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**THE DYNAMICS OF INCOME INEQUALITY  
IN MEXICO SINCE NAFTA**

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# The Dynamics of Income Inequality in Mexico since NAFTA

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**Abstract:** This paper reviews the pattern of income inequality in Mexico since 1994. It shows that in the past few years there has been an important reduction of income inequality in Mexico, which has almost reverted the sharp increase in inequality observed between 1984 and 1994. Using a Gini decomposition exercise we conclude that labor income, transfers and remittances have all played an important role in this process. We also argue that the equalizing effect of labor income and the reduction of wage inequality in Mexico can be explained by a structural change in Mexico's workforce composition in terms of education and experience. In general, we conclude that the recent reduction of inequality in Mexico is due to the interaction of both, the market and the State.

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## 1. Introduction

Mexico has long been characterized as a highly unequal country. This is a fact recognized at least since Alexander von Humboldt wrote at the beginning of the nineteenth century that the region then known as the *New Spain* was “the country of inequality”. Sadly, this is still true in the twenty-first century. For example, Corbacho and Schwartz (2002) point out that “Mexico’s income inequality is significantly more pronounced than the Latin American average, which is the region with the highest degree of inequality in the world”. Also, looking at the long-run trend in income inequality in Mexico leaves little room to be optimistic about this aspect of the Mexican economy. Historical data show that while Mexico achieved an important reduction in inequality during the 1960s and 1970s, periods of very rapid economic growth, Mexico has experienced very little progress in its income distribution since the 1980s (Székely, 2005).

This situation, however, could have started to change in recent years. In this paper we provide evidence on the reduction in income inequality that has taken place in Mexico since 1994 and we discuss some of the likely sources of such process (see Figure 1). The recent trend in inequality in Mexico is important for at least two reasons: first, because it has almost completely reverted the widely documented increase in inequality that occurred in the 1984-1994 period (Bouillón et al. (2003) and Legovini et al. (2005)), and second, because this reduction seems to be the result of two important structural changes in the Mexican economy: on the one hand, the arrival of better-targeted social programs such as *Progres/Oportunidades* and, on the other, a reduction in labor income and wage inequality that seems to be associated to the improvement on educational levels in Mexico. A third contributing factor to the recent reduction in inequality was the growing flow of remittances that many Mexicans living abroad send to their families left behind in Mexico.

The fact that both social policy and educational improvements could partially explain the reduction in income inequality in Mexico cannot be underestimated. In fact, income inequality is diminishing in several Latin American countries and it is possible that similar factors could also be at play in many of these other countries.<sup>2</sup> This could lead not

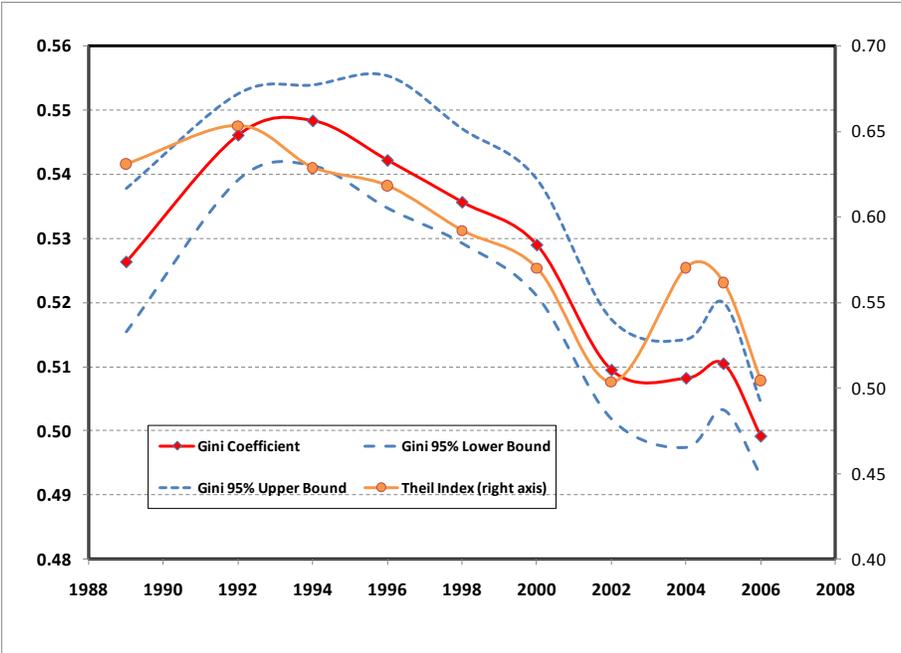
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<sup>2</sup> See, for example, Ferreira et al. (2007) and Barros (2008) for the Brazilian case; Gasparini and Cruces (2008) for Argentina; and Eberhard and Engel (2008) for Chile. For a more general view on the recent trends of inequality in Latin America see the introduction to López-Calva and Lustig (2010) as well as Gasparini, Cruces and Tornarolli (2009).

only to an appropriate evaluation of the new social policies that are being implemented in the region, but also to a reconsideration of the role that higher levels of education, combined with globalization and trade liberalization, may have on inequality in middle-income countries.<sup>3</sup>

Besides this introduction, the rest of the paper is as follows: Section 2 provides an overview of macroeconomic conditions in Mexico during the past decades. Section 3 shows estimates of income inequality in Mexico using alternative definitions of income. In Section 4 we perform a Gini-decomposition analysis to investigate the contribution of different income sources to the evolution of inequality in Mexico. Section 5 discusses the role of income labor and wage inequality in explaining the dynamics of inequality. Finally, Section 6 concludes.

**Figure 1. Mexico’s Gini Coefficient and Theil Index**



Source: CIEDLAS. Data provided by Guillermo Cruces.

<sup>3</sup> See Goldberg and Pavcnik (2007) for a recent survey on this issue.

## 2. An Overview of Mexico's Economic Conditions since 1950

Table 1 provides an oversimplified summary of Mexico's economic performance since 1950. In the first stage, between 1950 and 1970, Mexico's GDP grew at a relatively rapid pace (3% per year in per capita terms) with price stability, low fiscal deficits and with a fixed exchange rate since 1956. The second stage, between 1970 and 1982, was again a period of rapid growth (3% per year in per capita terms) but this time with macroeconomic instability. During this period, Mexico suffered double digit annual inflation and large devaluations in both 1976 and 1981. Mexico's government incurred in large fiscal deficits and Mexico's public sector external debt soared. These two initial stages were characterized by having a semi-closed economy with high tariff and non-tariff barriers. During the first stage inequality remained relatively stable, whereas during the second stage there was a rapid reduction in income inequality in Mexico (Székely, 2005).

**Table 1. Mexico's Economic Overview**

	<b>Stage I</b> <b>1950-1970</b>	<b>Stage II</b> <b>1970-1982</b>	<b>Stage III</b> <b>1982-1994</b>	<b>Stage IV</b> <b>1994-2000</b>	<b>Stage V</b> <b>2000-2006</b>
<b>Macro</b>	High growth with macroeconomic stability	High growth with macroeconomic instability	Low growth with macroeconomic adjustment	1994 crisis and recovery. Low growth with some inflation	Low growth with macroeconomic stability
<b>Openness</b>	Semi-closed economy with tariff and non-tariff barriers	Semi-closed economy with tariff and non-tariff barriers	Unilateral openness in 1985. NAFTA negotiations began in 1992	NAFTA comes into effect. Free Trade Agreement with the EU.	Open economy
<b>Inequality</b>	Relatively stable	Rapid reduction	Increased	Reduction	Reduction
<b>Social Protection</b>	Low	Low	Non-targeted Social Programs (Solidaridad)	Targeted Programs in Rural Areas: Progres a and Procampo	Progres a expands to Urban Areas

The third stage, between 1982 and 1994, was one of structural adjustment and important economic reforms. During this period Mexico went through a process of macroeconomic adjustment that led to a radical change in Mexico's economic model: the

government drastically reduced public expenditures, there was an important renegotiation of public sector's foreign debt, a large-scale privatization process and, in 1985, in the midst of an unexpected collapse in the price of its main exporting product (oil), Mexico unilaterally opened up its economy by significantly reducing its tariffs and by eliminating most of its non-tariff barriers. In the early 1990s, Mexico announced its intention of going well beyond these reforms (as well as locking them in) by proposing a Free Trade Agreement with the United States and Canada.<sup>4</sup> This agreement came into effect in 1994 in what was denominated as the North American Free Trade Agreement (NAFTA). It established the largest free trade area in the world, and the most asymmetrical too. During this period the Mexican economy stagnated in per capita terms and income inequality increased substantively in the country throughout the period.

The first year of the post-NAFTA period was characterized by a severe macroeconomic crisis that began in December of 1994. In that month, Mexico experienced a large devaluation and it was closed to incur in a financial default. The fiscal and macroeconomic adjustment of 1995, led to a sharp and steep decline in economic activity during 1995 (a contraction of 8% in per capita GDP). Later on, from 1995 to 2000, the domestic economy recovered relatively fast mainly based on an important increase in Mexican exports to the U.S. market. Between 1995 and 2000 Mexico's per capita GDP grew at a rate of 4 percent per year.

The first post-NAFTA stage was also characterized by the implementation of two important social and economic programs: *Progresa* (later known as *Oportunidades*) and *Procampo*. The first one is a focalized conditional-cash transfer program that started in 1997 and it is currently considered as the most important anti-poverty program in Mexico. This program was first applied in rural areas, although it has now been expanded to include urban areas since 2001. The second program, *Procampo*, is the income support program for agricultural producers designed to help them face the transition from a closed economy towards a more open economy. This program began in 1994 when NAFTA came into effect and it is considered a badly-designed program in redistributive terms (Esquivel et al., 2010). In average, the period from 1994-2000 was one of a mediocre economic performance (2 percent per year) but it was also the period during which income inequality

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<sup>4</sup> See Tornell and Esquivel (1998) for more details on these issues.

started to fall. The most recent stage, from 2000 to 2006, was one of low growth with macroeconomic stability. During these years, Mexico's per capita GDP grew at only 1% per year, since it was negatively affected by the U.S. recession of 2000/2001. Despite that, during this period income inequality was reduced even further.

### **3. Income Inequality in Mexico since NAFTA**

Before discussing inequality in Mexico it is important to clarify what measure of inequality and what definition of income we will use in this paper, since different definitions could not only lead to different estimates of inequality but also to slightly different conclusions.<sup>5</sup> Most of our results, however, are robust to alternative definitions of income and to alternative measures of inequality.

In this paper we use the Gini coefficient as our preferred measure of inequality.<sup>6</sup> This measure not only satisfies all the desirable properties of an inequality measure,<sup>7</sup> but it is also decomposable by income source, which is something we are interested in. On the other hand, inequality is usually measured using either Current Total Income or Current Monetary Income.<sup>8</sup> We use both definitions in our initial estimates of inequality, but we later focus only on monetary income estimates. Chart 1 provides a simple description of the components of both income definitions. The description of the sources of monetary income will be later used in a Gini decomposition exercise. All of our estimates use information from the National Survey of Household Income and Expenditure (or ENIGHs by their initials in Spanish). There are surveys available for the years 1984, 1989, 1994, 1996, 1998, 2000, 2002, 2004, 2005 and 2006.

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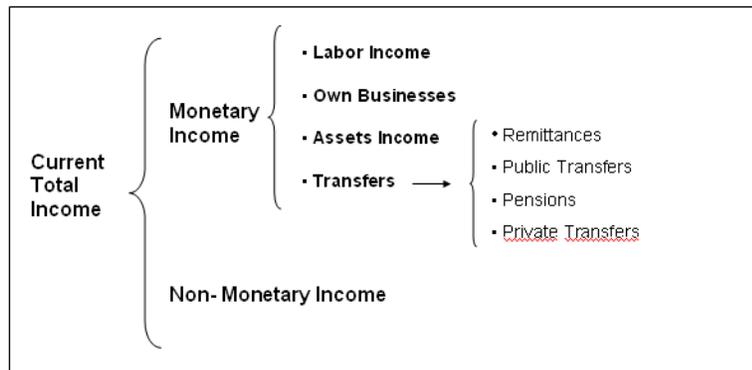
<sup>5</sup> Corbacho and Schwartz (2002) have a survey of Gini coefficient estimates in Mexico for different periods and different income definitions. CONAPO (2007) and Cortés (2008) show recent estimates of inequality using monetary income.

<sup>6</sup> The Gini coefficient does not capture well changes at the extremes of the distribution. However, other measures of inequality show similar trends as those described in the text and they are available from the author upon request. See also Campos (2008) for comparisons using alternative measures of inequality.

<sup>7</sup> These principles are: 1) Adherence to the Pigou-Dalton transfer principle, 2) Symmetry, 3) Independence of scale, 4) Homogeneity, and 5) Decomposability.

<sup>8</sup> There is yet a third definition of income that is widely used in Mexico: net total income. This definition is similar to current total income but deducts gifts and in-kind transfers given. This measure is the one used in the official estimation of poverty rates in Mexico.

**Chart 1. Mexico: Sources of Current Total Income**

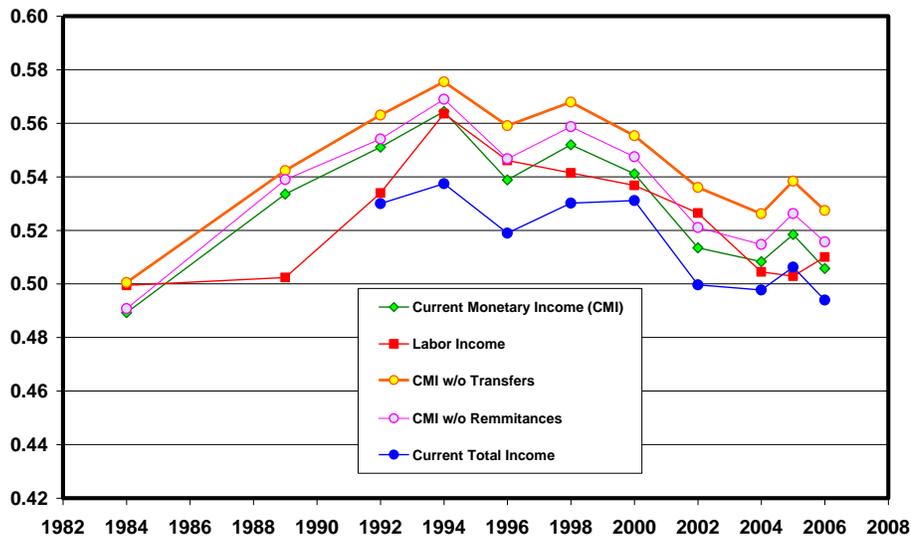


Source: ENIGHs

Figure 2 shows the evolution of the Gini coefficient in Mexico for the period that goes from 1984 to 2006, using alternative definitions of income. The figure clearly shows the existence of an inverted U-shape that peaks in 1994 in all cases and that steadily declines thereafter. This figure also shows the rapid increase in inequality that took place between 1984 and 1994, and that has been studied by, among others, Bouillón et al. (2003) and Legovini et al. (2005). The Gini coefficient for current monetary income went from 0.564 in 1994 to 0.505 in 2006, a ten percent reduction; whereas the corresponding measure for total income went from 0.537 to 0.494, an 8 percent reduction. These reductions are similar in magnitude to those recently observed in Brazil as documented by Barros et al. (2010). In annual terms, inequality in Mexico has fallen at a rate of 0.9 and 0.7 percent per year in the case of current monetary income and total income, respectively. Although these rates are still below the annual 1 percent rate at which income inequality diminished in Mexico between 1954 and 1984, they undoubtedly show a significant improvement with respect to 1994 figures.

Figure 2 also shows a few other interesting results. For example, the figure shows that the distribution of monetary income is more unequal (i.e. has a higher Gini coefficient) than the distribution of total current income (which is explained by the fact that non-monetary income is less unequally distributed) and, on the other hand, the graph also shows that the Gini coefficient of monetary income before including either transfers or remittances tends to be slightly higher than the Gini Coefficient of monetary income, thus suggesting the equalizing contribution of these two factors, an issue to which we will return later.

Figure 2. Mexico: Gini Coefficients for Alternative Income Definitions, 1984-2006



### *The Urban/ Rural Dimension of Inequality in Mexico*

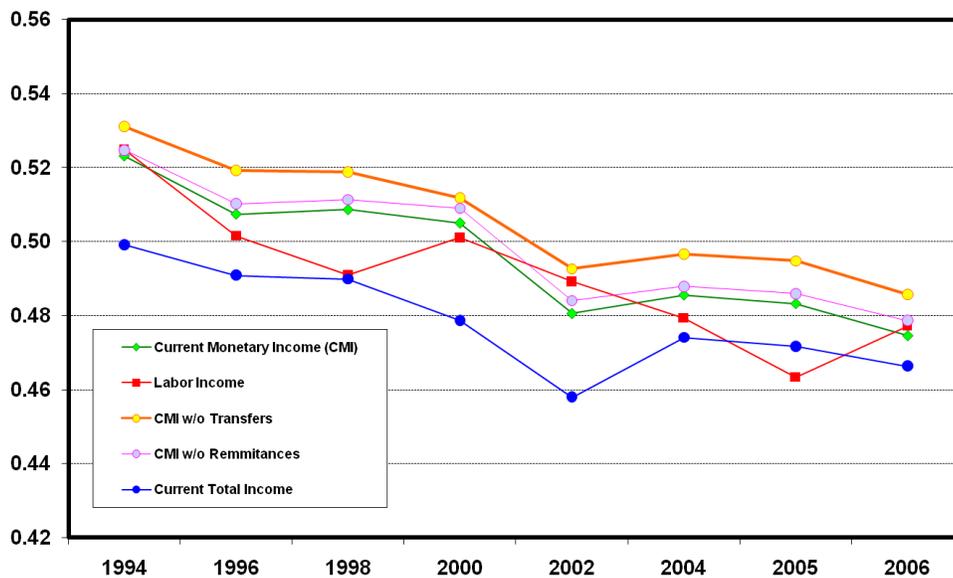
Previous studies have shown the relevance of understanding the dynamics of rural and urban inequality in Mexico by separate. For example, Pánuco-Laguette and Szekely (1996) showed that inequality *within* urban and rural areas accounted for 84% of total inequality in Mexico in 1992, whereas only one sixth of total inequality was explained by the rural/urban gap. For that reason, we now focus on the dynamics of inequality in rural and urban areas in Mexico since 1994. As will be discussed later, this distinction is crucial to understand the contribution of different factors in the recent downward trend in inequality in the country.

Figures 3a and 3b show the evolution of the Gini coefficients for urban and rural areas in Mexico, respectively, for the 1994-2006 period.<sup>9</sup> The divergence in the patterns of inequality by sector is quite striking. On the one hand, income inequality in urban areas in Mexico, regardless of the income definition that we use, has steadily declined since 1994. On the other, income inequality in rural areas increased until 2000 if we use the total income definition or until 2002 if we use any other income definition. After reaching the peak, income inequality in rural areas has basically returned to their 1994 levels. The existence of such a differentiated pattern of income inequality in rural and urban areas in Mexico somehow suggests that different factors could be affecting the dynamics on those two sectors of the Mexican economy. We explore this idea in more detail later.

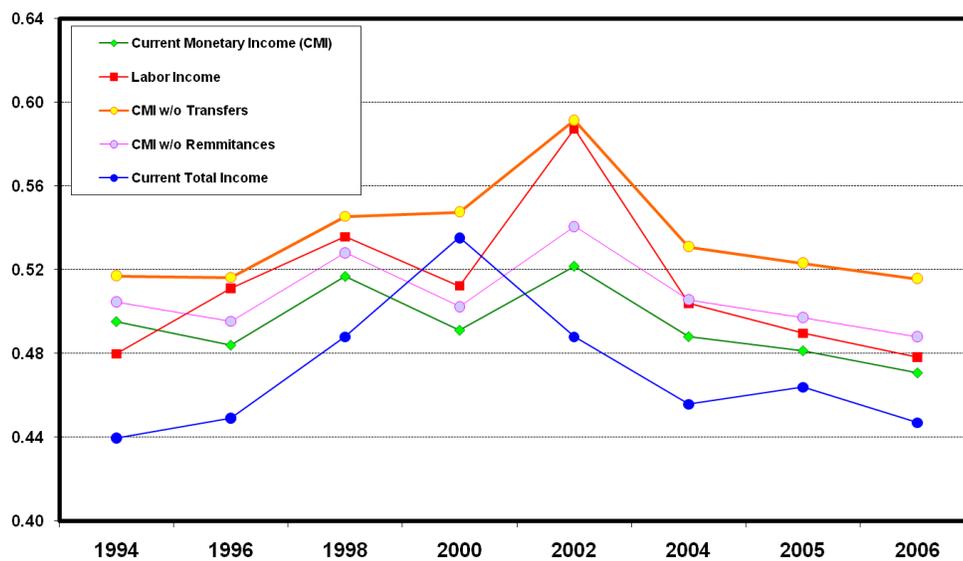
<sup>9</sup> Please note that this is not a rural/urban income inequality decomposition exercise. This analysis only refers to the income inequality dynamics *within* rural and urban areas and does not discuss the contribution of each sector to total inequality in Mexico.

## Figures 3a-3b

**Urban Mexico: Gini Coefficients for Alternative  
Income Definitions, 1994-2006**



**Rural Mexico: Gini Coefficients for Alternative  
Income Definitions, 1994-2006**



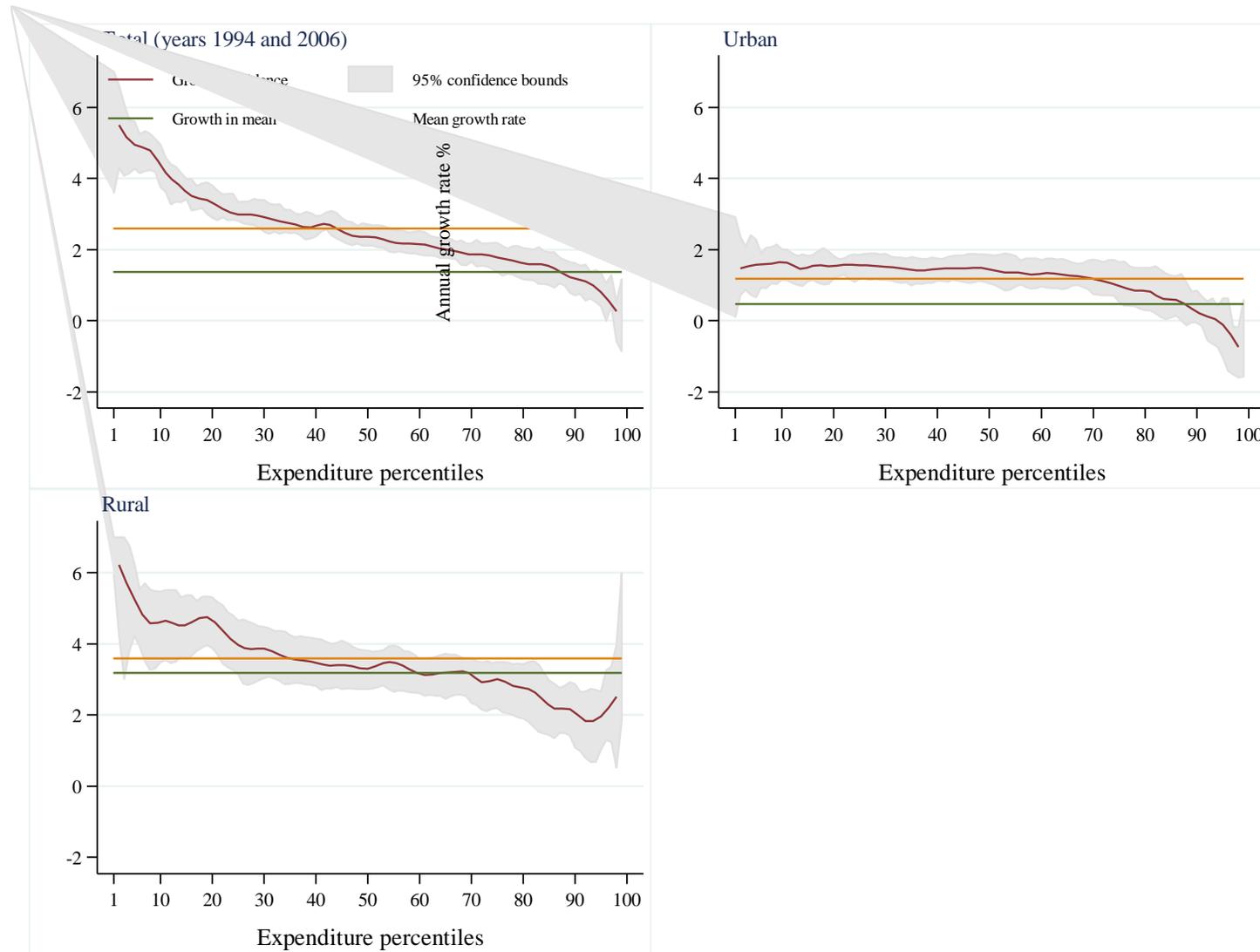
### *The Distribution of Monetary Income in Mexico*

We now explore in more detail the distribution of monetary income in Mexico, by looking at the Growth Incidence Curves (GICs) suggested by Ravallion and Chen (2003). These curves show the percent change in per capita income along the entire income distribution between two points in time. Figure 4 shows the GIC for the entire 1994-2006 period at the national, urban and rural levels.

The negative slope in the first graph clearly shows why Mexico's income inequality diminished during this period: the income of the bottom part of the distribution grew faster than the income from the middle and the top segments of the income distribution. This figure also shows the different patterns followed by the urban and rural income distributions during this period: in the urban areas, income growth was pretty flat across the entire distribution except for the top three deciles which experienced smaller and in some cases even negative income growth rates; in the case of rural areas, two aspects are salient: first, average income growth was greater than in urban areas (an effect that given the relatively large rural-urban gap, is inequality-reducing) and, second, the rural GIC curve also had a negative slope, so that the bottom-half of the rural income distribution had higher income growth rates than the top segment of its own distribution. All these facts contributed to the reduction in income inequality in Mexico that has taken place since 1994.

Interestingly, these results already suggest that the reduction in inequality in Mexico between 1994 and 2006 came from different sources: in urban areas, it was the result of the relative (and for some even absolute) loss of income of the top part of the distribution, whereas in rural areas, it was the generalized improvement in rural incomes as well as the specific improvement in the income of the relatively poor rural households throughout this period.

**Figure 4. Mexico: Growth Incidence Curves using Monetary Income, 1994-2006**



#### 4. What Are the Sources of Income Inequality in Mexico? A Decomposition Analysis

In this section we conduct a decomposition of the Gini coefficient for the years 1994, 2000 and 2006, to investigate the contribution of different income sources on the observed inequality of monetary income in Mexico.

##### *Sources of Monetary Income*

The main component of monetary income in Mexico is labor income, which accounts for around 60 percent of all monetary income in 2006; whereas the second largest source of monetary income in Mexico is the one obtained from own businesses, which accounts for another 20 percent of monetary income. The rest of monetary income proceeds from a variety of sources including transfers and remittances. Table A1 in the appendix shows the percentage of households that receive income from sources other than labor income.

This table shows the dramatic increase that has taken place since 1992 in the percentage of Mexican households that receives some type of transfer. That year, less than 24 percent of households received a public or a private monetary transfer; whereas, by 2006, more than 45 percent of all households reported receiving part of their monetary income through a private or public transfer. The single most important contributor to this trend is undoubtedly the social program *Progresa/Oportunidades* which, according to the 2006 ENIGH data, is received by 15 percent of Mexican households.<sup>10</sup> There are two other factors that account for part of this increase in transfers to Mexican households: the rural program *Procampo*,<sup>11</sup> which was aimed to support rural producers during the transition to trade liberalization in agricultural products; and, second, remittances, which are now received in 7 percent of Mexican households, which is twice as large as it used to be back in 1994. Based on what we know about the distributive effects of the *Procampo* (regressive) and *Progresa/Oportunidades* (very progressive) programs (Esquivel et al. 2010), it is quite likely that they can actually account for a large deal of the up-and-down dynamics of income inequality in rural areas depicted in Figure 3b.

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<sup>10</sup> For more details about this program see Cobacho and Schwartz (2002) and Levy (2008).

<sup>11</sup> For more details on *Procampo* see also Corbacho and Schwartz (2002).

## ***Methodology***

Lerman and Yitzhaki (1985) showed that the Gini coefficient for total income inequality ( $G$ ) with  $K$  income sources can be expressed as

$$G = \sum_{k=1}^K S_k G_k R_k$$

where  $S_k$  is the share of source  $k$  in total income,  $G_k$  is the Gini coefficient of the income source  $k$ , and  $R_k$  is the Gini correlation between the source income  $k$  and total income.

This decomposition of the Gini coefficient has a neat and clear-cut interpretation since it shows that the contribution of income source  $k$  to inequality depends on the interaction of three elements: a) how important the income source on total income is ( $S_k$ ), b) how unequally distributed the income source is ( $G_k$ ), and c) how correlated the income source and the distribution of total income are ( $R_k$ ).

Therefore, an income source that represents a relative large share of total income could have a large effect on inequality as long as it is unequally distributed (i.e. if it has a relatively high  $G_k$ ). However, if  $G_k$  is low, this factor will dwarf the contribution of that income source. On the other hand, if an income source is very unequally distributed but it is not highly correlated with total income (as in the case of well-targeted transfer programs), then the contribution of such source could in fact become negative.

Later on, Stark, Taylor and Yitzhaki (1986) showed that with this type of decomposition one can estimate the effect of a small percentage change ( $\pi$ ) in a given income source on total inequality (holding all other income sources constant) through the following expression:

$$\frac{\partial G}{\partial \pi} = S_k (G_k R_k - G)$$

or, alternatively,

$$\frac{\partial G / \partial \pi}{G} = \frac{S_k G_k R_k}{G} - S_k$$

This expression means that the percent change in inequality resulting from a marginal percentage change in income source  $k$  is equal to the initial share of income source  $k$  on total income inequality minus the initial share of the income source  $k$ .

### *Gini Decomposition Results*

Now we proceed to decompose the monetary income Gini coefficients for Mexico following the approach just described and using the income sources described in Chart 1 and Table A1. Instead of applying the methodology for the whole period under analysis, we have chosen to apply it only to the surveys of 1994, 2000 and 2006, for simplicity of exposition. In the decomposition exercise we used the `descogini` Stata command written by López-Feldman (2006).

The marginal effects of our decomposition exercise are shown in Figure 5. Results are unequivocal: at the national level, there are three inequality-augmenting and three inequality-reducing sources of income. Among the first group we have pensions, income from own businesses and income from property rents. Among the second group we have income labor (at least since 2000), remittances and transfers. In the last two cases, their marginal negative effects on the Gini coefficient have increased along the period.

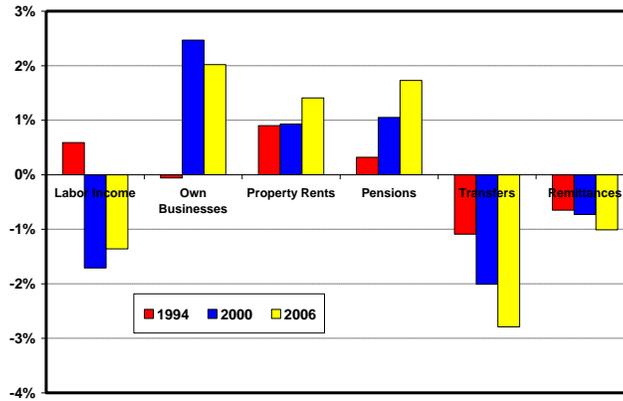
Figure 5 also shows the marginal effect of the different income sources at the urban and rural areas. The sign of the marginal effects of the different income components is basically the same that we observe at the national level. There are, however, some important differences in terms of the relative importance of the impact of some sources. For example, labor income is a very important inequality-reducing force in urban areas, but not within the rural sector (there, it is even inequality-augmenting in 2006). On the other hand, transfers are a very important inequality-reducing factor in rural areas, but not as large in urban ones. Finally, note that remittances do not seem to have a large negative marginal effect on inequality in any sector in specific, although they are relevant at the national level. This apparent paradox is explained by the fact that while remittances Gini correlation with rural monetary income is close to 50 percent, they have a much lower Gini correlation with monetary income at the national level. In that sense, remittances have an effect at the national level because they are heavily concentrated on the bottom half of the *national* income distribution.<sup>12</sup> Therefore, remittances work as an inequality-reducing source of income through the rural/urban income gap and not through the sector specific income distribution.

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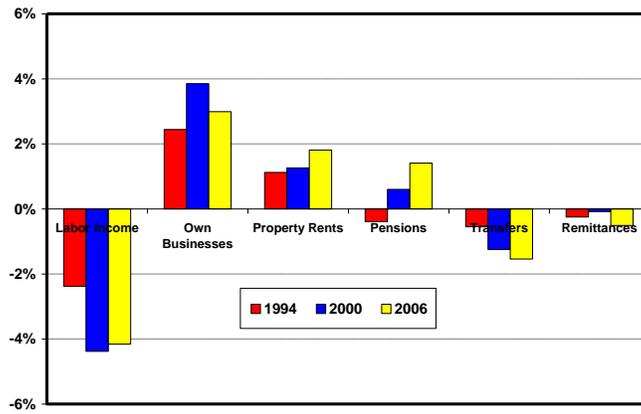
<sup>12</sup> For more details on this issue see, for example, Esquivel and Huerta-Pineda (2007).

# Figure 5

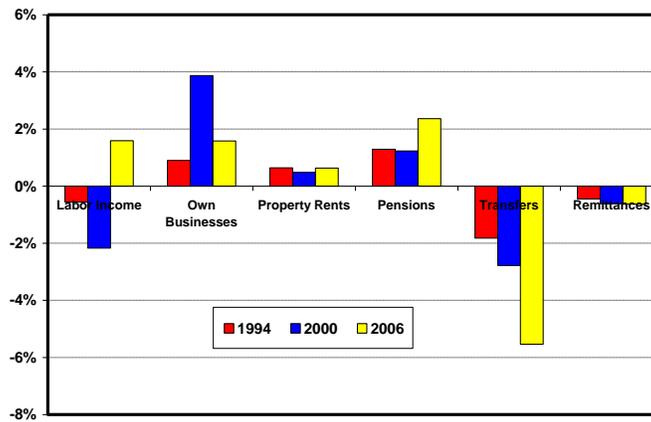
## Marginal Effect on Gini Coefficient by Income Source



## Urban Mexico: Marginal Effect on Gini Coefficient by Income Source



## Rural Mexico: Marginal Effect on Gini Coefficient by Income Source



## 5. Why has Labor Income Become an Equalizing Income Force?

The results of the decomposition exercise of the previous section suggest that one of the most important equalizing forces in recent years in Mexico has been the evolution of labor income (both, in urban areas and in the country as a whole). In fact, the reduction in the total contribution of labor income to the Gini coefficient accounts for almost all of the observed reduction in this coefficient throughout the 1994-2006 period. Therefore, understanding the nature of the change in the effect of labor income on inequality, that went from being positive in 1994 to becoming negative in 2000 and 2006 (see Figure 5), is crucial to understand the whole dynamics of income inequality in Mexico since 1994.

To begin with, note that labor income is basically the output of multiplying hourly wages and hours worked. In that sense, leaving aside changes in the number of hours worked along the income distribution (which could have occurred, but probably not necessarily in the magnitude or direction that could actually explain the observed changes in income inequality), the only other channel through which labor income can affect income inequality is through changes in wage rates. Therefore, most of the changes in this type of inequality must be somehow the outcome of changes in wage inequality. In some sense, this is a very fortunate circumstance since we can then establish a link between our discussion on income inequality with the literature on wage inequality in Mexico that has been written as part of the debate on the relationship between trade and wages.<sup>13</sup>

Let us first look at the evolution of wage inequality in Mexico in recent years. For that purpose, we will make use of a standard definition of wage inequality, which is given by the ratio of the wages of non-production workers to those of production workers. This ratio is also (grossly) defined as the skilled/unskilled wage ratio, where non-production workers are considered as a proxy for skilled labor and production workers are a proxy for unskilled labor.<sup>14</sup>

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<sup>13</sup> See the abundant references to the Mexican case that appear in the survey on globalization and inequality by Goldberg and Pavcnik (2007).

<sup>14</sup> This is, of course, a gross simplification, since there are production workers that are highly skilled and non-production workers that are relatively unskilled.

Figure 6 shows the evolution of this measure of wage inequality in the Mexican industry for the periods that goes from 1984 through 2007. The data for this graph came from the Industrial Survey in Mexico, which has monthly and annual data on total wages paid and total hours worked in the industry by both production and non-production workers. This figure is an updated version of similar versions published in, for example, Esquivel and Rodríguez-López (2003) and Chiquiar (2008).



The pattern of wage inequality in Mexico’s industry in Figure 6 is remarkably similar to the evolution of inequality in the various definitions of income that were shown before. This figure shows a continuous upward increase in wage inequality since 1984 that lasted until the mid-1990s, followed by a steady decline since then. A slight difference between this graph and the income inequality indicators, however, is that our measure of wage inequality peaks in 1996, whereas all the other definitions of inequality peaked around 1994.<sup>15</sup> A second difference is that wage inequality in 2006, unlike the income inequality measures, has not returned yet to its mid-1980s level. This suggests that some additional elements, other than those associated to wage inequality, are contributing to the reduction of income inequality in Mexico (such as remittances and transfers, as discussed above).

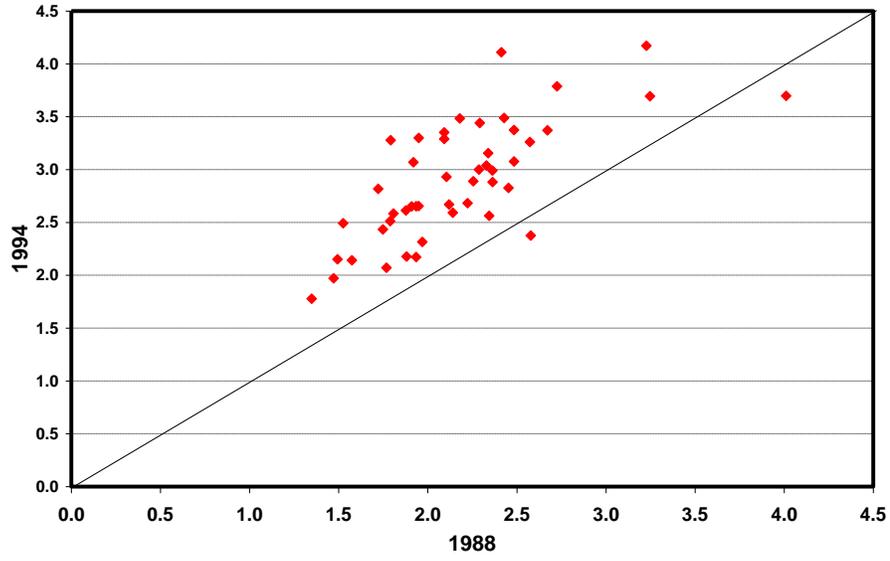
<sup>15</sup> See also the discussion on this issue in Robertson (2007) and Campos (2008).

Let us now take a more detailed look at the evolution of wage inequality in Mexico's industry in recent years. Figure 7 shows the skilled/unskilled wage ratio at the branch level of Mexico's manufacturing industry in two different points in time. The top image compares the observed wage ratio in 1988 ( $x$ -axis) with that of 1994 ( $y$ -axis), whereas the bottom one shows the equivalent ratio for the years 1994 and 2007. Both figures include a 45 degree line as a reference. The top figure shows that the increase in the wage gap between skilled and unskilled workers that occurred before 1994 was generalized across the whole manufacturing industry. In fact, the wage ratio increased in 46 of the 48 manufacturing branches. Between 1994 and 2007, however, the pattern of the skilled/unskilled wage ratio in Mexico's manufacturing industry looks somewhat different and more heterogeneous than in the previous period: now, most industries show a slightly declining wage ratio between these two years, but there are also a few branches where the wage ratio is now either the same or it is slightly above its 1994 level.

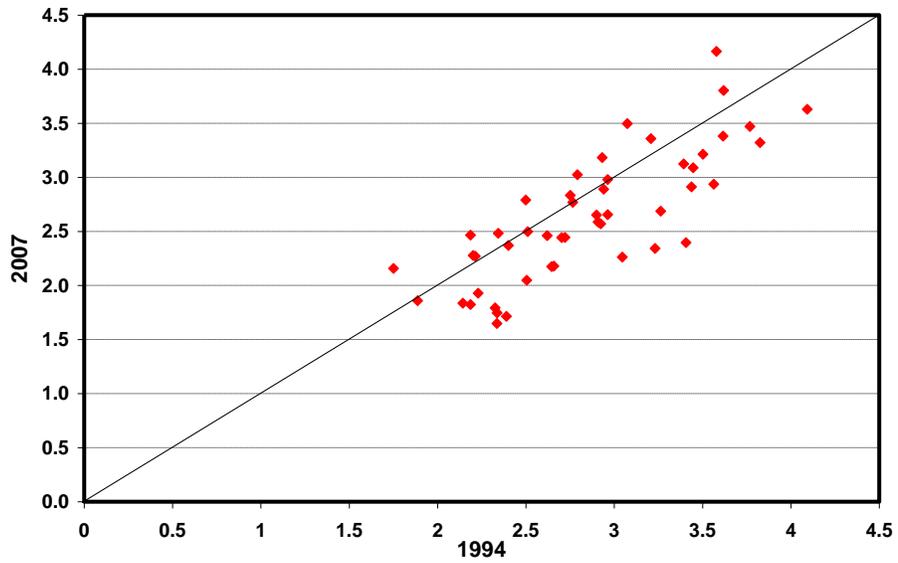
On the other hand, data on the evolution of the skilled/unskilled wage ratio at the state-level, show also a clearly declining trend in almost every state in Mexico since the mid-1990s (Esquivel, 2008). In summary, since 1996 there has been an important reduction in wage inequality in Mexico. This reduction took place not only at the industry-wide level, but it also occurred in most manufacturing branches and across the country in many regions and states. As a consequence, a good explanation of labor income inequality (and of wage inequality) has to be able to explain not only the rapid increase in wage inequality between 1984 and 1996, but it must also be able to explain the reduction in wage inequality that has been observed since 1996.

**Figure 7**

**Mexico: Skilled/Unskilled Relative Wage by Industry, 1988 vs 1994**



**Mexico: Skilled/Unskilled Relative Wage by Industry, 1994 vs 2007**



### *Explaining the Evolution of Wage Inequality in Mexico*

The rapid increase in wage inequality that occurred in Mexico between 1984 and 1994 or 1996 has been widely documented and studied.<sup>16</sup> An interesting aspect of this trend is that the beginning of this process coincided with the unilateral opening of the Mexican economy that started precisely in the mid-1980s. In that sense, the evolution of Mexico's wage inequality was somehow unexpected considering that Mexico is a relatively unskilled-labor abundant country (at least from the perspective of its main trade partner: the United States), and that standard trade theories would have predicted exactly the opposite pattern (i.e. a reduction in the skilled/unskilled wage ratio, see Cragg and Eppelbaum, 1996). As a consequence, several possible channels (most of them linked to the opening of the economy in the mid-1980s) have been suggested to explain this apparent paradox.

The explanations that have been proposed to explain the post-openness increase in Mexico's income inequality can be grossly divided into two groups: in the first one, the explanations emphasize factors affecting the bottom part of the income distribution (that is, the segment mostly comprised of less skilled and less experienced workers); whereas the second group of explanations emphasizes factors affecting the upper part of the distribution. In the first group, for example, we have theories emphasizing the reduction in real minimum wages (Fairris, Popli and Zepeda, 2008), as well as theories suggesting that the mid-1980s reduction in tariffs disproportionately affected industries intensive in low-skilled workers (Hanson and Harrison, 1999). On the second group, some explanations have emphasized the role of an increase in the demand for skilled workers associated either to the presence of foreign investment (Feenstra and Hanson, 1997), to a skill-biased technological change (Cragg and Eppelbaum, 1996 and Esquivel and Rodríguez-López, 2003), and to a process of quality-upgrading due to an increase in exports (Verhoogen, 2008). Other explanations have suggested that education inequality could have also played a role (López-Acevedo, 2006) or that these trends could be indicating only short-run effects (Canonero and Werner, 2002).

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<sup>16</sup> See, for example, Esquivel and Rodríguez López (2003), Airola and Juhn (2005), Robertson (2007), Acosta and Montes-Rojas (2008), Chiquiar (2008), Verhoogen (2008), and the references cited therein.

On the other hand, the post-1996 reduction in wage inequality in Mexico has been much less studied. So far, only Robertson (2007) and Campos (2008) have analyzed this trend. While the latter favors an explanation based on supply factors, the former suggests that Mexico's manufacturing workers are now complements rather than substitutes of U.S. workers and that there has been an important expansion of assembly activities in Mexico which has increase the demand for less-skilled workers.

Of course, many of the proposed explanations for the pre-NAFTA increase of wage inequality in Mexico are not mutually exclusive and they could in fact be (at least partially) correct. However, it is also true that most of them cannot explain the subsequent reduction in wage inequality that has been observed since 1996. In that sense, these explanations are either incorrect or incomplete since there could be many underlying forces acting in different directions. That is why Robertson (2007) has noticed that the pattern of wage inequality in Mexico is puzzling because no single theory could explain the evolution of wage inequality before and after NAFTA.<sup>17</sup>

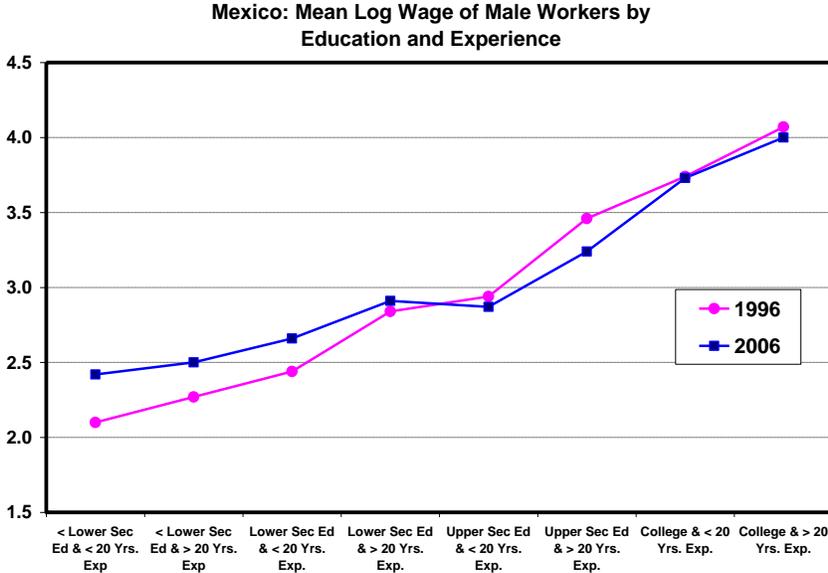
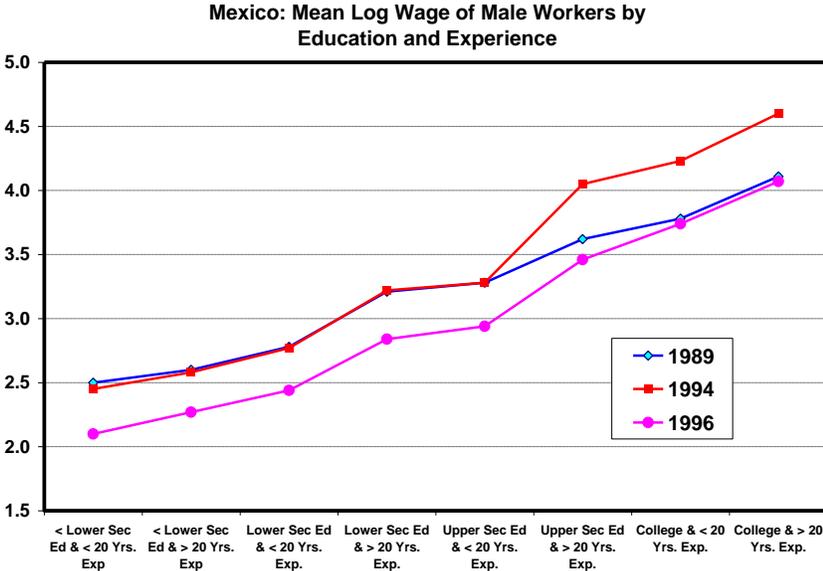
Although it is not the objective of this paper to identify or to establish which explanation (if any) is correct, we could at least rule out some of them by looking at some wage data provided by Campos (2008). The next two figures show the mean log wage of male workers in Mexico for selected years and for different combinations of education and years of experience. Workers are classified according to the level of education achieved (less than lower-secondary, lower-secondary, upper-secondary, and college education) and to the number of years of work experience (less or more than 20 years of experience).

The upper part of Figure 8 shows data for years 1989, 1994 and 1996, whereas the lower part shows information for 1996 and 2006. The first figure shows an interesting result: between 1989 and 1994, most of the changes in the wage distribution in Mexico occurred in the upper tail of the distribution. That is, the increase in wage inequality in those years cannot be explained as a result of a reduction in the wages of the low-skilled or inexperienced workers; instead, such increase in inequality can only be explained as a result

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<sup>17</sup> There are, however, some tentative theoretical explanations for such pattern. For example, Atolia (2007) has suggested that, under certain circumstances, even if the standard prediction from a Heckscher-Ohlin-Samuelson model works as predicted in the long-run, there may be some short-run (or transitory) effects of trade liberalization that may lead to a different outcome from those of the long-run as a result of two factors: first, an asymmetry in the contraction and expansion of some sectors, and second, because of the capital-skill complementarity in production.

of an increase in the wages of the high-skilled or high-experienced workers. This result basically rules out any explanation based on changes in the lower tail of the wage distribution such as those based on a falling real minimum wage or on a biased openness of unskilled-labor intensive industries. This figure also shows the widespread negative effects of the financial crisis of 1994/95 which reduced, almost proportionally, the real wages of all types of workers in Mexico between 1994 and 1996.



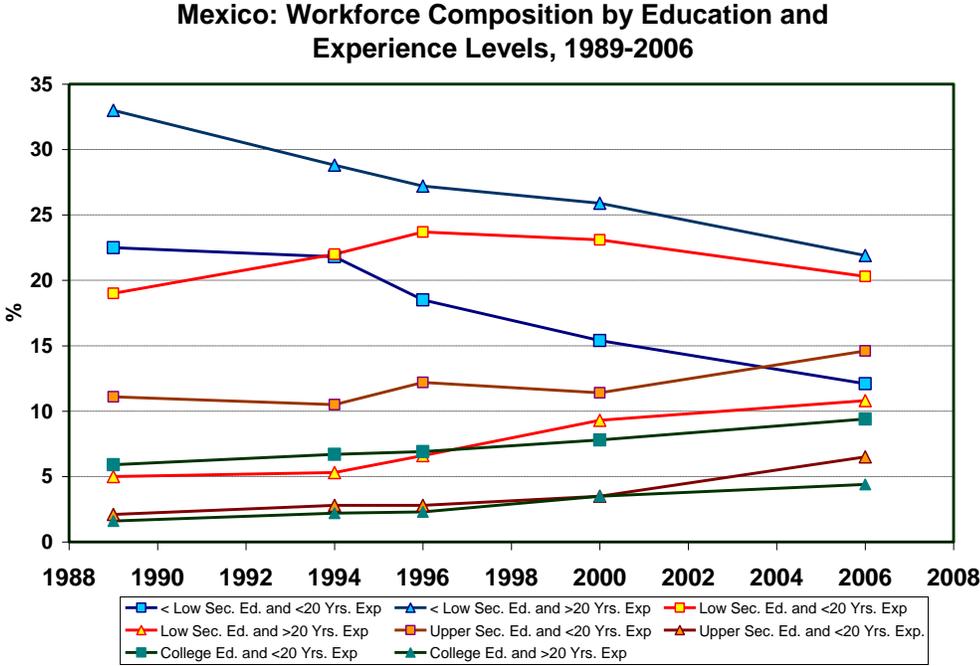
Source: Own elaboration based on Campos (2008).

The bottom part of Figure 8 shows the wage distribution in Mexico for 1996 and 2006. Unlike the previous figure, this one shows that most of the changes in the wage distribution took place in the lower tail. That is, workers with lower levels of education and/or less years of work experience had the largest increases in their average wages and this explains the reduction in wage inequality that has been observed since 1996. This also suggests that any convincing story of the post-NAFTA reduction in wage inequality has to explain the increase in the wages of the low-skilled/less-experienced workers rather than the reduction of the wages of the high-skilled/more-experienced workers.

The previous results confirm the intuition that there is no single explanation for the evolution of wage inequality in Mexico since 1984. Indeed, the fact that the 1984-1994 increase in wage inequality is associated to changes in the upper tail of the distribution, whereas the post-NAFTA reduction in wage inequality is mostly associated to changes in the bottom tail, suggests that there at least two leading forces at play. In the first case, as discussed before, the only explanations that seem to be compatible with the observed trend are those suggesting the presence of a skill-biased technological change, either exogenous (Cragg and Eppelbaum, 1996 and Esquivel and Rodríguez-López, 2003) or endogenously determined by the presence of multinational firms (Feenstra and Hanson, 1997) and/or by the quality-upgrading of exporting firms (Verhoogen, 2008).

For the post-NAFTA period there are at least three possible explanations, two of which have already been mentioned and that are not mutually exclusive: an increase in the supply of relatively skilled workers (Campos, 2008) and an increase in the demand for unskilled labor resulting from an expansion in assembly activities in Mexico's manufacturing sector (Robertson, 2007). Any of these two effects could explain the reduction in the skilled wage premium that is observed in the data. A third explanation that is also compatible with the previous two stories is that of a standard Heckscher-Ohlin-effect in an unskilled-abundant country such as Mexico (Chiquiar, 2008). This effect could be the late outcome of trade liberalization as suggested by Canonero and Werner (2002) and that has been already modeled by Atolia (2007) or, alternatively, as an underlying effect that had not showed up in the data before due to the presence of a stronger force such as a skill-biased technological change as previously hypothesized by Esquivel and Rodríguez-López (2003).

To be able to discriminate amongst these alternative hypotheses a much more detailed and rigorous analysis is needed. However, we might move forward by analyzing whether some of these hypotheses are borne out by the data. For that matter, Figure 9 shows the composition of Mexico’s workforce between 1989 and 2006 according to the levels of education and experience defined above. This composition obviously reflects the interaction of both supply and demand factors.



Source: Own elaboration based on Campos (2008).

In general, the figure shows that throughout the period there was both a reduction in the share of the least skilled (those with less than lower secondary education) and less experienced workers, and an increase in the share of the most skilled and more experienced workers. The most dramatic changes, however, took place in the share of those workers with less than lower secondary education. In fact, this group, which accounted for almost 55 percent of the workforce population in 1989, only represented about one third of the workforce population by 2006, that is, a reduction of about 20 percentage points in a 17 year span. Such reduction was compensated by increases in the shares of all the other groups of workers. These trends, which had already been present between 1989 and 1994, accelerated in the post-NAFTA period.

Therefore, these results suggest that at least part of the relative increase in the wages of the low-skilled/low-experience workers is associated to the change in the composition of the workforce in Mexico and, in particular, by a reduction in the number of unskilled workers rather than by an increase in the supply of skilled workers. Of course, this result is not at all incompatible with the hypothesis of an increase in the demand for unskilled workers as suggested by Robertson (2007) but this story, by itself, cannot explain the simultaneous increase in the relative wages and the reduction in the participation of these workers in Mexico's total workforce population.

The next figure shows some results that are compatible with the view that emphasizes the role of the composition of the labor force. The graph shows on the *x-axis* the change between 1996 and 2006 in the share of the eight different groups of workers according to their levels of education and experience as defined above. There are three groups of workers that have declined in their participation in Mexico's workforce and they correspond to the least educated and less experienced workers (see Figure 9). The *y-axis* indicates the average change in the log wage of male and female workers that belong to each one of these groups. As expected, the groups whose shares have diminished in the past decade are those that have had the largest increase in their wages. Notice that the increases in the wages of these workers are close to 20%, and in some cases even close to 30%, throughout this ten-year period. On the contrary, those categories of workers that have increased their shares in Mexico's workforce (the more educated/more experienced workers) tend to have either stagnant or even decreasing wages since 1996. This graph then supports the hypothesis that the change in Mexico's workforce composition is the leading force explaining the reduction in wage and labor income inequality in Mexico in the post-NAFTA period.

## 6. Summary and Conclusions

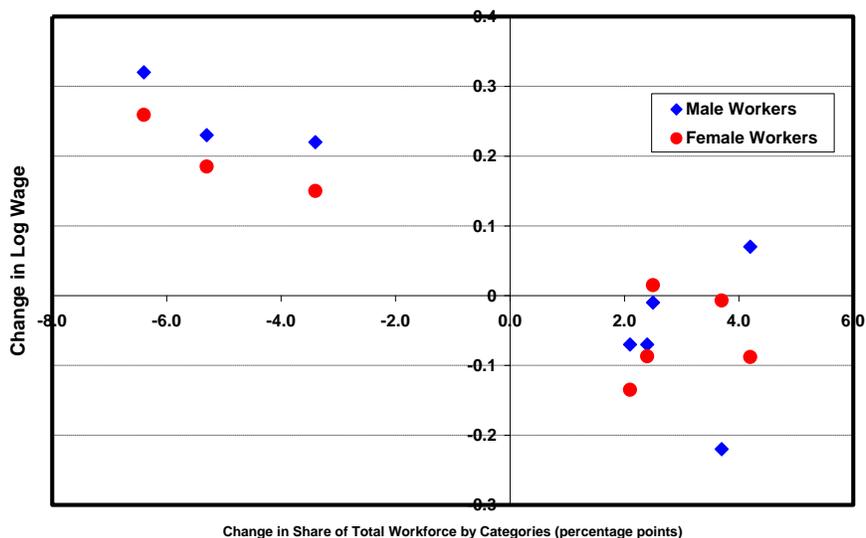
In this paper we have reviewed the pattern of income inequality in Mexico since 1994, the year when NAFTA came into effect. Using nationally representative information from household surveys we have shown that there has been an important reduction in Mexico's income inequality since 1994, and that this process has almost reversed income inequality to the levels that were observed before the rapid increase in inequality that took place between 1984 and 1994.

Using a Gini decomposition analysis by income source we conclude that labor income, remittances and public transfers (mainly through the Progresa/Oportunidades program) have all played an important role in this equalizing process. In particular, we have shown that labor income has become a very important equalizing force in urban areas, whereas public transfers have been particularly important for the reduction of inequality in the rural sector. Remittances, on the other hand, have also been a nationally inequality-reducing source of income in Mexico since 1994.

We have also provided some evidence suggesting that the forces that led to a sharp increase in wage inequality across all industries in Mexico during the 1980s and early 1990s are no longer operating. In fact, we now observe a generalized reduction in wage inequality across industries and regions in Mexico suggesting the growing relevance of other elements in this process.

In general, we believe that Mexico is now beginning to experience the inequality-reducing effects of having a more educated workforce and of trading with more skill-abundant countries. This equalizing effect seems to have been postponed by a skill-biased technological change (either exogenous or endogenous) or by an endogenous technological upgrading which, in any case, now seem to have ended. This fact, together, with an ambitious and widespread social program focused on poor rural households; seem to be the main explanatory factors of the sharp reduction in inequality that has been observed in Mexico.

**Mexico: Change in Share of Total Workers by Education and Experience vs Change in Log Wage by Gender, 1996-2006**



Source: Own elaboration based on Campos (2008).

**Table A1. Households that receive income from sources other than Labor Income (as a percent of total households)**

Source of Income	1992	1994	1996	1998	2000	2002	2004	2005	2006
1.- Own Businesses	43.8	42.7	43.3	43.2	41.1	41.9	38.1	39.1	42.0
2.-Property Rents	4.4	3.5	3.7	3.5	3.1	4.0	4.7	4.0	4.6
3.-Financial Income	25.9	15.2	22.9	19.1	19.1	19.3	20.2	18.1	23.5
4.-Transfers	23.5	23.8	29.0	31.2	34.0	38.6	42.0	41.3	45.5
4.1 Remittances	3.7	3.4	5.3	5.3	5.3	5.7	5.6	6.0	7.0
4.2 Pensions	8.8	8.1	8.2	9.5	10.0	10.0	11.8	11.4	11.9
4.3 Public and Private Transfers	13.6	14.5	18.7	19.6	23.1	28.4	31.2	30.5	34.6
4.3.1 Procampo	-	1.2	4.6	2.8	2.6	5.6	4.6	3.5	4.0
4.3.2 Progres/Oportunidades	n.a.	n.a.	n.a.	n.a.	n.a.	12.3	13.4	13.5	14.8

Source: Author's own estimates based on ENIGHs.

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