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The Dynamics of Income Inequality in Mexico since NAFTA

That Mexico is a highly unequal country is a fact that has been recognized at least since Alexander von Humboldt wrote at the beginning of the nineteenth century that the region then known as 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. Historical data show that while Mexico achieved an important reduction in inequality during the 1960s and 1970s, periods of very rapid economic growth, the country has experienced very little progress in income distribution since the 1980s (Székely 2005).

This situation, however, may have started to change in recent years. This paper provides evidence on the reduction in income inequality that has taken place in Mexico since 1994 and discusses some of the likely sources of this trend (see figure 1), which is important for at least two reasons: first, because it has almost completely reversed the widely documented increase in inequality that occurred in the 1984–94 period (Bouillón, Legovini, and Lustig 2003; Legovini, Bouillón, and Lustig 2005), and second, because the reduction seems to be the result of two important structural changes in the Mexican economy:

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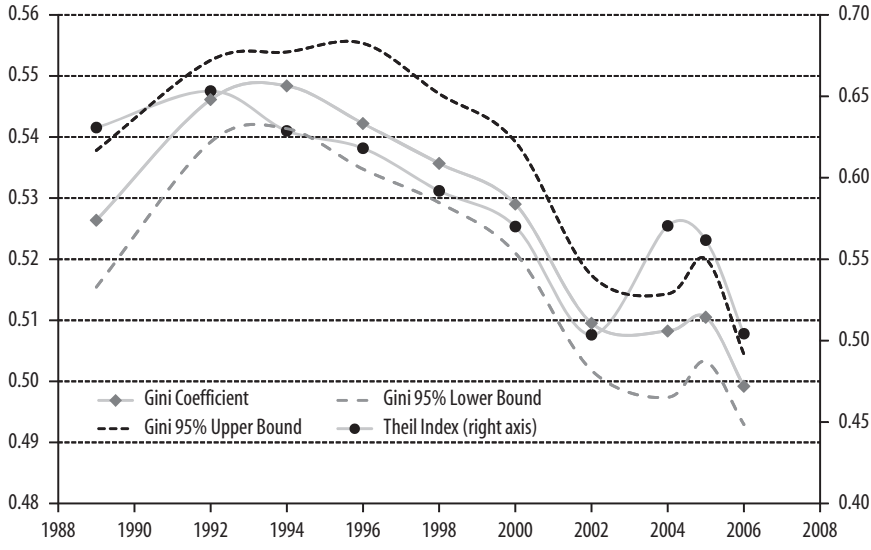
FIGURE 1. Mexico's Gini Coefficient and Theil Index



Source: CEDLAS and World Bank (2010).

the arrival of better-targeted social programs such as Progresa/Oportunidades and a reduction in labor income and wage inequality that seems to be associated with the improvement in educational levels in Mexico. A third contributing factor to the recent reduction in inequality has been the growing flow of remittances that many Mexicans living abroad send to their families left behind in Mexico.

The possibility that both social policy and educational improvements 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 be at play in many of those countries.[1] This could lead not only to an appropriate evaluation of the new social policies that are being implemented in the region but also to a reconsideration of the effect that higher levels of education, combined with

1. See, for example, Ferreira, Leite, and Wai-Poi (2007) and Barros and others (2010) for the Brazilian case; Gasparini and Cruces (2010) for Argentina; and Eberhard and Engel (2008) for Chile. For a more general view on recent trends in inequality in Latin America, see the introduction to López-Calva and Lustig (2010) as well as Gasparini, Cruces, and Tornarolli (2009).

TABLE 1. Overview of Mexican Economy

Feature	*Stage I 1950–70*	*Stage II 1970–82*	*Stage III 1982–94*	*Stage IV 1994–2000*	*Stage V 2000–06*
Macro	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
Openness	Semiclosed economy with tariff and nontariff barriers	Semiclosed economy with tariff and nontariff barriers	Unilateral openness in 1985; beginning of NAFTA negotiations in 1992	NAFTA; free trade agreement with the EU	Open economy
Inequality	Relatively stable	Rapid reduction	Increase	Reduction	Reduction
Social protection	Low	Low	Nontargeted social programs: Solidaridad	Targeted programs in rural areas: Progresa and Procampo	Expansion of Progresa to urban areas

Source: Author's compilation.

globalization and trade liberalization, may have on inequality in middle-income countries.[2]

The paper first provides an overview of macroeconomic conditions in Mexico during the past decades followed by estimates of income inequality in Mexico using alternative definitions of income. Next, a Gini decomposition analysis is conducted to investigate the contribution of different income sources to the evolution of inequality in Mexico, and the role of income labor and wage inequality is discussed in explaining the dynamics of inequality. The conclusions follow.

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 (1950–70), GDP grew at a relatively rapid pace (3 percent a year per capita), with price stability, low fiscal deficits, and a fixed exchange rate since 1956. The second stage (1970–82) was again

2. See Goldberg and Pavcnik (2007) for a recent survey on this issue.

a period of rapid growth (3 percent a year per capita), but with macroeconomic instability. During this period, Mexico suffered double-digit annual inflation and large devaluations in both 1976 and 1981. Mexico's government incurred large fiscal deficits, and public sector external debt soared. The two initial stages were characterized by a semi-closed economy with high tariff and nontariff 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).

The third stage (1982–94) 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 its economic model: the government drastically reduced public expenditures; there was an important renegotiation of public sector foreign debt; large-scale privatization took place; and, in 1985, in the midst of an unexpected collapse in the price of its main export (oil), Mexico unilaterally opened up its economy by significantly reducing its tariffs and eliminating most of its nontariff barriers. In the early 1990s, Mexico announced its intention of going well beyond those reforms (and locking them in) by proposing a free trade agreement with the United States and Canada.[3] The agreement went into effect in 1994 as the North American Free Trade Agreement (NAFTA), establishing the largest free trade area in the world—and the most asymmetrical. During this period the Mexican economy stagnated in per capita terms and income inequality increased substantially throughout the period.

The first year of the post-NAFTA period was characterized by a severe macroeconomic crisis that began in December 1994. In that month, Mexico experienced a large devaluation and was close to incurring 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 percent in per capita GDP). Later, from 1995 to 2000, the domestic economy recovered relatively quickly, mainly because of 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 a 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 program is a targeted conditional cash transfer program that started in 1997 and is currently considered the most important antipoverty program in Mexico. Progresa was implemented

3. See Tornell and Esquivel (1997) for more details on these issues.

first in rural areas, although it has included urban areas since 2001. The second program, Procampo, is an income-support program for agricultural producers designed to help them face the transition from a closed economy to a more open economy. The program, which began in 1994 when NAFTA went into effect, is considered a badly designed program in redistributive terms (Esquivel, Lustig, and Scott 2010). On average, the period 1994–2000 was one of mediocre economic performance (2 percent growth a year), but it was also the period during which income inequality started to fall. The most recent stage, from 2000 to 2006, was one of low growth with macroeconomic stability. During those years, Mexico's per capita GDP grew at only 1 percent a year, because it was negatively affected by the U.S. recession of 2000–01. Nevertheless, during this period income inequality was reduced even further.

Income Inequality in Mexico since NAFTA

Before inequality in Mexico is discussed, it is important to clarify what measure of inequality and what definition of income is used in this paper, since different definitions could lead not only to different estimates of inequality but also to slightly different conclusions.[4] Most of the results, however, are robust to alternative definitions of income and alternative measures of inequality.

In this paper the Gini coefficient is used as the preferred measure of inequality.[5] This measure not only satisfies all the desirable properties of an inequality measure[6] but also can be decomposed by income source, a feature that is of interest here. On the other hand, inequality is usually measured using either current total income or current monetary income.[7] Both definitions are used in the initial estimates of inequality, but later monetary income estimates are the only focus of attention. Figure 2 provides a simple description of the

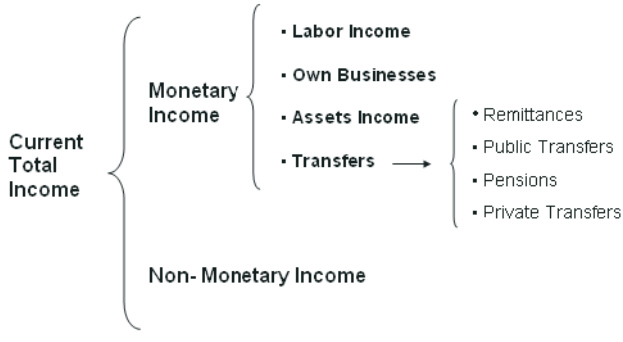
4. Corbacho and Schwartz (2002) include a survey of Gini coefficient estimates in Mexico for different periods and different income definitions.

5. The Gini coefficient does not capture well changes at the extremes of the distribution. However, other measures of inequality that show trends similar to those described in the text are available from the author on request. See also Campos (2008) for comparisons using alternative measures of inequality.

6. These principles are as follows: adherence to the Pigou-Dalton transfer principle; symmetry; independence of scale; homogeneity; and decomposability.

7. There is 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. This measure is the one used in the official estimation of poverty rates in Mexico.

FIGURE 2. Sources of Current Total Income in Mexico



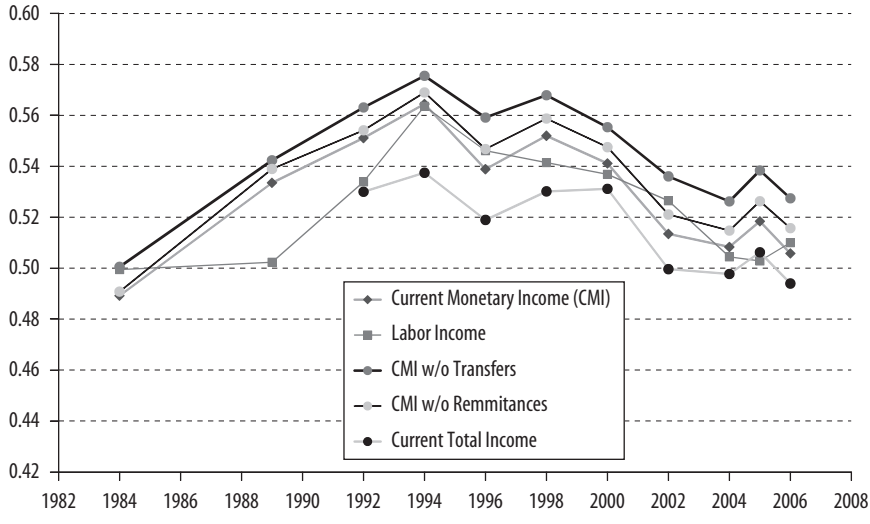
Source: ENIGH (various years).

components of both income definitions. The description of the sources of monetary income are later used in a Gini decomposition exercise. All estimates use information from the National Survey of Household Income and Expenditure (ENIGH, the acronym in Spanish). Surveys are available for the years 1984, 1989, 1994, 1996, 1998, 2000, 2002, 2004, 2005, and 2006.

Figure 3 shows the evolution of the Gini coefficient in Mexico for the period 1984–2006, 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. The figure also shows the rapid increase in inequality that took place between 1984 and 1994, which has been reported in, among other studies, Bouillón, Legovini, and Lustig (2003) and Legovini, Bouillón, and Lustig (2005). The Gini coefficient for current monetary income dropped from 0.564 in 1994 to 0.505 in 2006, a 10 percent reduction; the corresponding measure for total income dropped from 0.537 to 0.494, an 8 percent reduction. These reductions are similar in magnitude to those recently observed in Brazil and documented in Barros and others (2010). In annual terms, inequality in Mexico has fallen at a rate of 0.9 and 0.7 percent a year in the case of current monetary income and total income, respectively. Although those rates are still below the annual 1 percent rate at which income inequality diminished in Mexico between 1954 and 1984, they show a significant improvement with respect to the 1994 figures.

Figure 3 also shows a few other interesting results. For example, the figure shows that the distribution of monetary income is more unequal (that is,

FIGURE 3. Mexico: Gini Coefficients for Alternative Income Definitions, 1984–2006



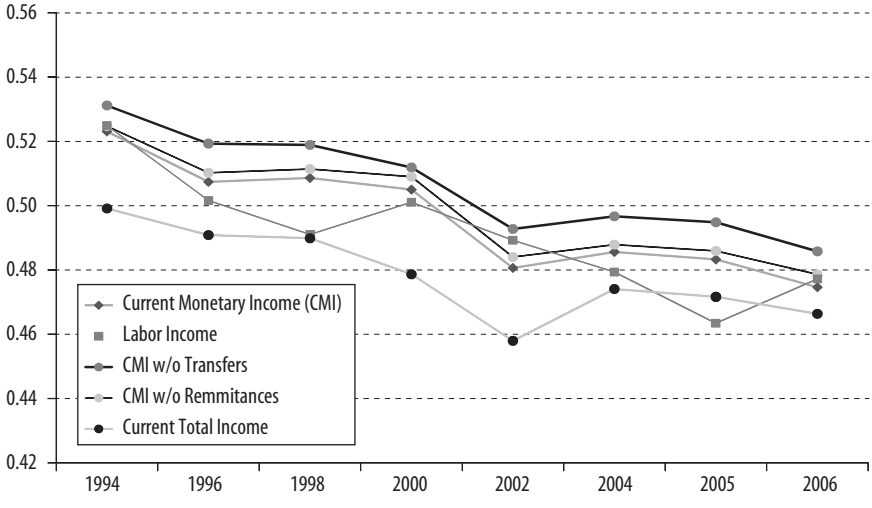
Source: Authors elaboration based on ENIGH (various years).

it has a higher Gini coefficient) than the distribution of total current income (which is explained by the fact that nonmonetary income is less unequally distributed); on the other hand, the figure also shows that before either transfers or remittances are included, the Gini coefficient of monetary income tends to be slightly higher than the Gini coefficient of monetary income, thus suggesting the equalizing contribution of these two factors, an issue discussed later in the paper.

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 separately. For example, Pánuco-Laguette and Szekely (1996) showed that inequality *within* urban and rural areas accounted for 84 percent of total inequality in Mexico in 1992, whereas only one-sixth of total inequality was explained by the rural/urban gap. For that reason, this paper now focuses on the dynamics of inequality in rural and urban areas in Mexico since 1994. As discussed later, this distinction is crucial to understanding the contribution of different factors in the recent downward trend in inequality in the country.

FIGURE 4. Urban Mexico: Gini Coefficients for Alternative Income Definitions, 1994–2006



Source: Author's elaboration based on ENIGH (various years).

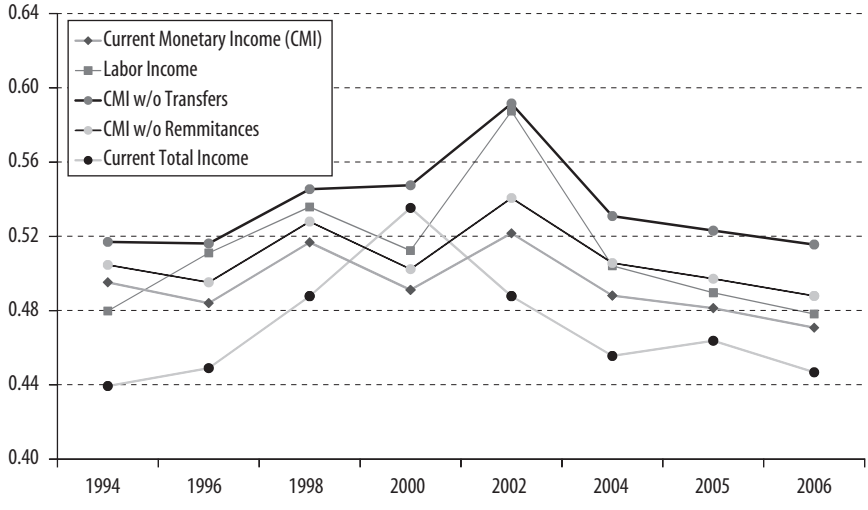
Figures 4 and 5 show the evolution of the Gini coefficients for urban and rural areas in Mexico for the 1994–2006 period.[8] The divergence in the patterns of inequality by sector is quite striking. On one hand, income inequality in urban areas in Mexico, regardless of the income definition used, has steadily declined since 1994. On the other, income inequality in rural areas increased until 2000, according to the total income definition, or until 2002, according to any other income definition. After reaching its peak, income inequality in rural areas basically returned to its 1994 level. The existence of such a differentiated pattern of income inequality in rural and urban areas somehow suggests that different factors could be affecting the dynamics in those two sectors of the Mexican economy. This idea is explored in more detail later.

The Distribution of Monetary Income in Mexico

The distribution of monetary income in Mexico is now explored in more detail by looking at the growth incidence curves (GICs) suggested by Ravallion and

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

FIGURE 5. Rural Mexico: Gini Coefficients for Alternative Income Definitions, 1994–2006



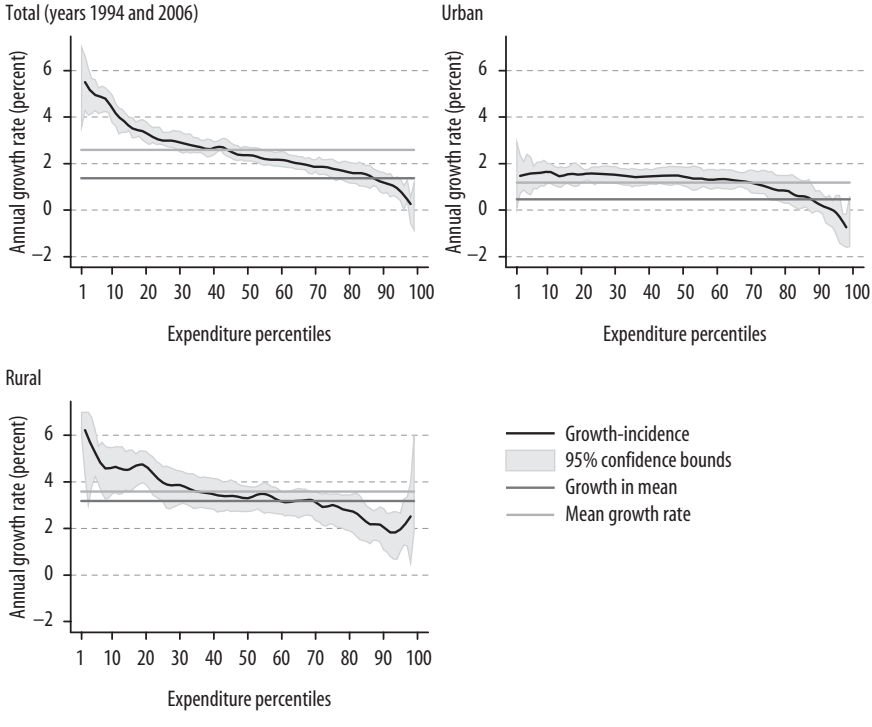
Source: Author's elaboration based on ENIGH (various years).

Chen (2003). These curves show the percent change in per capita income along the entire income distribution between two points in time. Figure 6 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: income at the bottom part of the distribution grew faster than income at the middle and the top parts of the distribution. The figure also shows the different patterns followed by the urban and rural income distributions during this period. In 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, reduces inequality), and second, the rural GIC curve also has a negative slope, so that the bottom half of the rural income distribution had higher income growth rates than the top segment of the distribution. All these facts have 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

FIGURE 6. Mexico: Growth Incidence Curves Using Monetary Income, 1994–2006



Source: Author's elaboration based on ENIGH (various years).

areas, it was the result of the relative (and for some even absolute) loss of income at 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.

Decomposition Analysis of Sources of Income Inequality in Mexico

A decomposition of the Gini coefficient is conducted below for the years 1994, 2000, and 2006 to investigate the contribution of different income sources to the observed inequality of monetary income in Mexico.

Sources of Monetary Income

The main component of monetary income in Mexico is labor income, which accounted for around 60 percent of all monetary income in 2006; the second-largest source of monetary income in Mexico is income obtained from the businesses of self-employed individuals, 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 receive some type of transfer. Although less than 24 percent of households received a public or a private monetary transfer in that year, by 2006 more than 45 percent of all households reported receiving part of their monetary income though a private or public transfer. The single most important contributor to this trend is undoubtedly the social program Progresa/Oportunidades, which, according to 2006 ENIGH data, is received by 15 percent of Mexican households.[9] Two other factors account for part of the increase in transfers to Mexican households: first, the rural program Procampo, which was intended to support rural producers during the transition to trade liberalization in agricultural products,[10] and, second, remittances, which are now received in 7 percent of Mexican households, twice as many as in 1994. Based on what is known 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 great deal of the up-and-down dynamics of income inequality in rural areas depicted in figure 5.

Methodology

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

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

9. For more details about this program, see Corbacho and Schwartz (2002) and Levy (2006).

10. For more details on Procampo, see Corbacho and Schwartz (2002).

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: how important the income source on total income is (S_k); how unequally distributed the income source is (G_k); and 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 (that is, 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 is not highly correlated with total income (as in the case of well-targeted transfer programs), then the contribution of such a source could in fact become negative.

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

$$\frac{\partial G}{\partial \pi} = S_k \left(G_k R_k - G \right) \tag{2}$$

or, alternatively,

$$\frac{\partial G / \partial \pi}{G} = \frac{S_k G_k R_k}{G} - S_k . \tag{3}$$

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 income source k.

Gini Decomposition Results

Now the monetary income Gini coefficients for Mexico are decomposed following the approach just described and using the income sources described in figure 2 and table A1. For simplicity of exposition, instead of applying the

methodology to the whole period under analysis, it is applied only to the surveys of 1994, 2000, and 2006. The descogini Stata command presented in López-Feldman (2006) is used in the decomposition exercise.

The marginal effects of the decomposition exercise are shown in figure 7. Results are unequivocal: at the national level, there are three inequality-augmenting and three inequality-reducing sources of income. Among the first group are pensions, income from own businesses, and income from property rents. Among the second group are income labor (at least since 2000), remittances, and transfers. In the last two cases, the marginal negative effects on the Gini coefficient have increased throughout the period.

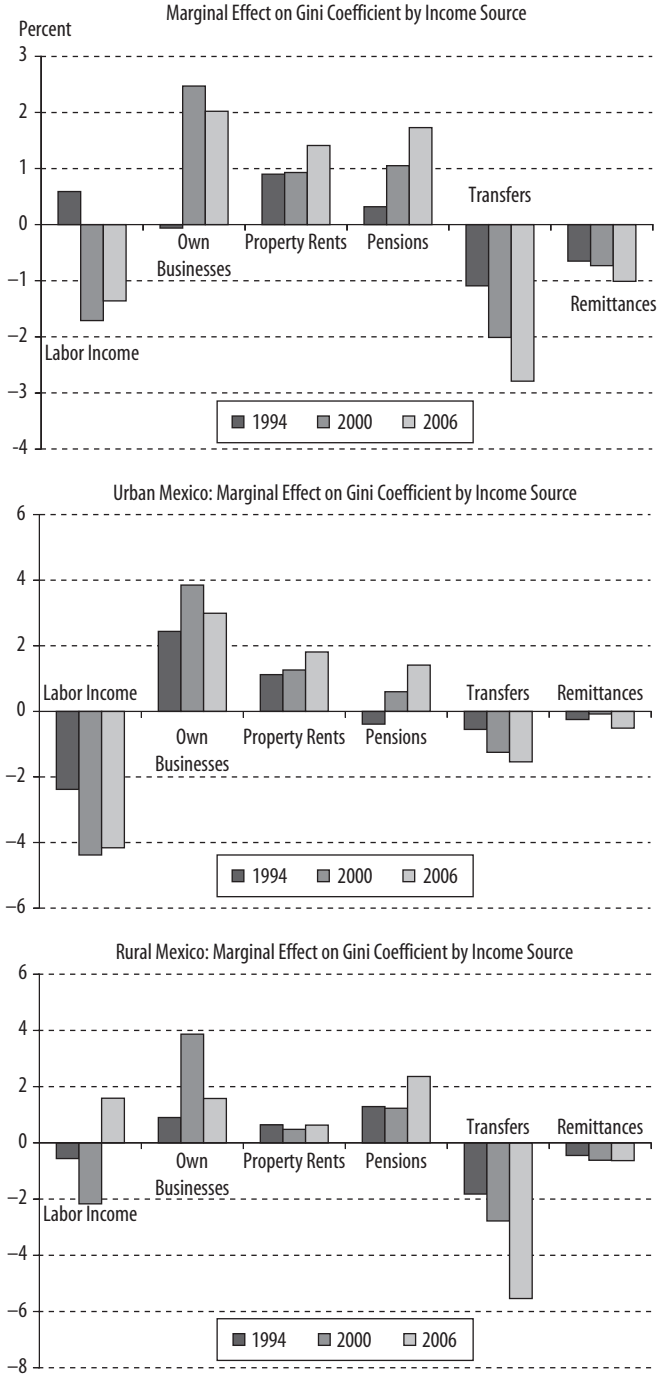
Figure 7 also shows the marginal effect of the different income sources in urban and rural areas. The sign of the marginal effects of the different income components is basically the same as that observed at the national level. There are, however, some important differences in terms of the relative importance of the impact of some sources. For example, labor income is a very important inequality-reducing force in urban areas but not in the rural sector (there, it even augmented inequality in 2006). On the other hand, transfers are a very important inequality-reducing factor in rural areas but not as important in urban ones. Finally, note that remittances do not seem to have a large negative marginal effect on inequality in any specific sector, although they are relevant at the national level. This apparent paradox is explained by the fact that while the Gini correlation of remittances 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 in the bottom half of the *national* income distribution.[11] Therefore, remittances work as an inequality-reducing source of income through the rural/urban income gap and not through the sector-specific income distribution.

Why Labor Income Has Become an Equalizing Income Force

The results of the decomposition exercise 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

11. For more details on this issue see, for example, Esquivel and Huerta-Pineda (2007).

FIGURE 7. Marginal Effect on Gini Coefficient by Income Source: Overall, Urban, and Rural Mexico



Source: Author's elaboration based on ENIGH (various years).

1994–2006 period. Therefore, understanding the nature of the change in the effect of labor income on inequality, which went from being positive in 1994 to becoming negative in 2000 and 2006 (see figure 7), is crucial to understanding the whole dynamics of income inequality in Mexico since 1994.

To begin with, note that labor income is basically the product of multiplying hourly wages by number of hours worked. That being the case, 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 somehow must be the outcome of changes in wage inequality. In some sense, this is a very fortunate circumstance, since a link can then be established between this discussion on income inequality and the literature on wage inequality in Mexico that has been written as part of the debate on the relationship between trade and wages.[12]

Let us look first at the evolution of wage inequality in Mexico in recent years by using a standard definition of wage inequality given by the ratio of the wages of nonproduction workers to those of production workers. This ratio is also (grossly) defined as the skilled/unskilled wage ratio, wherein nonproduction workers are considered a proxy for skilled labor and production workers a proxy for unskilled labor.[13]

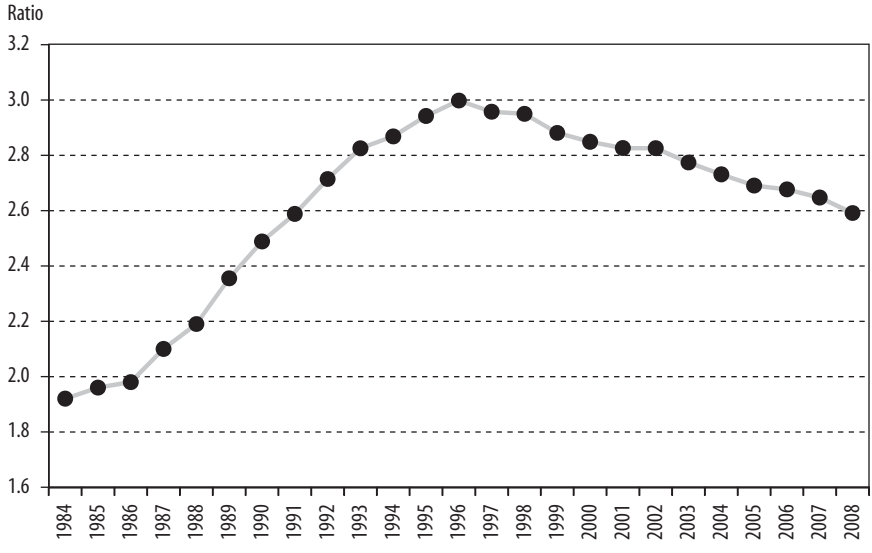
Figure 8 shows the evolution of this measure of wage inequality in Mexican industry for the period from 1984 through 2007. The data for this graph come from the Encuesta Industrial Mensual (EIM) [Monthly Industrial Survey], which has monthly and annual data on total wages paid and total hours worked in industry by both production and nonproduction 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 industrial sector in figure 8 is remarkably similar to the evolution of inequality under 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

12. See the abundant references to the Mexican case that appear in Goldberg and Pavcnik (2007), a survey on globalization and inequality.

13. This is, of course, a gross simplification, since there are production workers who are highly skilled and nonproduction workers who are relatively unskilled.

FIGURE 8. Ratio of Skilled to Unskilled Industrial Wages, 1984–2007



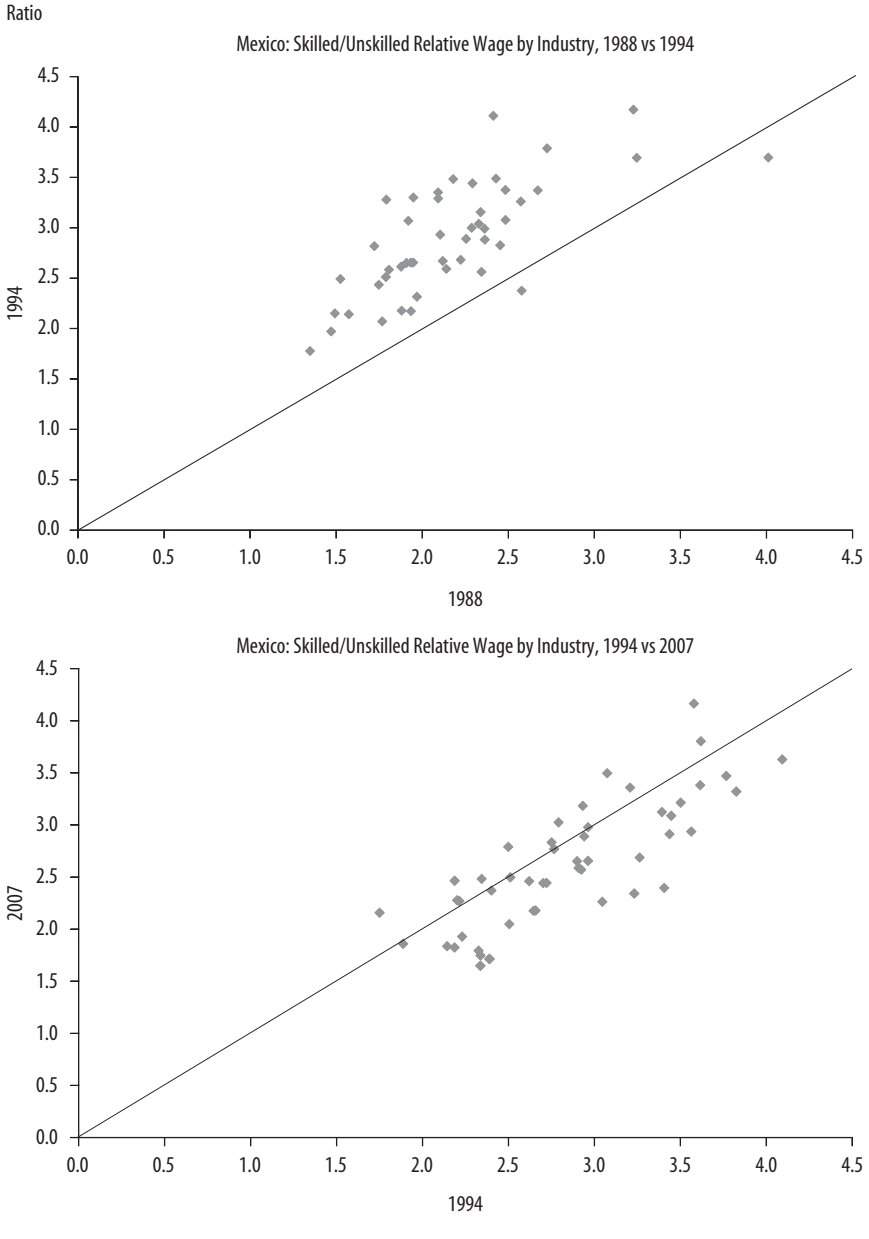
Source: Author's elaboration based on EIM (various years).

and the income inequality indicators, however, is that this measure of wage inequality peaks in 1996, whereas all the other definitions of inequality peak around 1994.[14] A second difference is that wage inequality in 2006, unlike the income inequality measures, had not yet returned to its mid-1980s level. That suggests that some elements besides those associated with wage inequality are contributing to the reduction of income inequality in Mexico (such as remittances and transfers, as discussed above).

Let us now take a more detailed look at the evolution of wage inequality in Mexico's industry in recent years. Figure 9 shows the skilled/unskilled wage ratio for forty-eight industries in Mexico's manufacturing sector at two different points in time. The top image compares the observed wage ratio in 1988 (x axis) with that of 1994 (y axis); 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 entire manufacturing industry. In fact, the wage ratio increased in

14. See also the discussion on this issue in Robertson (2007) and Campos (2008).

FIGURE 9. Ratio of Skilled to Unskilled Wages, by Industry



Source: Author's elaboration based on EIM (various years).

forty-six of the forty-eight 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: most industries now show a slightly declining wage ratio between these two years, but there also are a few branches in which the wage ratio is now either the same or 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 has taken place not only at the industry-wide level but also in most manufacturing branches and across the country in many regions and states. Consequently, 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 also the reduction in wage inequality that has been observed since 1996.

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.[15] An interesting aspect of this trend is that its beginning coincided with the unilateral opening of the Mexican economy that started precisely in the mid-1980s. The increase in Mexico's wage inequality therefore would be somewhat unexpected, considering that Mexico has a relative abundance of unskilled labor (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 (that is, a reduction in the skilled/unskilled wage ratio; see Cragg and Epelbaum 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, the explanations emphasize factors affecting the bottom part of the

15. 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.

income distribution (that is, the segment that for the most part comprises less skilled and less experienced workers); the second emphasizes factors affecting the upper part of the distribution. In the first group, for example, are 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 that employed mostly low-skilled workers (Hanson and Harrison 1999). In the second group, some explanations emphasize the role of an increase in the demand for skilled workers associated with the presence of foreign investment (Feenstra and Hanson 1997); with skill-biased technological change (Cragg and Epelbaum 1996; Esquivel and Rodríguez-López 2003); and with a quality-upgrading process 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 indicate only short-run effects (Canonero and Werner 2002).

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 Campos favors an explanation based on supply factors, Robertson suggests that Mexico's manufacturing workers are now complements of rather than substitutes for U.S. workers and that there has been an important expansion of assembly activities in Mexico that has increased the demand for less skilled workers.

Of course, many of the proposed explanations for the pre-NAFTA increase in 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. Therefore these explanations are either incorrect or incomplete, since there could be many underlying forces acting in different directions. That is why Robertson (2007) noted 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.[16]

Although it is not the objective of this paper to identify or to establish which explanation (if any) is correct, at least some of them could be ruled out

16. There are, however, some tentative theoretical explanations for such a pattern. For example, Atolia (2007) 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 lead to a different outcome because of two factors: first, an asymmetry in the contraction and expansion of some sectors and, second, the capital-skill complementarity in production.

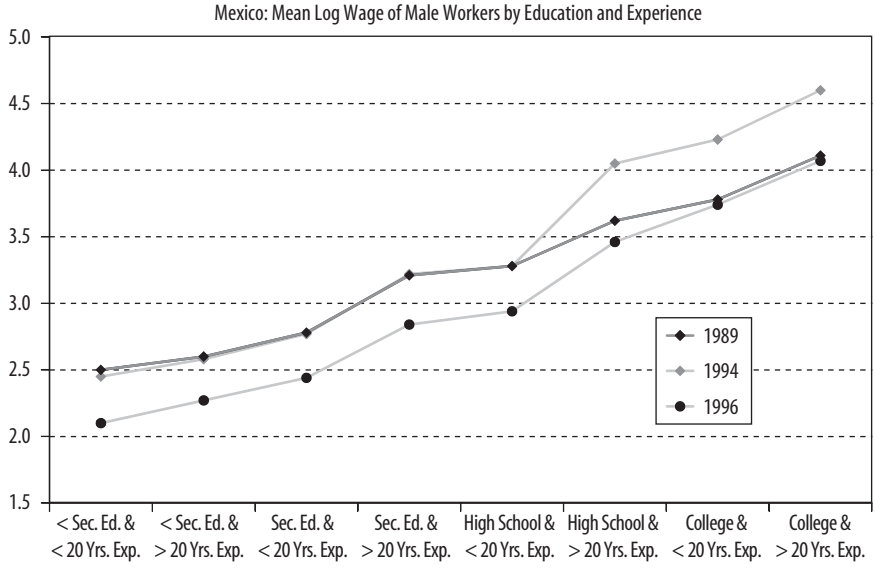
by looking at some wage data provided by Campos (2008). The next two figures show the mean log wage of male workers in Mexico for selected years and for different combinations of education and years of experience. Workers are classified according to the level of education achieved (less that lower-secondary, lower-secondary, upper-secondary, and college education) and to the number of years of work experience (less or more than twenty years of experience).

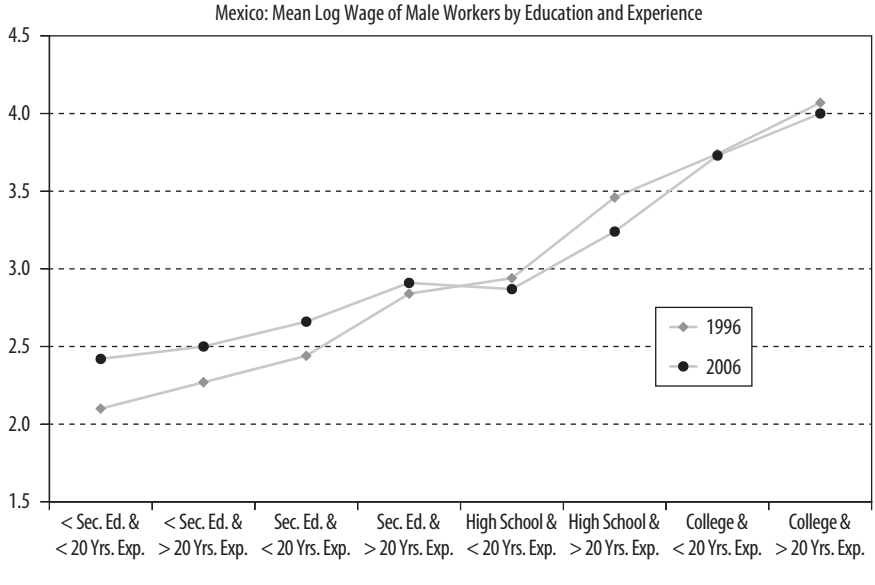
The upper part of figure 10 shows data for the years 1989, 1994, and 1996 and the lower part shows information for 1996 and 2006. The first figure shows an interesting result: between 1989 and 1994, most of the changes in the wage distribution in Mexico occurred in the upper tail of the distribution. That is, the increase in wage inequality in those years cannot be explained by a reduction in the wages of low-skilled or inexperienced workers; instead, the increase can be explained only by an increase in the wages of highly skilled or highly 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.

The bottom part of figure 10 shows the wage distribution in Mexico for 1996 and 2006. Unlike figure 9, 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 fewer years of work experience had the largest increases in their average wages, and that 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 low-skilled/less experienced workers rather than the reduction in the wages of 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 1984–94 increase in wage inequality is associated with changes in the upper tail of the distribution while the post-NAFTA reduction in wage inequality is associated mostly with changes in the bottom tail suggests that there are at least two leading forces at play. In the first case, as discussed, the only explanations that seem to be compatible with the observed trend are those suggesting the presence of skill-biased technological change, either exogenous change (Cragg and Epelbaum 1996 and Esquivel and Rodríguez-López 2003) or endogenous change resulting from the presence of multinational

FIGURE 10. Mean Log Wage of Male Workers by Education and Experience, Select Years





Source: Author's elaboration based on Campos (2008).

firms (Feenstra and Hanson 1997) in Mexico and/or by the upgrading of the quality of exporting firms (Verhoogen 2008).

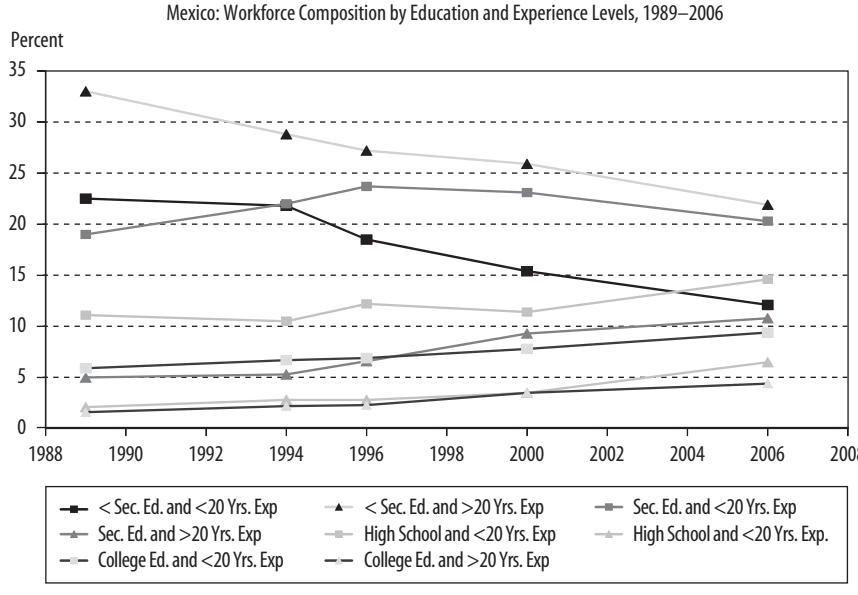
For the post-NAFTA period there are at least three possible explanations, two of which have already been mentioned and are not mutually exclusive: an increase in the supply of relatively skilled workers (Campos 2008) and an increase in the demand for unskilled labor resulting from an expansion of assembly activities in Mexico's manufacturing sector (Robertson 2007). Either of the two effects could explain the reduction in the skilled-wage premium observed in the data. A third explanation that is also compatible with the previous two is that of a standard Heckscher-Ohlin effect in a country such as Mexico in which unskilled labor is abundant (Chiquiar 2008). This effect could be the late outcome of trade liberalization suggested by Canonero and Werner (2002) and already modeled by Atolia (2007) or, alternatively, an underlying effect that did not show 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).

A much more detailed and rigorous analysis is needed to discriminate among these alternative hypotheses. However, it is possible to move forward by analyzing whether some of these hypotheses are borne out by the data. Figure 11 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.

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

These results therefore suggest that at least part of the relative increase in the wages of the low-skilled/less experienced workers in Mexico is associated with the change in the composition of the workforce and, in particular, with a reduction in the number of unskilled workers rather than an increase in the supply of skilled workers. Of course, this result is not at all incompatible with the hypothesis that the demand for unskilled workers increased, as

FIGURE 11. Workforce Composition by Education and Experience, 1989–2006

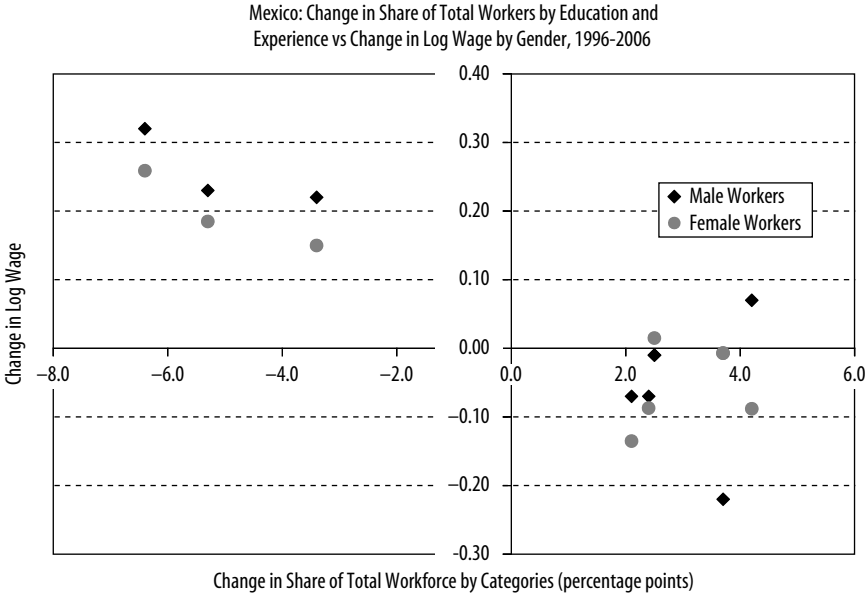


Source: Author's elaboration based on Campos (2008).

suggested in Robertson (2007), but, by itself, the result cannot explain the simultaneous increase in the relative wages and reduction in the participation of these workers in Mexico's total workforce.

Finally, figure 12 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. Participation in Mexico's workforce has declined in three groups, which correspond to the least educated and less experienced workers. The y-axis indicates the average change in the log wage of male and female workers that belong to each of the groups. As expected, the groups whose shares have diminished in the past decade are those that have had the largest increase in wages. Notice that the increases in the wages of these workers are close to 20 percent—and in some cases even close to 30 percent—throughout the ten-year period. On the other hand, the categories of workers whose shares in Mexico's workforce have increased (the more educated/more experienced workers) have tended to have either stagnant or

FIGURE 12. Change in Share of Total Workers by Education and Experience versus change in Log Wage by Gender, 1996–2006



Source: Author's elaboration based on Campos (2008).

even decreasing wages since 1996. This graph then supports the hypothesis that the change in the composition of Mexico's workforce is the leading force in the reduction in wage and labor income inequality in Mexico in the post-NAFTA period.

Summary and Conclusions

This paper reviews the pattern of income inequality in Mexico since 1994, when NAFTA went into effect. Using information from nationally representative household surveys, it shows that there has been an important reduction in income inequality since 1994 and that this trend has almost reversed income inequality to the levels that were observed before the rapid increase in inequality that took place between 1984 and 1994.

As shown by a Gini decomposition analysis by income source, labor income, remittances, and public transfers (mainly through the Progresa/

Oportunidades program) have all played an important role in this equalizing process. In particular, the paper shows that labor income has become a very important equalizing force in urban areas in Mexico, while public transfers have been especially important in reducing inequality in the rural sector. Remittances, on the other hand, have been a national inequality-reducing source of income since 1994.

The paper also provides 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, a generalized reduction in wage inequality across industries and regions in Mexico is now observed, suggesting the growing relevance of other elements in this trend.

In general, I 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 that, in any case, now seems to have ended. This fact and an ambitious and widespread social program focused on poor rural households seem to be the main explanatory factors in the sharp reduction in inequality that has been observed in Mexico in recent years.

Appendix

TABLE A1. Households That Receive Income from Sources Other than Labor Income
Percent of total households

Source of income	*1992*	*1994*	*1996*	*1998*	*2000*	*2002*	*2004*	*2005*	*2006*
Own business	43.8	42.7	43.3	43.2	41.1	41.9	38.1	39.1	42.0
Property rent	4.4	3.5	3.7	3.5	3.1	4.0	4.7	4.0	4.6
Financial income	25.9	15.2	22.9	19.1	19.1	19.3	20.2	18.1	23.5
Transfer	23.5	23.8	29.0	31.2	34.0	38.6	42.0	41.3	45.5
Remittance	3.7	3.4	5.3	5.3	5.3	5.7	5.6	6.0	7.0
Pension	8.8	8.1	8.2	9.5	10.0	10.0	11.8	11.4	11.9
Public and private transfers	13.6	14.5	18.7	19.6	23.1	28.4	31.2	30.5	34.6
Procampo	. . .	1.2	4.6	2.8	2.6	5.6	4.6	3.5	4.0
Progresa/Oportunidades	n.a.	n.a.	n.a.	n.a.	n.a.	12.3	13.4	13.5	14.8

Source: Author's estimates based on ENIGH (various years).

Comment

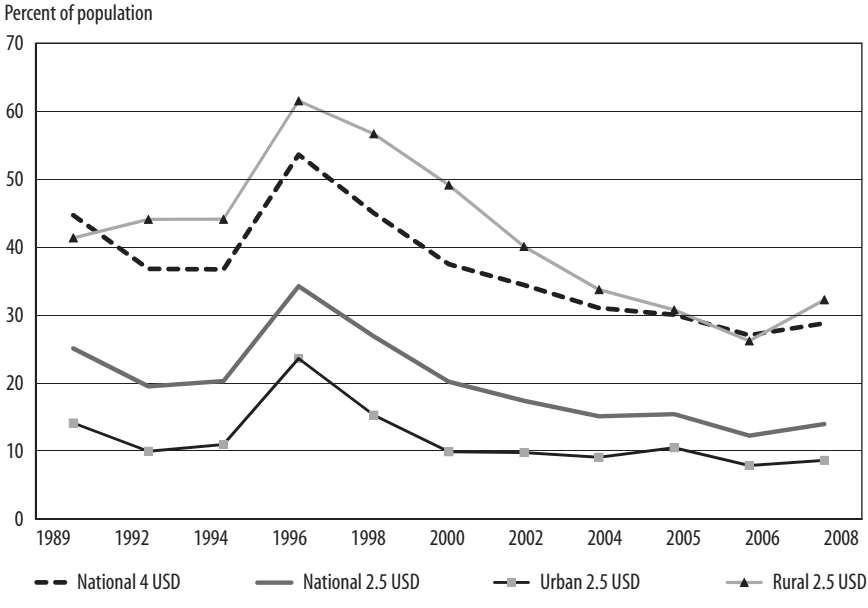
Guillermo Cruces: The paper by Gerardo Esquivel in this edition of *Economía* presents a thorough account of inequality trends in Mexico since the mid-1990s. Papers such as this constitute a fundamental extension of the discussion of aggregate regional trends such as that provided by Gasparini, Cruces, and Tornarolli (2011), and they present an opportunity to discuss in depth the factors underlying the evolution of inequality at the country level. Identifying the fundamental causes of the evolution of a national income distribution is never an easy feat, and the author must be lauded for providing a coherent and compact discussion of an eventful period in Mexico that included major transformations with potentially large effects on the income distribution, including macroeconomic crises, market-oriented structural reforms, the opening of the economy to international capital flows, a free trade agreement with the world's largest economy, technological change, increased globalization, a political transition, and even an armed indigenous uprising.

This comment examines some evidence on distributional changes in terms of poverty reduction to complement the article's main focus on inequality and then discusses the author's conclusions in terms of a structural change in inequality trends in Mexico in light of the effects of the international economic crisis that started in 2007. Finally, it suggests some avenues for further research.

The first point of this comment concerns the evolution of poverty over the period of time covered by the article. National aggregate poverty rates for the US$2.50 and US$4.00 purchasing power parity (PPP) international poverty lines are presented in figure 1 for the period 1989–2008 and also for the urban and rural populations for the US$2.50 poverty line. This figure provides information on a dimension of distributional change that complements the thorough discussion of the evolution of inequality in the paper. The figure indicates a

Guillermo Cruces is with CEDLAS-UNLP and CONICET.

FIGURE 1. Poverty Rate for National and Rural/Urban Populations, Mexico, 1989–2008

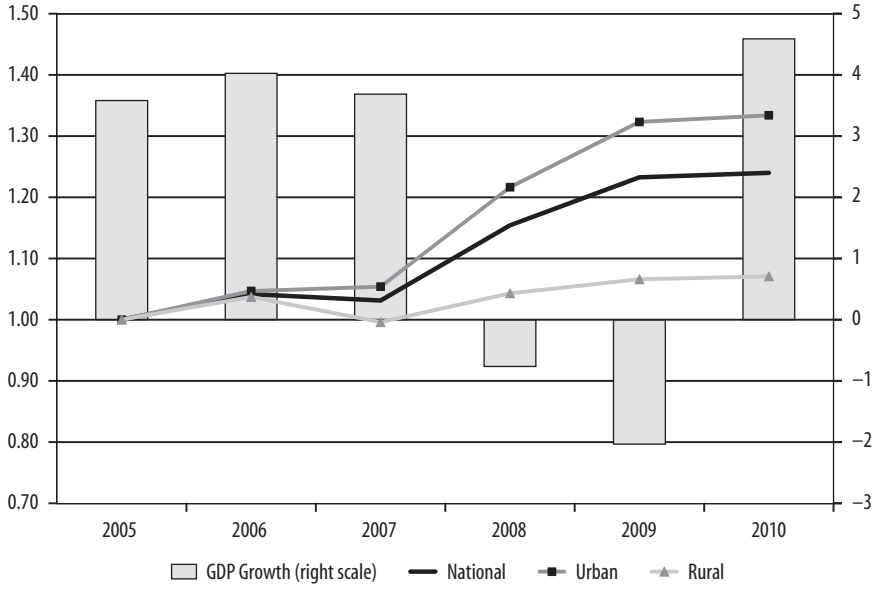


Source: CEDLAS and World Bank (2011). Based on Mexico's INEGI biannual survey, Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIGH).

moderate fall in poverty in the early 1990s, followed by a large increase between 1994 and 1996 that can be attributed mainly to the macroeconomic crisis of 1995. From 1996 until 2006, there is a continuous fall in the poverty rates presented in the figure. In fact, this evidence indicates that the notable results from figure 4 in the paper, which show substantial growth in income at the bottom of the distribution in the period 1994–2006, could be even larger if computed using the post-crisis year 1996 as a basis.

This discussion illustrates a further dimension of the distributional dynamics documented in figure 1 of the paper: the reduction in inequality in Mexico was accompanied by a substantial fall in the proportion of the population living under different poverty lines and reflects the increase in standards of living and the pro-poor nature of the growth process in the Mexican economy over the period under study. At the same time, this evidence also indicates that there is still ample room for improvement: about 15 and 30 percent of the population still lived under the US$2.50 and US$4.00 poverty lines, respectively, in 2008, and major regional inequalities are evident in the poverty

FIGURE 2. Labor Income Poverty Trend Index and Yearly GDP Growth Rate[a]



Source: CONEVAL (2011). The Labor Income Poverty Trend Index indicates the proportion of individuals who cannot cover the cost of a basic food basket with their labor income. It is based on Mexico's INEGI quarterly survey, the Encuesta Nacional de Ocupación y Empleo (ENOE).

a. Fourth quarter with respect to fourth quarter of the previous year; base fourth quarter of 2005 = 1.

levels in rural areas, which are about twice the national aggregate. While the paper discusses urban-rural differentials, providing more evidence on their nature and discussing their consequences in terms of policy are certainly worthwhile directions for further research. Finally, figure 1 reveals a small but significant increase in poverty between 2006 and 2008; the implications of this change and its underlying factors are discussed next.

The second point of this comment refers to the sustainability of the distributional change process documented in the paper and to its vulnerability with respect to aggregate shocks. The 2010 national household survey (ENIGH) was not available at the time this issue went to press, implying that no aggregate poverty rates comparable to those in figure 1 were available. Figure 2 presents an alternative measure, the Labor Income Poverty Trend Index constructed by the Consejo Nacional de Evaluación de la Política de Desarrollo Social [National Council for Evaluation of Social Development Policy] (CONEVAL) and based on INEGI's quarterly survey, the Encuesta Nacional

de Ocupación y Empleo [National Survey of Occupation and Employment] (ENOE). The index, which indicates the proportion of individuals who cannot cover the cost of a basic food basket with their labor income, has been normalized to 1 for the fourth quarter of 2005. The evidence in the figure illustrates a series of factors. First, the sizable growth in GDP in 2005, 2006, and 2007 (between 3 and 4 percent each year) did not translate into substantial reductions in aggregate poverty. In fact, there was a relatively large increase in urban poverty rates for 2005–07, which can be attributed to the increase in the price of food related to an upward trend in commodity prices and growth in the global economy during that period.

Second, the figure not only provides further evidence on the increase in aggregate poverty between 2006 and 2008 but also illustrates the very large distributional impact of the international economic crisis, with the poverty rate increasing further in the 2008–10 period. That increase was seen even for the rural population, which was relatively spared from the 2005–07 upward trend. The large increase in poverty for 2008–10 is all the more worrying when considering that the international crisis had only a relatively modest effect (at least by Latin American standards) on domestic growth rates, with reductions of about 1 and 2 percent of GDP for 2008 and 2009, respectively. Moreover, the reversal in this trend between 2009 and 2010, with a yearly growth rate of about 4.5 percent, did not translate into a further reduction in poverty: the Labor Income Poverty Trend Index increased (although only slightly) over that period.

The evidence in figure 1 points toward a more fundamental question related to the nature and the limits of the process of distributional change documented by the Esquivel paper for the period 1994–2006. While inequality and poverty fell substantially over the period, the reversal in growth trends resulted in a large increase in aggregate poverty levels and, apparently, a change in the mechanism linking growth with poverty reduction, as witnessed by the stagnant poverty levels of 2010. Moreover, the SEDLAC database (CEDLAS and World Bank 2011), on which figure 1 in the paper is based, indicates an increase of 0.7 in the Gini coefficient between 2006 and 2008 (although the change is not statistically significant at standard levels). While further gains in distributional terms are always harder to accomplish at lower poverty and inequality levels, the impact of the international economic crisis could provide a framework to adjust the policies implemented over the previous period, especially in terms of the breadth, depth, and modality of safety nets and also in terms of the implications of the productive structure of the economy and its links with major economies.

TABLE 1. Changes in the Skilled Wage Premium and Relative Supply of Skilled and Unskilled Workers and Relative Demand, Mexico, 1989–2008

Period	*Wage premium*	*Relative supply*	*Relative demand* (σ_{su}=2)	*Relative demand* (σ_{su}=3)	*Relative demand* (σ_{su}=4)
1989–2000	1.8	3.6	7.2	9	10.8
2000–08	−2.8	2.2	−3.5	−6.3	−9.2

Source: Cruces, Galiani, and Gasparini (2011), based on microdata from household surveys.

a. Under alternative elasticity of substitution assumptions; σ_{su} represents the elasticity of substitution in a CES (constant elasticity of substitution) production function. See Katz and Murphy (1992) for more details. 100 × annual log changes. Skilled workers = workers with some tertiary education; unskilled workers = workers with secondary education or less.

This comment's final point is related to the discussion in the paper of skilled wage differentials and their impact on the aggregate income distribution. The paper provides some evidence corroborating the increase in the skilled wage premium over the early 1990s and an apparent reversal of this trend, with the author pointing out the importance of educational upgrading and trading with more skill-abundant countries as underlying factors. The multiple pieces of evidence presented in the paper can be integrated in a Katz and Murphy (1992) framework, as done for an earlier period in Mexico in Montes Rojas (2006) and Manacorda, Sánchez-Páramo, and Schady (2010) and as currently done for several countries in the region in Cruces, Galiani, and Gasparini (2011). Table 1, reproduced from the latter study, depicts the change in the skilled wage premium and the relative supply of skilled to unskilled workers, as well as the magnitude of demand factors implied by these changes under different assumptions for the elasticity of substitution between the two factors, as in the Katz and Murphy (1992) analysis of the United States. The table indicates that the skilled wage premium increased substantially in Mexico in the late 1980s and early 1990s and that it began to fall in the mid-1990s, earlier than in most other Latin American countries (Gasparini, Cruces, and Tornarolli 2011). The table presents only the 1989–2008 change, which indicates an overall increase in the skilled wage premium even in the context of an increase in the relative supply of skilled workers. However, the evidence for the 2000–08 period indicates an acceleration of the fall in this skill premium, with an overall negative change. The pattern for the 1989–2000 period is consistent with a strong increase in the relative demand for skilled labor, while the evidence for 2000–08 implies a substantial reversal in the effect of demand factors.

The conclusion of the paper suggests implicitly a permanent change in the underlying forces driving inequality trends and other distributional changes. However, this brief discussion points out potential vulnerabilities in the

nature of these changes. While innovative social policy certainly played a substantial role in the reduction in poverty over the period under study and changes in labor demand patterns reduced inequality, the ever-evolving nature of the world economy, to which Mexico now seems fully integrated, implies the need to constantly revise policy initiatives and the nature, effects, and stability of the economy's productive structure. The paper does a very good job of documenting the trends and underlying factors for the 1994–2006 period. A possible next step in the analysis is to determine whether the international economic crisis represents only a disturbance in Mexico's continuing path toward reduction of inequality and poverty or whether it may have lasting consequences for growth and distributional dynamics.

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