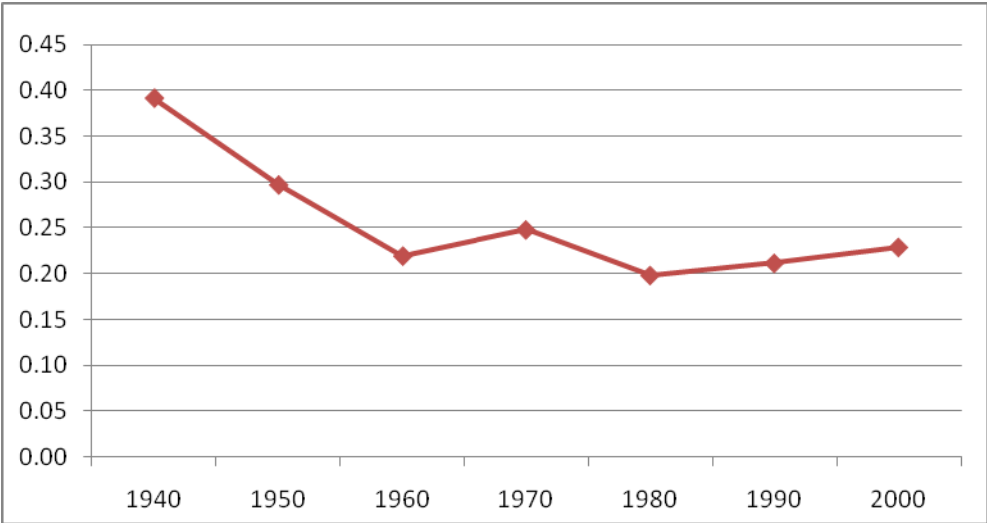
⁷ I look at share of labor occupied by primary sector because economic development theories comparing the development gaps across countries pay particular attention to the sectoral composition of the economy. For example, Kuznets, 1955; Lewis, 1954, Harris and Todaro, 1970; Rostow, 1960. In general there is a negative correlation between the level of development and the relative size of the primary sector, consisting of agriculture, livestock, forestry, fishing, and hunting.

⁸ The weights matrix is an average of the adjacent states using the queen contiguity type.

has become more pronounced: Nuevo León and Baja California Norte on the border, and Estado de Mexico surrounding Mexico City, reduced their share. Meanwhile, Chiapas, Guerrero, and Veracruz, in the south and center, increased their share. Not surprisingly, the Federal District has the lowest share during the entire period, as it is the largest metropolitan area of the country. Thus, it is clear that since 1970 the differences have become more pronounced to the extent that the south is a region of the country with very high values compared to the rest of the states.

While the findings of this section so far indicate that there was a remarkably consistent cluster of states with low development in the south from 1940 to 2000, it should be noted that the relative wellbeing of these states with regard to the rest of the country has varied over time. Studies have shown that incomes converged across states in Mexico in the period between 1940 and 1980, but that divergence has been observed since the beginning of the 1990s.⁹ This is reflected in Figure 2, which shows the evolution of the nation’s Gini coefficient (measuring inequality across states) over the period of 1940 to 2000. The figure shows that inequality decreased rapidly from 1940 to 1960, stabilized during the 1960s and 1970s, and then grew in the 1980s and 1990s

Figure 2: Gini coefficients for states per capita income in Mexico, 1940-2000



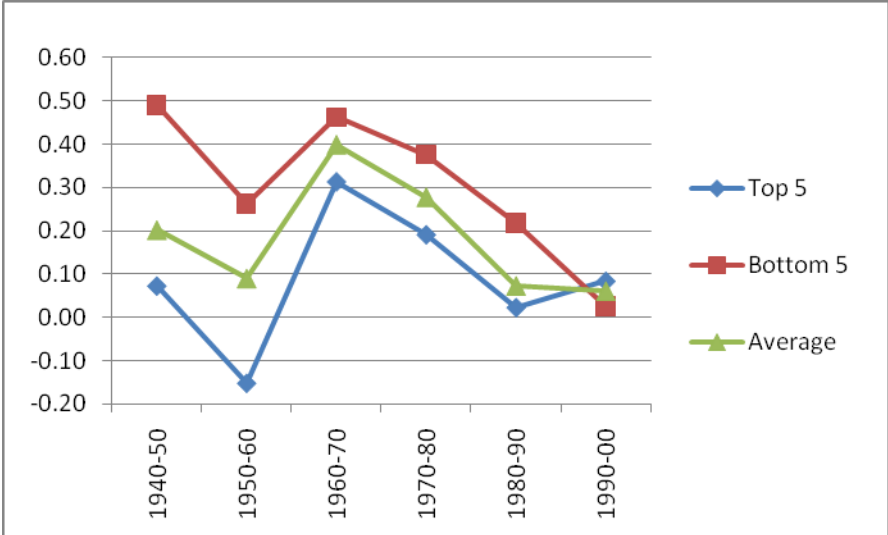
Source: Author’s calculation with data from Esquivel, 1999.

It is important to consider the nature of the break in the convergence trend. For example, it is possible that the break in the 1980s was caused by some states growing much

⁹ Juan-Ramón, V. Hugo and Rivera Bátiz, 1996; Esquivel, 1999; Esquivel and Messmacher 2002; and Sánchez Reaza and Rodríguez Posé, 2002.

faster, even if all states were growing. In this case, a convergence trend break would not necessarily be bad news. However, it is also possible that the trend break reflected some states actually experiencing a decline in growth. By looking at the average state growth rate in different decades and the growth rates in the poorest and richest states over the various decades, I find unfortunately that the trend break reflects an actual decline for some states.¹⁰ Figure 3 shows that the average state growth rate in Mexico has declined in every decade since 1970. It is interesting to note, however, that in every decade before 1990, the poorest five states had an average growth rate higher than that of the richest five states. Both of these growth rates were declining at about the same rate from 1970 to 1990. From 1990-2000, however, the growth rates of the five poorest states continued to fall, while the growth rates of the five richest rebounded. In fact, the growth rates of the poor states fell so much, and the growth rates of the rich states rose enough, that for the first time in the period of observation, the average growth rate of the richest states was above that of the poorest states. Obviously it is not surprising therefore that we began to see divergence from 1990-2000.

Figure 3: Average growth rates of states per capita income, by groups of states



Source: Author’s calculation with data from Esquivel, 1999.

In sum, this section has established the geographic distribution of the poorest states in Mexico is highly unlikely to be random. The spatial correlation tests across several indicators of development show that the most pronounced spatial pattern from 1940-2000 is the existence of a cluster of low values in the south of the country. This indicates that while individual state

¹⁰ For this analysis, I took the richest and poorest states in 1940 and compared their average growth rates over 1940-50, and I repeated the same exercise in the other decades (i.e. not necessarily using the same particular states but comparing richest to poorest).

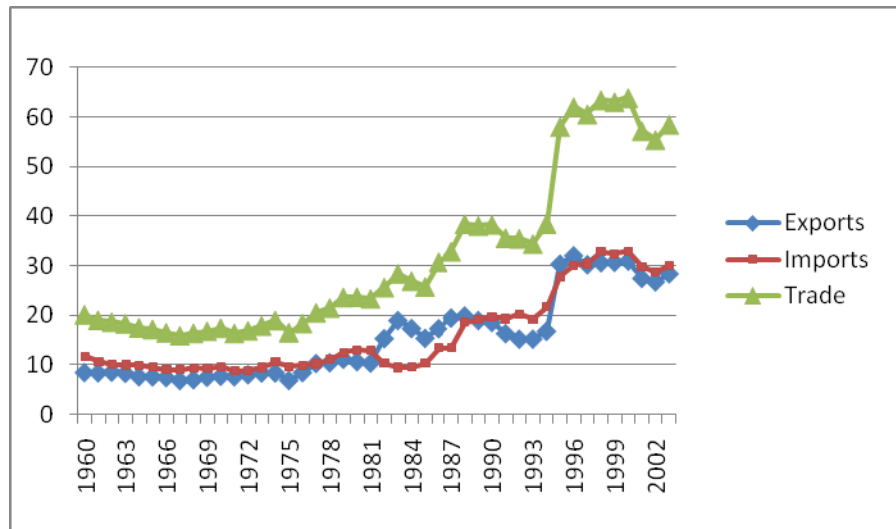
characteristics are no doubt important, there is likely to be something commonly affecting the states of this region. However, while the ordinal ranking of different states with regard to these indicators is remarkably constant (states that were more advanced in 1940 continued to be so in 2000, while states that lagged behind in 1940 continue to lag behind), their relative wellbeing in relation to other states has varied greatly. During the period of 1940 to 1980 there was a general convergence pattern, which was subsequently reversed. The following section turns to examine the role of trade in explaining these general patterns.

III. The role of trade and infrastructure in Mexico's regional inequality

In the late 1940s, Mexico established a system of import barriers, licensing restrictions, and official reference pricing as part of its import substitution strategy for industrialization, which was a common strategy in Latin America.¹¹ This system remained in place until the economic crisis of the 1970s and 1980s, after which Mexico underwent a major economic reform (Quintana Romero, 2004). One of the main characteristics of the new economic regime was (and is) the promotion of the external sector of the economy. The change of regime included the elimination of the protection for domestic industry that was maintained during the import substitution period, as well as the institution of additional policies to boost exports. The aim was to encourage national industry to compete with international industry and thus make local producers more efficient. Mexico joined the General Agreement on Tariffs and Trade in 1986, and from 1982 to 1990, the share of total imports that were subject to import licenses decreased from 100% to 14.1%. The highest tariff barrier fell from 100% to 20% (Quintana Romero, 2004). Moreover, since the 1990s, Mexico has signed twelve free trade agreements, including the North American Free Trade Agreement in 1994 (see Appendix 3). As might be expected, the volume of trade has increased substantially as a result of these changes, as shown in Figure 4.

¹¹ The aim under the Import Substitution Industrialization was to achieve industrialization avoiding external disequilibria that arise from unfavorable terms of trade and consequently avoiding structural unemployment. This strategy is based on the influential ideas of center periphery development theory of Raúl Prebisch. Solís, 1988.

Figure 4: Trade volume in Mexico (as % of GDP)



Source: World Bank, World Development Indicators 2005.

How might these changes in trade policy have affected Mexico's regional inequality in general, and the performance of Chiapas and other southern states more specifically? There are several important—and differing—theoretical perspectives on this relationship, and my previous work (González Rivas, 2007) has focused on evaluating their relative explanatory power in the context of Mexico. Here I focus particularly on two prominent hypotheses in the literature. The first is that poorer states will grow faster than rich ones as trade openness increases. And the second is that states better endowed with infrastructure will grow faster than those with less infrastructure endowments as trade openness increases. I first review the theoretical work proposing these hypotheses and then present the results examining their ability to shed light on the experience of Mexico.

The first hypothesis stems from the core-periphery model of Krugman and Livas Elizondo (1996) and Krugman (1991b). The model shows that if there is one region where the majority of manufacturing activity is already located in a closed economy, that region will also be where *new* manufacturing activities locate, since the large part of the market will be there. The concentration of economic activities in a core area will therefore tend to be reinforced, contributing to increased regional inequality. However, in the model of Krugman and Livas (1996), the concentration of economic activities is *less* beneficial in the face of trade openness, because the costs of concentration gain more relevance. Krugman and Livas (1996) argue that protectionist policies encourage the concentration of economic activities, because firms want to take advantage of being close to suppliers and buyers. Once trade barriers fall, instead of relying on the core for inputs and markets, firms will now seek to access foreign markets and rely on imports for inputs. As such, firms can now locate outside the core and avoid external diseconomies of concentration that arise in large centers (like pollution and traffic) as well as

high land prices and labor costs. In sum, the benefits of concentration are greater in closed economies compared to open economies. The result should be a dispersion of activities and therefore more equal regional development in the context of trade openness.¹²

The second hypothesis arises from a literature that has built on the core-periphery model but that predicts concentration rather than dispersion, due to the advantages that states well endowed with infrastructure have over those with relatively low levels of infrastructure endowments (Mansori, 2003). This is based on the idea that infrastructure exhibits increasing returns due to its high sunk costs. As Mansori (2003) puts it, “an airport, a railway line connecting two cities, or a port can easily cost billions of dollars to construct before any transportation services can be provided, and then require periodic and costly maintenance thereafter” (p. 251). Because of the large fixed costs relative to variable costs in infrastructure projects, infrastructure exhibits increasing returns and therefore tends to be highly concentrated (see Neary, 2001). Since trade increases the use of the infrastructure, the average costs of that infrastructure decline, thereby giving an additional advantage to those regions with already existing infrastructure. Mansori argues that these regions with already existing infrastructure are likely to have innate geographic or topographic advantages that lowered their transportation costs in the first place, and trade essentially augments this advantage.¹³ Hu (2002), who argues that trade openness, aggravates natural geographic advantages already inherent in regions, positing that port and border areas will benefit from open trade more than hinterland regions.¹⁴

I test these two hypotheses using regression analysis of an equation in which the dependent variable is the growth rate of state GDP per capita over ten-year intervals from 1940 to 2000. The first independent variable is trade openness, measured as the sum of exports and imports divided by the GDP in a given year.¹⁵ The other two independent variables are GDP per

¹² The Krugman and Livas (1996) model has been extended to include initial endowments and initial beliefs (Ottaviano, 2001) and the size of population (Villar, 1999), to see how the spatial distribution of activities change once controlling for these factors. However, the original results still hold.

¹³ In assuming variation in transportation costs across regions, Mansori differs from Krugman and Livas Elizondo, who assume constant transportation costs across regions.

¹⁴ If one considers trade openness as part of economic openness more broadly, one might consider Mansori’s argument supported also by Fuchs and Pernia (1987), who study Japanese FDI in six Asian countries and emphasize the importance of infrastructure for the dispersion of economic activities. They argue that in developing countries the availability of infrastructure outside the main urban center is very limited, and thus dispersion does not take place. Along the same lines, Fujita and Hu (2001) analyze different factors that could have contributed to increasing inequality across regions in China and find that foreign direct investment (FDI) and economic liberalization in general have been among the most important, as new investment located in areas with better infrastructure.

¹⁵ The volume of trade, although not measuring directly the evolution of a country’s trade policy over time—as opposed to tariff rates, for example—can reflect changes in trade restrictions such as tariffs, quotas, licensing agreements, and other regulatory measures. The main problem with using the volume of trade as a measure for trade openness is that it includes changes in volume due to variation in factors other than trade

capita and highway density (the total length of highways and roads in each state divided by the area of each state), the latter of which is a proxy for the overall level of infrastructure in a state.¹⁶ To capture the dynamics stipulated in each of the hypothesis above, I include these two variables on their own and also interact (multiply) them with the level of trade openness. I have centered the trade variable, so that the coefficients on GDP per capita and highway density indicate their effect when trade is at the mean level in the sample (Braumoeller, 2004 and Brambor, Clark and Golder, 2005). I also include dummy variables for each state (fixed effects), in order to capture unobserved characteristics of each state.

The results are presented in Table 1. To begin with, it should be noted that the effect of trade openness on state economic growth is negative, consistent with the finding of Yanikkaya (2003) and models in which trade takes place among asymmetric partners. Although the causal mechanism in these models—that developing countries are at a disadvantage when trading when richer countries—is not tested in this analysis, it seems to be relevant for the case of Mexico, given that the majority of the country’s total trade is with developed countries. Table 2 shows Mexico’s major trading partners, and the United States is by far Mexico’s main commercial partner, representing an average of 73 percent of Mexico’s exports and 68 percent of Mexico’s imports for the period 1980 to 1997. Moreover, Figure 5 shows that the US and other important trading partners have maintained higher protection than Mexico.

However, our principal interest is not in the overall effect of trade, but rather its effect on individual states, and how that effect translates into regional inequality. To analyze this conditional effect, we turn to the interaction terms. The coefficient for Hypothesis I—the interaction term between trade openness and per worker state income—is positive and significant at the one percent level. This result provides evidence against Krugman and Livas Elizondo’s theory that increasing trade openness leads to higher growth rates in poorer states, and in fact provides evidence that increased trade openness *increases* regional inequality. This might be interpreted as providing support for the ideas of Myrdal (1957), discussed before, in which trade provides additional advantages to already well developed regions. And the coefficient for Hypothesis II—the highway density variable interacted with trade—is significant at the five percent level, with a positive coefficient. This provides evidence for Mansori’s argument that transportation infrastructure exhibits increasing returns in the context of increasing trade openness, leading to higher growth rates in regions with higher infrastructure

policy, such as transportation costs, production growth, world demand, etc. For example, in countries where exports are mainly composed of a commodity subject to large price fluctuations, like oil, trade volume might reflect such price fluctuations rather than a change of policy. However, this is not the case of Mexico, as since the late 1980s non-oil exports (including agricultural, chemical, and manufacturing products, of which auto parts and automobiles constitute the majority) have increased substantially.

¹⁶ Although road density is a good measure that conveys overall levels of infrastructure across states it is important to note that it has a tendency to exhibit lower road density for larger states simply because of their size. An ideal measure would capture both the quality of roads and their functionality in terms of whether they serve local populations or populations from other states (in transit).

levels. This result indicates a mechanism by which trade openness can increase regional inequality, by benefiting those states that already have higher levels of infrastructure. In sum, the results indicate that trade openness has increased regional inequality in Mexico.

Table 1: Results of the fixed effects model of state per capita GDP growth rate

Variables	Coefficient (Standard errors)
Hypothesis 1: Trade openness * per worker income	0.00344*** (0.00127)
Hypothesis 2: Trade openness * infrastructure	0.363** (0.164)
Trade openness	-0.0763*** (0.0181)
Per worker income	-0.0134*** (0.0024)
General infrastructure	-0.376 (0.239)
Constant	0.151*** (0.0208)
Within R ² =	0.37
Between R ² =	0.15
Overall R ² =	0.22

*** p<0.01, ** p<0.05, * p<0.1 N= 192, T=32

The implications of the results can best be seen in terms of substantive effects, which use the regression results to demonstrate how the effect of trade policy varies according to a state's level of income and infrastructure. Table 3 below shows the difference in percentage points of the effect of trade openness on per capita income growth for two extreme cases: Federal District and Chiapas. For example, if trade openness were at mean levels observed in the sample, all else equal, a state with the 1940-2000 mean income level of Chiapas (which is among the lowest mean income levels) would grow 0.58 percentage points faster than a state with the 1940-2000 mean income level of the Federal District (the highest mean income level). This convergence effect would be even stronger—Chiapas would grow 0.82 percentage points faster—if trade were at the minimum level. However, if trade openness were at the maximum level, the convergence would be reduced, as Chiapas would only grow 0.39 percentage points faster than the Federal District.

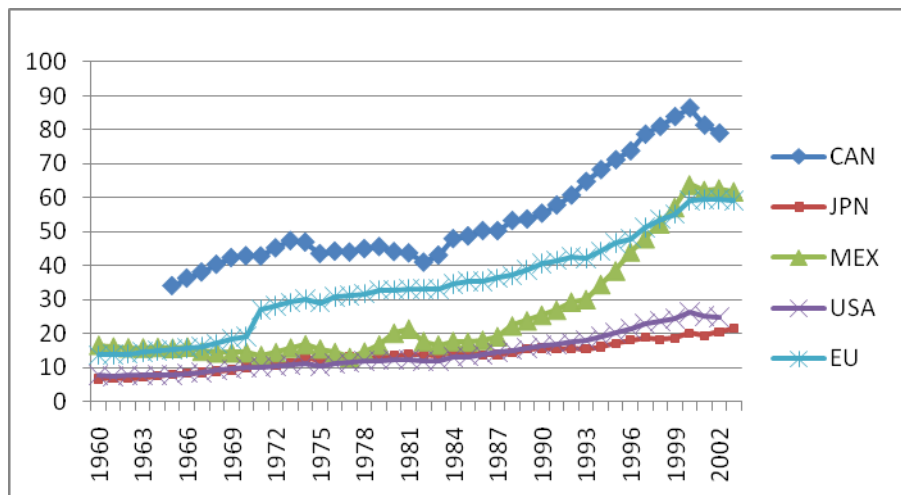
Table 2: Mexico's main trade partners

<i>Trade partners</i>	<i>Exports</i>					
	1980	1985	1990	1995	1997	1980-1997
United States of America	65%	61%	69%	84%	86%	73%
France, Germany, Italy, United Kingdom	8%	19%	13%	4%	4%	10%
Asia (excluding China) mainly Japan	5%	9%	7%	2%	2%	5%
Canada	1%	2%	2%	2%	2%	2%
Rest of Western Europe	8%	0%	0%	0%	0%	2%
Middle East (mainly Israel)	4%	2%	1%	0%	0%	2%
Latin American Association (mainly Brazil)	4%	3%	0%	0%	0%	1%
Rest of the World	4%	5%	9%	7%	7%	6%
Total	100%	100%	100%	100%	100%	100%

<i>Trade partners</i>	<i>Imports</i>					
	1980	1985	1990	1995	1997	1980-1997
United States of America	65%	60%	66%	75%	75%	68%
France, Germany, Italy, United Kingdom	13%	12%	17%	9%	9%	12%
Asia (excluding China) mainly Japan	6%	6%	7%	9%	9%	7%
Canada	2%	2%	1%	2%	2%	2%
Latin American Association (mainly Brazil)	4%	4%	0%	0%	0%	2%
Rest of the World	10%	17%	9%	5%	5%	9%
Total	100%	100%	100%	100%	100%	100%

Source: Data from INEGI, 1998, Cuadro 18.4.

Figure 5: Mexico's level of trade openness compared to main trade partners



Source: World Bank, World Development Indicators 2005.

Table 3: Substantive effect of trade openness on per capita income growth by hypotheses

	Trade at min	Trade at mean	Trade at max
Effect of hypothesis 1: Income	0.82	0.58	0.39
Effect of hypothesis 2: Infrastructure	0.12	0.05	-0.01

Positive numbers imply an advantage for the less endowed state and negative numbers reflect an advantage to the more endowed state. Effects assume all else is equal. See text for interpretation examples.

As for the effect of infrastructure (also shown in Table 3), the results indicate that, when trade is at the mean level and all else equal, Chiapas grows 0.05 percentage points faster than Aguascalientes (the state with the highest mean level); and when trade is at the minimum level, the advantage of Chiapas over Aguascalientes increases to 0.12 percentage points. However, when trade is at the maximum level, not only is the advantage of Chiapas reduced, but Aguascalientes actually grows faster than Chiapas, by 0.01 percentage points.

In sum, while the overall effect of trade on state income growth in Mexico has been negative, it has been *more* negative for worse endowed states. Table 4 below shows how much faster Chiapas grows than the Federal District, all else equal, in percentage points, at different levels of trade openness, given their average endowments during the period of study. The results indicate that the effect on regional inequality of moving from a minimum to a mean level of trade openness is negative. That is, the advantage of the lower endowed state, in this case Chiapas, over the more endowed state, Federal District, is lessened. In sum, as trade openness increases, the benefits accrue to the more endowed states, due to the different levels of income and infrastructure.

Table 4: How much faster Chiapas grows than the Federal District, all else equal, in percentage points.

High openness	Mean openness	Low openness
0.38	0.62	0.94

Positive numbers imply an advantage for the less endowed state. Effects assume all else is equal. See text for interpretation examples.

IV. Historical roots of regional inequality

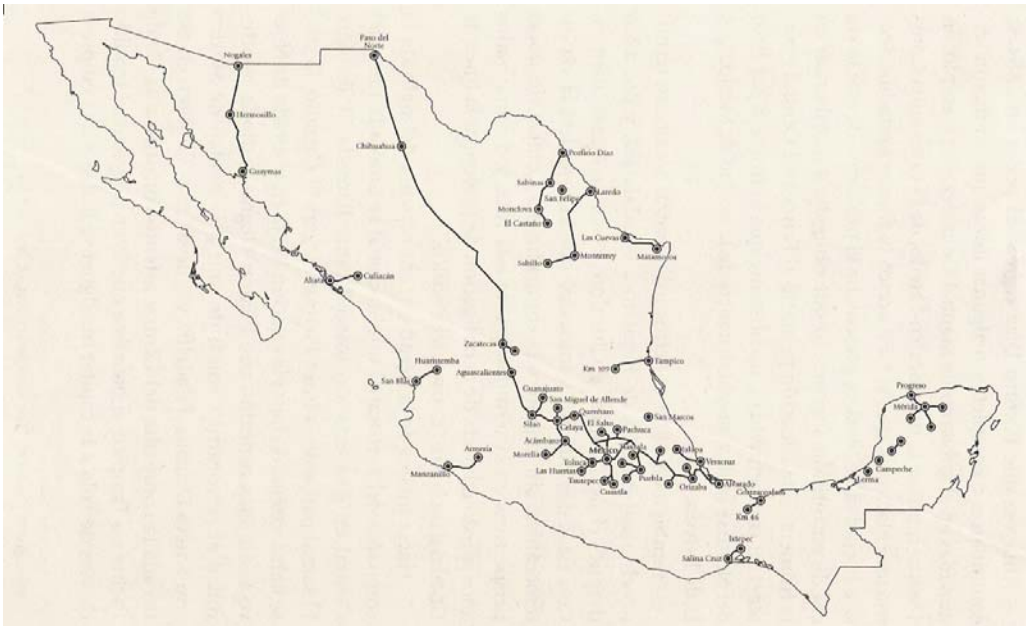
The previous section has demonstrated the importance of infrastructure for reaping the benefits of trade openness. Given that southern states have had low levels of infrastructure throughout the period, this provides one explanation for why these states have performed so poorly relatively to other states in recent years. But why have *all* of these southern states had low levels of infrastructure, presumably leading to the spatial cluster observed above?

As I explain in this section, the answer lies in how transportation and other infrastructure networks have been systematically designed by the central government in order to access external markets, first Europe and then the United States. The concentration of infrastructure in the core urban areas of the center and north of the country has its origins in the colonial period, when the first roads were established. Subsequently, this concentration was only strengthened by the transportation decisions pursued by the government, first with regard to the pre-revolutionary establishment of the railroad network that started to function in 1850, and later with the construction of the national highway system that started in 1925 (López Malo, 1960; Unikel, 1978; and Haber, 1989).

The railroad system was designed originally to connect the political center of the country, i.e. Mexico City, to the port of Veracruz, as it was the main port for European products.¹⁷ In the following years, the railroad connected the capital to the mining and agricultural areas in the center and north of the country. In 1881, the longest railroad line connected the capital to the north (Paso del Norte), as primary commodities were exported to the USA as shown in Figure 6 (Haber, 1989 and Jáuregui, 2004). In general, the south remained largely disconnected. According to Jáuregui (2004), although the railroad network benefited the entire country because it consolidated its union, it tended to benefit regions unequally, as only four stations—Mexico City, Guadalajara, San Luis Potosí, and Chihuahua—accounted for 45% of the total cargo. More importantly, Jáuregui argues that the railroad network mainly linked the country to the world economy, as the two main lines connected Mexico City with the port and the northern border (p. 93). The railroad network did not connect the south with the rest of the country due to their lack of mineral resources, their topography, and their remoteness to the US market (Tamayo, 1997).

¹⁷ Before the existence of the railroad, when Mexico was a Spanish colony, roads transported mining production (mainly silver) to Veracruz and foreign imports into Mexico City, basically connecting the center of the country—Mexico City, Zacatecas, San Luis Potosí, and Guanajuato—to the port in the Gulf of Mexico (Haber, 1989).

Figure 6: Rail network 1884



Source: Jáuregui, 2004, p. 85.

The road system that was built during 1860s and 1870s also benefited the center of the country, and it was not until 1925 that the financing and construction of a national highway system was made officially. Among the main highway projects of this effort was the route that connected Mexico City to the border (Nuevo Laredo) to foster the tourism coming from the USA into Mexico. The major projects during the 1950s mainly connected the center to the north of the country, and it was not until the 1980s that new roads were built beyond the established routes. In sum, therefore, the transportation system has given marked priority to the center and north of the country throughout Mexico's modern history.

Agricultural policies have also played a role in fostering the infrastructure advantage of certain areas, particularly since the 1950s, when the period of import substitution industrialization (ISI) began. As Little, Scitovsky, and Scott (1970) argued in their comparative study of seven developing countries' industrialization experiences, the ISI strategy was implicitly biased against the agricultural sector. As Rubio (2004) states, during ISI most countries satisfied their internal food demand through domestic production because of the high protectionist measures required by ISI.¹⁸ It was important to keep food prices low, so as to keep worker's salaries high in terms of purchasing power and thereby increase demand for industrial goods. Thus, food prices were kept low within countries through internal competition and regulation by the state. Little, Scitovsky, and Scott (1970) argue that Mexico implemented a successful agricultural development program during the 1950s and 1960s that aimed to compensate, at

¹⁸ It is important to note that protectionist measures were in place in most countries during the postwar period.

least partially, the bias against the agricultural sector.¹⁹ However, as Unikel (1978) points out, this program mainly benefited the already modern mechanized agriculture sector of the northern and central part of the country, because the policy rewarded capital-intensive export crops with high productivity. Thus the agricultural sector in the south did not benefit from these compensation policies and suffered the most under ISI.

In fact, the main reason the northern states could take advantage of the compensation programs was because they had been the principal beneficiaries of infrastructure investment. Fujigaki (2004) and Hewitt (1976) argue that the government played a key role in the modernization of agriculture of the country, which mainly consisted of large investments in infrastructure (irrigation, highways, and electricity) and the extension of credit. These investments mainly benefited the northern states, specifically Baja California Norte, Chihuahua, Sinaloa, Sonora, and Tamaulipas, where 53% of the irrigation investments took place between 1940 and 1970 (Fujigaki, p. 123). Thus, the infrastructure, incentives, and technical support provided since the 1930s to the northern states resulted in substantial differences in the productivity of the land compared with the rest of the country: on average the rate of yield growth from 1946 to 1962 was 3.6 percent in the north, whereas in the rest of the country it was 1.8 percent (Hewitt, p. 107). This also resulted in a much faster rate of growth of land under cultivation in the irrigated northern states—8.4 percent annually—compared to the slow growth of 1.3 percent per year in the center and south (Hewitt, 1976, p. 107).

Recent programs have only compounded these effects. As Fujigaki notes, the agricultural sector has become geographically bifurcated: specialization in more profitable crops like cotton and wheat in the north (due to the availability of infrastructure and production inputs) and concentration in the center and south on production of maize and beans, due to the lack of inputs and irrigation infrastructure. Since it is the crops in the center and south that compete directly with the USA and Canada, these states have suffered under NAFTA, and particularly the states where agriculture employs a large share of their population. However, the government programs that were set up to help farmers face the increased competition arising from NAFTA largely benefited the *northern* modernized agricultural producers (Yunez Naude and Taylor, 2006). This is because the program aimed at allowing farmers to sell their crops to food processors in competitive prices by providing marketing support for farmers in regions where there is a surplus of a basic crop. Therefore, Yunez Naude and Taylor state that the program “aids large farms, those with the capacity to produce surplus; therefore, most of its sponsorship goes to surplus producing regions of the irrigated areas of the northern states” (p. 164).

Finally, northern states, and specially border states, have also benefited from recent programs related to migration. For example, the Border Industrialization Program was

¹⁹ The incentives provided were cheap fertilizers, improved seeds, farm machinery, credit and irrigation infrastructure investment (p. 107).

established in 1965 as a response to the high unemployment of Mexicans returning to bordering states (and in the USA) after the Bracero Program was terminated.²⁰ The Border Industrialization Program allowed US products to be imported for free if they were used to manufacture products for export from Mexico, with the aim not only of employing the workers coming back from the United States but also of enabling Mexico to attain valuable international currency and technology. This program benefited the northern states and specifically those on the border by fostering the growth of manufacturing industry limited to this geographic zone. This advantage of the north has only been strengthened by the more recent set of export promotion policies of the mid-1980, which benefited those states with already established manufacturing sectors—states which were in the north and center.²¹

In sum, the combination of trade, transportation, agricultural and even migration policies has had a direct effect on the uneven development across states in Mexico, by systematically improving infrastructure and economic activity in certain areas of the country while neglecting others.

IV. Conclusion

This paper has attempted to accomplish three objectives. First, I characterized Chiapas and the other Mexican southern states in relation to the rest of Mexico in terms of their level of development. I showed that (a) these southern states have consistently had the lowest levels of socioeconomic indicators since 1940; (b) it is extremely unlikely that these underperforming states would be randomly grouped in this way, indicating that there is probably some common factor contributing to their low level of development; and (c) the gap between these states and the rest of Mexico has been rising since the 1980s.

Second, in the context of debates about the role of trade policy in aggravating or alleviating regional inequality, I built on my prior work and statistically analyzed this relationship, using data from 1940-2000. I showed that more trade openness has been associated with lower growth rates in states in general, but the effect has been significantly mediated by states' endowments. Specifically, the benefits of trade have systematically favored richer states and states with higher levels of infrastructure. Trade openness has therefore contributed to increased regional inequality in Mexico.

²⁰ The Bracero Program began in the 1940s and lasted until 1964. The Border Industrialization Program is commonly known as the Maquiladora program which is still functioning at the moment. The program was part of a federal program (Programa Nacional Fronterizo) that started in 1961 with the objective of fostering the economic development of the border region, even though the border region already had a higher level of development than the national mean, the idea was to take advantage of the geographic opportunity that bordering the US market represented. SPP, p. 17.

²¹ These policies mainly gave incentives to firms to export by providing rebates, and facilitating the administrative and fiscal process of exporting goods.

Third and finally, I have argued that the low levels of infrastructure that characterize the south—and which have contributed to the south’s continued poor economic performance—are indeed not random, in line with the previous analysis. The low levels of infrastructure in the region are the result of decades upon decades of transportation and other policies that have favored building infrastructure in the north and center, primarily as a way of accessing the markets of United States and Europe.

This poor economic performance has occurred together with a widening of Mexico’s historically high levels of regional inequality. As discussed earlier, Mexico has been an unequal country since 1940—both regionally and along other dimensions—but this inequality seems to have diminished over the period leading up to 1980. After 1980, this trend reversed, and Mexico’s spatial pattern of inequality—with the poorest states in the south and the richest states in the center and north—has been solidified.

This trend is disturbing, as scholars have argued that understanding regional inequality is important not only because it reflects the overall level of income inequality in a country, but also because of its political and social implications (Kanbur, Venables, and Guanghuan, 2005; Murshed and Gates, 2005). Regional inequality in Mexico has already had effects beyond the economic realm. For example, in the controversial 2006 presidential election, many analysts described Mexican society as deeply fractionalized over the two main candidates (from the left- and right-wing parties). In some quarters, the election was cast as a contest between the south vs. the north of the country, and indeed, Figure 7 showing election results by state look remarkably similar to the cluster maps of the socioeconomic indicators. Furthermore, the most recent and significant social unrest has taken place in Chiapas, Guerrero, and Oaxaca (Trejo, 2004; Meyer, 2007 and 2006), the three states that form the core of the cluster of low values through the 1940-2000 period. It is certainly plausible that the magnitude and persistence of regional inequality in Mexico may be a growing source of political instability for the country.

What can be done to address this inequality in the context of an open trade regime? A clear answer is suggested by the analysis in this paper: improve the levels of infrastructure in the southern states. In fact, this idea that relatively equal access to general infrastructure is necessary for the dispersion of economic activities and thus the reduction of regional inequality has been part of the discussion surrounding the results of NAFTA. In fact, an architect of the agreement during the Clinton administration, Bradford DeLong, was quoted in *The New York Times* as saying that Mexico’s inequality across regions in terms of infrastructure and human capital was ignored when NAFTA and its “alluring” promises were conceived and enacted (Uchitelle, 2007). It seems likely that NAFTA would have provided more (and more equal) benefits to Mexico if it had been combined with a series of complementary policies.²²

²² As Rodrik (2001) notes, one major problem with trade openness in Mexico (and in many other countries) is that it was implemented as if trade openness is in itself a development strategy. He argues that trade policy needs to

Figure 7: 2006 Presidential election results by state



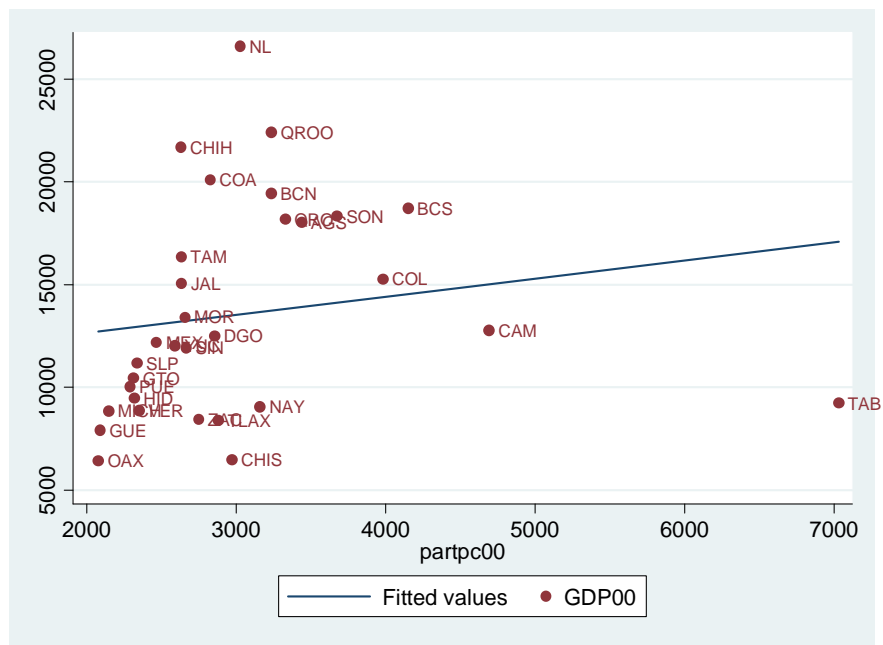
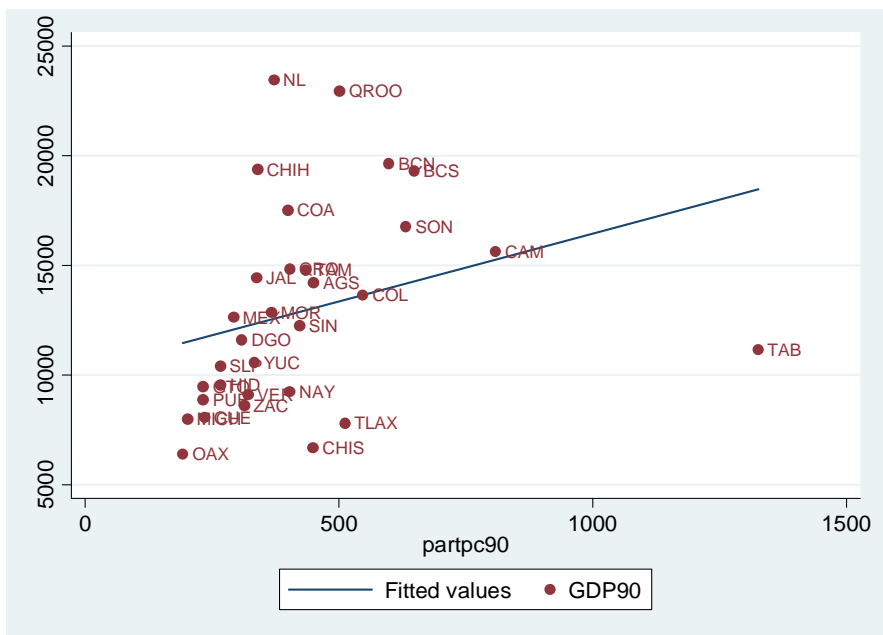
Source: Federal Electoral Institute, 2007, p. 67. Blue indicates states where the PAN (right-wing party) won; Yellow indicates states where the left-wing party (PRD) won.

Unfortunately, while analyses like those of DeLong (and this paper) suggest that infrastructure improvement in Mexico would be a highly effective policy with which to address regional inequality, federal transfers to states and municipalities in Mexico have been highly regressive, in keeping with the broad pattern of the past century or more described above. According to Díaz Cayeros (1995), richer states received more federal funding per capita than poorer states in 1990. I have replicated his analysis for both 1990 and 2000, and the same pattern appears, as shown in Figure 8. However, the pattern in 2000 is not as pronounced as in 1990. Moreover, it is interesting to note that in more recent years (specifically since 1994) Chiapas has been the beneficiary of more federal investment in federal highways, as shown in Figure 9.²³ This latest investment has lessened the gap between Chiapas and other states, but the difference still remains enormous, and it is notable that Chiapas' neighbors have not seen similar investment. Unless the gap between these states and others is reversed, the analysis in this paper indicates that regional inequality in Mexico will continue to widen, and Chiapas and its neighbors will continue to fall farther behind the rest of the country.

be complemented with industrial, development, and institutional policies in order for the benefits of open trade to be realized (Rodrik, 2001 and 1999).

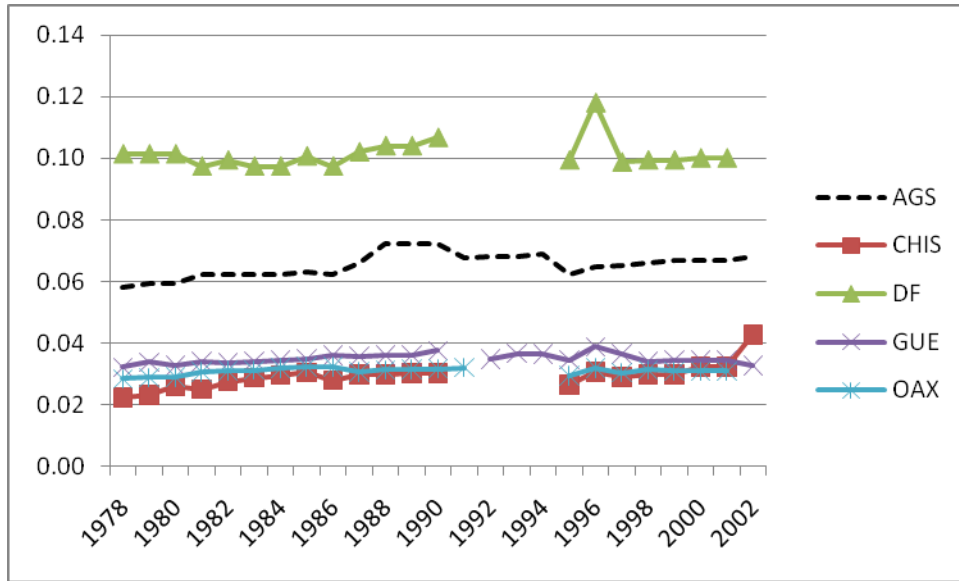
²³ As opposed to federal transfers, which states can use for infrastructure development, Figure 9 shows the results of direct federal investment in roads.

Figure 8: Federal transfers (participaciones) by states per capita vs. level of per capita income, 1990 and 2000



Source: Own calculation with data from INEGI, Finanzas estatales, 2007. Horizontal axis is federal transfers per capita by state and vertical axis is the level of GDP per capita, 1990 and 2000.

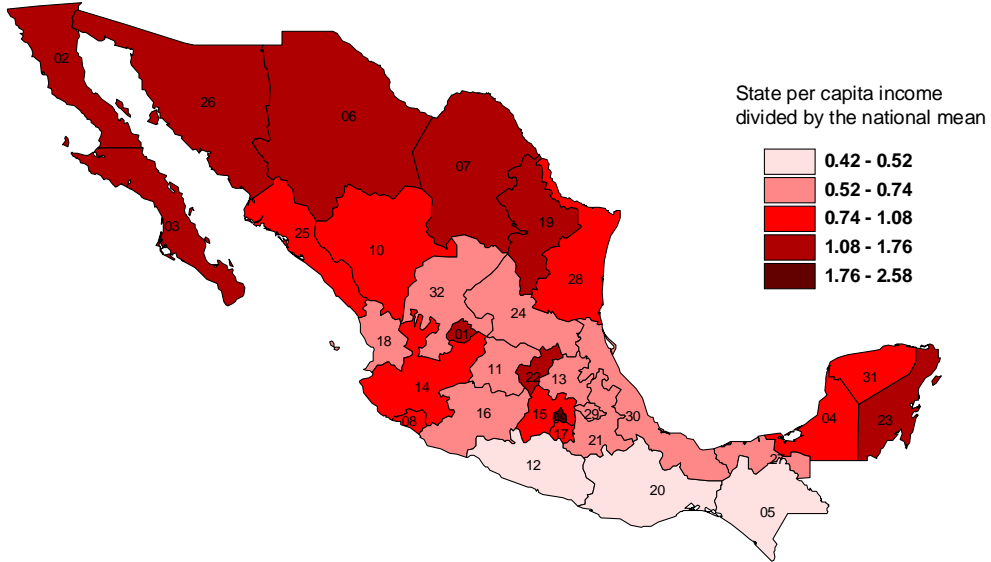
Figure 9: Federal highway density for various states, 1978 to 2002



Source: Own calculation with data from INEGI, Anuarios estadísticos de los Estados.

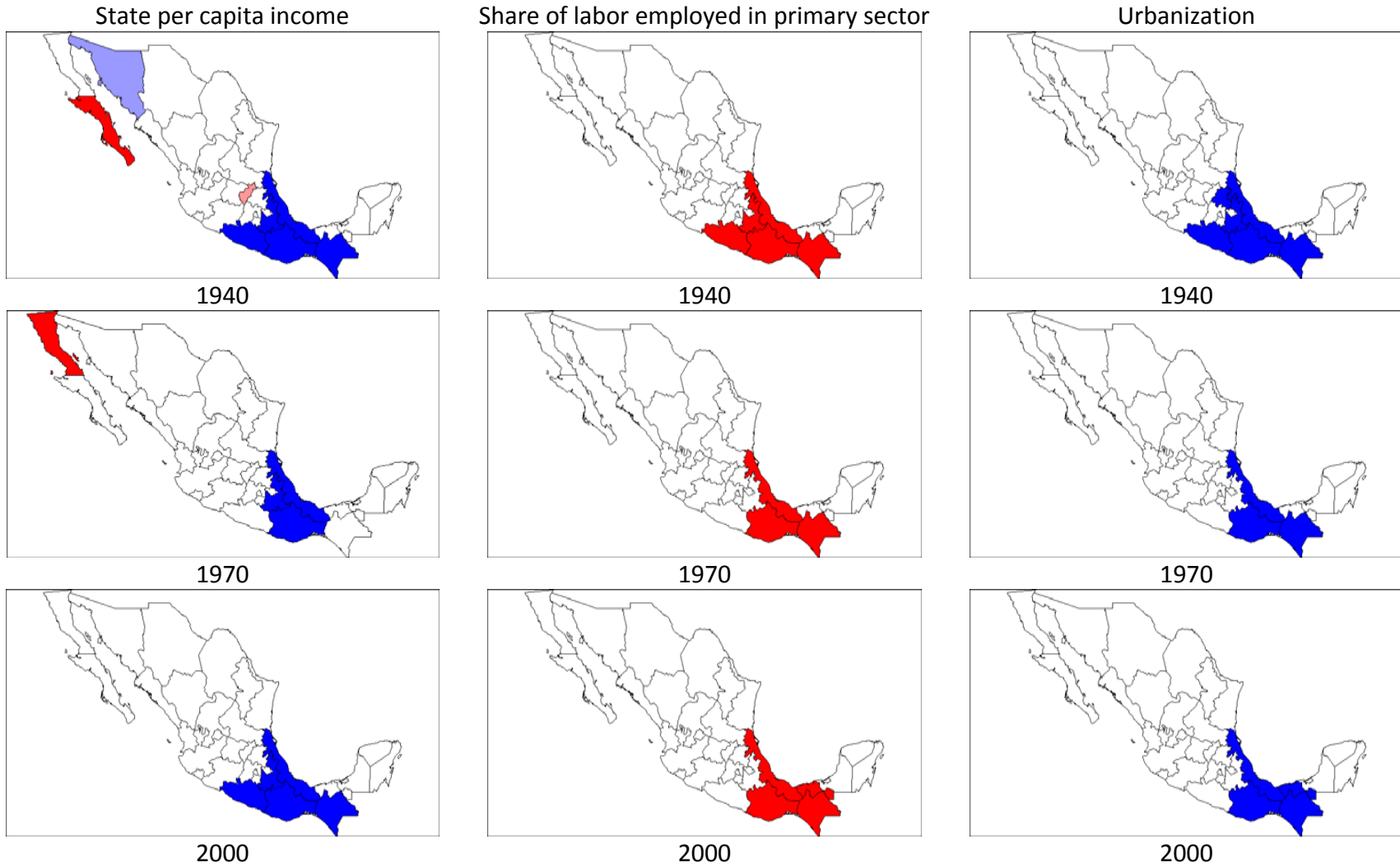
Appendix 1: State per capita income for 2000, relative to the mean

STATE PER CAPITA INCOME RELATIVE TO THE MEAN, 2000



<i>Code</i>	<i>State</i>	<i>Code</i>	<i>State</i>
01	Aguascalientes	17	Morelos
02	Baja California Norte	18	Nayarit
03	Baja California Sur	19	Nuevo León
04	Campeche	20	Oaxaca
05	Chiapas	21	Puebla
06	Chihuahua	22	Querétaro
07	Coahuila	23	Quintana Roo
08	Colima	24	San Luis Potosí
09	Distrito Federal	25	Sinaloa
10	Durango	26	Sonora
11	Guanajuato	27	Tabasco
12	Guerrero	28	Tamaulipas
13	Hidalgo	29	Tlaxcala
14	Jalisco	30	Veracruz
15	México	31	Yucatán
16	Michoacán	32	Zacatecas

Appendix 2: Cluster Maps of Local Indicators of Spatial Autocorrelation for 1940, 1970 and 2000



Appendix 3: Free trade agreements that Mexico has ratified

Treaty	Countries	Year
FTA Mexico-Chile	Chile	1992
NAFTA	USA and Canada	1994
FTA-G3	Colombia and Venezuela	1995
FTA Mexico - Costa Rica	Costa Rica	1995
FTA Mexico - Bolivia	Bolivia	1995
FTA Mexico – Nicaragua	Nicaragua	1998
FTAUEM	European Union	2000
FTA Mexico - Israel	Israel	2000
FTA Mexico – TN	El Salvador, Guatemala and Honduras	2001
FTA Mexico - AELC	Iceland, Norway, Liechtenstein and Switzerland	2001
FTA Mexico – Uruguay	Uruguay	2004
EPA Mexico-Japan	Japan	2005

Source: Mexico's Ministry of Economics. Available on-line at:
<http://www.economia.gob.mx/?P=2113&Nlanguage=es#>

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