The Financial Crisis Impact on the Income Distribution in Mexico

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Abstract

After the financial crisis of 1994 income and labor earnings distribution improved in Mexico. Usually one would expect inequality to go up during recessive times, as it seems plausible to admit that people at the top decile have more ways to protect their assets than those at the bottom decile do. Especially when it comes to labor which is basically the only asset of the poor (the labor-hoarding hypothesis).

It is true that the Mexican economy as a whole had a strong and impressive performance in 1997. The aggregate growth rate was around 7%, real investment grew by 24% and exports by 17%, the industrial production increased by 9.7%, and the civil construction sector, which is highly intensive in less skilled labor, experienced a growth close to 11%. Under such a scenario, an improvement in distribution of income and labor earnings itself is not unlikely, but the magnitude and quickness of the recovery calls for a detailed inspection of the mechanisms responsible for it.

According to the National Household Income and Expenditure Survey (ENIGH), most of the worsening of the total current income distribution in Mexico happened in the mid-eighties (1984-1989). The early nineties display little variation in total current income inequality except for a small trend towards deterioration. From 1989 to 1994, the total current income share accruing to the 20% poorest decreased slightly (it went down from 3.9% to 3.8%), whereas the richest 10% were the only ones that increased theirs (by one percentage point), and, therefore, those in the middle also experienced losses. From 1994-1996, a period of time that entails a severe financial crisis, the 10% richest experienced relative losses (their total current income share dropped 1.6% points) and, accordingly, total current income inequality went down. The Gini coefficient came down from 0.534 in 1994 to 0.519 in 1996, whereas the drop in the Theil T was from 0.558 to 0.524.

In principle, it could be argued that the richest experienced severe capital losses due to the crisis (1994-1996), in such a way that their total current income was affected compared to the poor. This hypothesis, however, is not supported by the data as monetary income other than wages and salaries, and financial income as well, increased their share in total income in that time interim, particularly so for the urban areas. Nonetheless, this paper shows that financial income is a growing source of inequality in Mexico.

This paper investigates the financial crisis impact on income inequality in Mexico. i) It analyses the fall in income inequality after the crisis; ii) provides an analysis of the contribution of the various income sources to the evolution of income inequality; and, iii) investigates the factors and mechanisms that have been driving inequality in Mexico.

This type of analytical work is central to the social development objective of the World Bank Country Assistance Strategy. It is also part of a comprehensive work meant to build a poverty and inequality strategy for Mexico.

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1. INTRODUCTION

From 1994 through 1996 income distribution improved in Mexico at a time of a severe financial crisis in the Mexican economy. According to our results from the National Household Income and Expenditure Survey (ENIGH), the top decile experienced relative losses, their total current income share dropped 1.6 % points, while the other deciles increased their share in total current income. The Gini coefficient came down from 0.534 in 1994 to 0.519 in 1996, whereas the drop in the Theil T was from 0.558 to 0.524. Usually, one would expect inequality to go up during recessive times, as it seems plausible to admit that people at the top decile have more ways to protect their assets than those at the bottom decile do. Especially when it comes to labor which is basically the only asset of the poor (the labor-hoarding hypothesis).

In principle, it could be argued that the richest experienced severe capital losses due to the crisis, in such a way that their total income was affected compared to the poor. This hypothesis, however, is not supported by the data as monetary income other than wages and salaries, and financial income as well, increased their share in total income in that time interim, particularly so for the urban areas.

This paper is organized as follows: Section 2 discusses the evolution of income inequality and the income share within income groups in Mexico. Section 3 measures the impact of various income sources on inequality, for the period 1994-1996. Sections 4 and 5 examine the factors and mechanisms driving inequality. Section 6 relates the fall in income inequality to the observed economic sector activity. Section 7 presents the concluding remarks.

2. EVOLUTION OF INCOME INEQUALITY

Achieving sustainable economic growth with a more egalitarian income distribution is at the core of Mexico's development challenge. Yet, the country does not perform well in terms of equity when compared with other Latin American countries. According to a recent study developed by the IDB (1998), Mexico has the sixth most unequal overall household income distribution (and the third worst in urban areas). In the broader international context, Mexico's ratio between the income share accruing to the 10 top percent to the bottom 40 percent of the population is higher than what is observed for the high-income countries and for the vast majority of the low-income countries (see table A5.1 in Annex 5).

The evaluation of the income inequality evolution in Mexico is based on the information available in the ENIGHs. This survey captures total current income of the households, including non-monetary income, besides labor earnings and other sources of monetary income. The unit of analysis is the household, and the concept of income is the household per capita total current income.[3]

The main results of this evaluation are shown in table 1. It indicates that a very sizable deterioration in the income distribution has taken place between 1984 and 1996. While the poorest 20% of the population lost almost one seventh of their income share (0.6 percentage points), the richest 10% increased theirs by something close to one seventh (5.2 percentage points). Moreover, this last group was the only one that gained over that period, as not only the poorest, but also those in the middle lost in relative terms.

Looking at the results of this comparison, one can say that the 1984-1996 period in Mexico was marked by a series of regressive income transfers from almost the entire population spectrum

[3] Total current income of the household divided by its number of household members. That is, we are considering the household as a unit characterized by a flow of income transfers and disregarding aspects related to equivalence scale.

to the richest stratum. Accordingly, the most commonly used inequality index points to a worsening in income inequality over this span of time. The Gini coefficient, which is more sensitive to changes in the middle of the distribution, rises from 0.473 in 1984 to 0.519 in 1996. On the other hand, the Theil T index, which is extremely sensitive to changes in the upper and lower tails, goes up from 0.411 in 1984 to 0.524 in 1996.

Even though the worsening of the distribution is indisputable, there are, nevertheless, two points that must be stressed. The first one is that, according to the ENIGH survey, most of the worsening of the total current income distribution happened in the mid-eighties (1984-1989). The early nineties display little variation in total current income inequality except for a small trend towards deterioration. From 1989 to 1994, the total current income share accruing to the 20% poorest decreased slightly (it went down from 3.9% to 3.8%), whereas the richest 10% were the only ones that increased theirs (by one percentage point), and, therefore, those in the middle also experienced losses.

Table 1. Lorenz Curves for Total Current Income[1/] (accumulated income share %)

Population Share	1984	1989	1992	1994	1996
10	1.66	1.39	1.32	1.39	1.39
20	4.47	3.88	3.68	3.76	3.89
30	8.19	7.29	6.92	6.98	7.29
40	12.85	11.65	11.09	11.08	11.63
50	18.76	17.05	16.26	16.28	17.08
60	26.15	23.78	22.83	22.79	23.86
70	35.51	32.25	31.13	31.10	32.39
80	47.64	43.12	42.14	41.93	43.44
90	64.53	58.75	58.32	57.68	59.33
92	68.79	63.06	62.81	62.03	63.61
94	73.73	68.03	68.03	67.26	68.68
96	79.38	73.82	74.47	73.70	74.95
98	86.68	81.60	82.81	82.49	83.32
100	100.0	100.0	100.0	100.0	100.0
Bottom 20%	4.5	3.9	3.7	3.8	3.9
Middle 40%	21.7	19.9	19.2	19.0	20.0
Middle high 30%	38.4	35.0	35.5	34.9	35.5
Top 10%	35.5	41.3	41.7	42.3	40.7
Gini	0.473	0.519	0.529	0.534	0.519
Theil T	0.411	0.566	0.550	0.558	0.524

Source: Own calculations based on ENIGH.
[1/] Based on household per capita income.

The second fact to be emphasized is very surprising and hard to be explained: the observed improvement in the income distribution between 1994 and 1996, an interval of time that entails a severe financial crisis in the Mexican economy.[4] Usually one would expect inequality to go up during recessive times, as it seems plausible to admit that the rich have more ways to protect their

[4] In 1994, current account deficit was 30 billion dollars, about 7 percent of GDP. The main effects of the financial crisis were i) GDP and domestic demand felt 6.2 percent and 14 percent respectively each; ii) the unemployment rate rose from 3.7 percent in 1994 to 6.2 percent in 1995; and, iii) the GDP per capita decreased 7.8 percent and workers experienced a significant reduction in their real wage, nearly 17 percent in 1995.

assets than the poor do, especially when it comes to labor which is basically the only asset of the poor (the *labor-hoarding* hypothesis). The fact, however, is that the 10% richest experienced relative losses (their total current income share dropped 1.6% points) and, accordingly, total current income inequality went down. The Gini coefficient came down from 0.534 in 1994 to 0.519 in 1996, whereas the drop in the Theil T was from 0.558 to 0.524. In principle, it could be argued that the richest experienced severe capital losses due to the crisis, in such a way that their total current income was affected compared to the poor. Tables 2 and 3 show the shares by income source within income groups and the shares by income source within income source, respectively. Some interesting results are: i) labor earnings is the largest income share for all deciles. ii) The share of total labor earnings within income group decreased substantially for the top decile (13.7%) compared to the other income groups. And, iii) the largest increase within the financial income share was for the top decile (from 7.1% to 10.0%).

Table 2 Income share by source within income groups

	1994					1996				
Source	Bot.20%	Mid.40%	M.H.30%	Top 10%	Total	Bott.20%	Mid.40%	M.H.30%	Top 10%	Total
Monetary Current Income										
Total Labor Earnings	35.92	46.31	48.04	47.94	47.12	35.13	46.00	48.18	41.35	44.51
Own Business Income	18.16	15.26	16.10	18.51	16.96	20.26	16.07	14.58	21.38	17.74
Property Rents	0.37	0.62	0.89	1.64	1.10	0.04	0.07	0.07	0.06	0.06
Income from cooperatives	0.06	0.08	0.18	0.36	0.22	0.60	0.54	1.00	2.24	1.35
Monetary Transfers	11.01	7.96	5.63	3.33	5.44	11.28	8.56	7.00	4.39	6.55
Other Current Income	0.10	0.22	0.40	1.13	0.64	0.08	0.19	0.57	1.17	0.69
Non Monetary Current Income										
Auto-Consumption	6.77	2.08	1.48	0.47	1.44	4.59	1.92	1.06	0.52	1.20
Non Monetary Payment	1.08	1.92	2.12	0.88	1.55	1.03	2.06	2.98	1.83	2.25
Gifts	8.27	6.96	5.66	3.11	5.04	8.57	7.65	6.76	4.21	6.07
Housing Imputed Rent	16.61	16.18	16.42	15.50	16.02	16.49	14.39	13.95	12.89	13.76
Financial Income	1.64	2.40	3.09	7.12	4.46	1.93	2.55	3.85	9.98	5.80
Total Income	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: own calculations based on Enigh Survey.

In 1994, the top decile owned 62.41% of the financial income and this share increased by 4.4% in 1996. On the other hand, for the middle 40% and the middle high 30%, their financial income share decreased by 14.87% and 4.27% respectively in 1996. Another important result is that the labor earnings share at the top decile decreased from 39.78% to 35.20%.

Table 3 Income share by income groups within income sources

Source	1994					1996				
	Bot.20%	Mid.40%	M.H.30%	Top 10%	Total	Bot.20%	Mid.40%	M.H.30%	Top 10%	Total
Monetary Current Income										
Total Labor Earnings	3.28	20.36	36.59	39.78	100.0	3.68	22.33	38.79	35.20	100.0
Own Business Income	4.61	18.65	34.07	42.68	100.0	5.33	19.57	29.45	45.65	100.0
Property Rents	1.46	11.64	28.81	58.10	100.0	2.71	24.46	39.23	33.60	100.0
Income from cooperatives	1.18	7.68	28.46	62.68	100.0	2.08	8.65	26.41	62.87	100.0
Monetary Transfers	8.70	30.28	37.12	23.90	100.0	8.03	28.24	38.31	25.41	100.0
Other Current Income	0.67	7.01	22.78	69.54	100.0	0.54	6.00	29.39	64.07	100.0
Non Monetary Current Income										
Auto-Consumption	20.24	29.99	36.91	12.86	100.0	17.82	34.46	31.49	16.24	100.0
Non Monetary Payment	3.00	25.70	49.01	22.29	100.0	2.13	19.73	47.43	30.72	100.0
Gifts	7.05	28.60	40.27	24.08	100.0	6.59	27.24	39.89	26.28	100.0
Housing Imputed Rent	4.46	20.93	36.78	37.84	100.0	5.59	22.61	36.33	35.48	100.0
Financial Income	1.58	11.16	24.85	62.41	100.0	1.55	9.50	23.79	65.16	100.0
Total Income	4.30	20.72	35.89	39.10	100.0	4.67	21.61	35.83	37.89	100.0

Source: own calculations based on Enigh Survey.

Accordingly, a preliminary conclusion emerges: the top decile protected themselves by increasing their financial income and capital share. However, this increase did not compensate the drastic fall in their labor earnings.

3. THE IMPACT OF VARIOUS INCOME SOURCES ON INEQUALITY

Share in Overall Gini Index by Income Source

Now, we measure and analyze the impact of various income sources on inequality. In doing so, one can use the decomposition of the Gini index by income source[5]. In table 4 the results for the decomposition of Gini by income source are displayed for urban and rural areas using total income. The results indicate that i) both in urban and rural areas, labor earnings is the most important source of inequality. ii) Inequality in rural areas is lower than in urban areas and iii) inequality in urban areas drives the national pattern. In light of these outcomes, it seems pertinent to state that the leading force behind the behavior of total income distribution in Mexico is in urban areas.

[5] Section 2.1 in Annex 2 presents the methodology.

Table 4 Decomposition of Gini by income source, share in overall Gini

	1994						1996					
Source	National		Urban		Rural		National		Urban		Rural	
Monetary Current Income		%		%		%		%		%		%
Total Labor Earnings	0.2535	47.0	0.2409	46.8	0.1218	28.2	0.2255	42.6	0.2119	41.9	0.1458	31.4
Own Business Income	0.0925	17.1	0.0872	16.9	0.1154	26.7	0.0963	18.2	0.0932	18.4	0.1046	22.5
Property Rents	0.0017	0.3	0.0018	0.4	0.0007	0.2	0.0004	0.1	0.0002	0.0	0.0026	0.6
Income from cooperatives	0.0087	1.6	0.0087	1.7	0.0065	1.5	0.0110	2.1	0.0118	2.3	0.0035	0.8
Monetary Transfers	0.0240	4.4	0.0228	4.4	0.0475	11.0	0.0307	5.8	0.0285	5.6	0.0529	11.4
Other Current Income	0.0053	1.0	0.0055	1.1	0.0027	0.6	0.0056	1.1	0.0052	1.0	0.0080	1.7
Non Monetary Current Income												
Auto-Consumption	0.0010	0.2	0.0023	0.5	0.0111	2.6	0.0010	0.2	0.0020	0.4	0.0068	1.5
Non Monetary Payment	0.0076	1.4	0.0065	1.3	0.0077	1.8	0.0124	2.3	0.0110	2.2	0.0126	2.7
Gifts	0.0242	4.5	0.0217	4.2	0.0390	9.0	0.0298	5.6	0.0273	5.4	0.0391	8.4
Housing Imputed Rent	0.0322	16.5	0.0862	16.8	0.0377	8.7	0.0730	13.8	0.0711	14.1	0.0377	8.1
Financial Income	0.0889	6.0	0.0309	6.0	0.0417	9.7	0.0439	8.3	0.0433	8.6	0.0511	11.0
Total Income	0.5395	100	0.5146	100	0.4320	100	0.5296	100	0.5055	100	0.4648	100

Source: own calculations based on Enigh Survey.

Impact on Inequality of a Marginal Percentage Change in the Income from a Particular Source

The above source decomposition provides a simple way to assess the impact on inequality in the total income of a marginal percentage change equal for all households in the income from a particular source. Now suppose that there is an exogenous increase in income from source j, by some factor σ_j (i.e. $y_{ij}(\sigma_j)=(1+\sigma_j)y_{ij}$ for i=1,…,n). Thus the distribution of income form source j becomes $Y'_j=((1+\sigma_j)y_{1j},\ldots,(i+\sigma_j)y_{nj})$. Stark et al. (1986) showed that the derivative of the Gini coefficient with respect to a change in income source j is:

$$\frac{\partial G}{\partial s_j} = S_j(R_j G_j - G)$$

If this derivative is negative then the marginal increase in income component j will lessen income inequality. This will be the case either when:

i) Income from component j has either a negative or zero correlation with total income: or when

ii) Income from source j is positively correlated with total income (R_j>0) and $R_j G_j < G$.

If the previous equation is divided through by G, it can be seen that:

$$\frac{\partial G}{\partial s_j}\frac{1}{G} = \frac{S_j R_j G_j}{G} - S_j$$

This equation states that the marginal percentage change in inequality (as measured by the Gini coefficient) resulting from a small percentage change in income component j is equal to component j's share in total inequality less components j's share in total income.

Alternatively, the previous percentage change can be expressed in a different way by using the so-called Gini elasticity, which is $Nj=R_jG_j/G$.

$$\frac{\partial G}{\partial s_j}\frac{1}{G} = S_j(Nj-1)$$

Thus a percentage increase in the income from source with an elasticity of Gini *Nj* smaller (larger) than one will decrease (increase) the inequality in per capita income. The lower the Gini elasticity, the larger the re-distributive impact. The marginal contribution of an income source to inequality matters for policy purposes as well as for evaluating how the significance of such income source to inequality changes.

Table 5 presents the impact on inequality in total income of a marginal percentage change in the income from a particular source. It follows that monetary transfers have a re-distributive impact at national level and in urban areas, but they have a neutral effect on inequality in rural areas. In addition, financial income is always an inequality increasing source, since *Nj* is appreciably larger than one. Moreover, this effect increased in 1996 both at National level and in urban areas. It is also observed that at National level labor earnings was a neutral source of inequality in 1994, because *Nj* was too close to one. However, by region, this conclusion does not hold. Notice also that in 1996 labor earnings had the largest re-distributive impact in urban areas. Given the results derived in the previous section, it is plausible to conclude that the re-distributive impact of labor earnings in urban areas was larger than the regressive effect of financial income on total income distribution. The re-distributive net effect took place mainly at the top decile. The results show a reduction of total income inequality.

Table 5 Gini elasticity (*Nj*) and the Percent change in Gini per 1 percent change in income source (%)[3]

	1994						1996					
Source	National		Urban		Rural		National		Urban		Rural	
Monetary Current Income	*Nj*	%	*Nj*	%	*Nj*	%	*Nj*	%	*Nj*	%	*Nj*	%
Total Labor Earnings	0.997	-0.14	0.955	-2.20	0.879	-3.87	0.957	-1.93	0.91	-4.15	0.929	-2.39
Own Business Income	1.011	0.19	1.044	0.72	1.175	3.97	1.025	0.45	1.077	1.32	1.02	0.44
Property Rents	1.427	0.10	1.48	0.11	1.426	0.05	1.04	0.00	1.207	0.01	1.724	0.23
Income from cooperatives	1.456	0.50	1.499	0.56	1.731	0.64	1.544	0.73	1.586	0.86	1.495	0.25
Monetary Transfers	0.817	-1.00	0.939	-0.29	0.98	-0.22	0.886	-0.75	0.957	-0.26	1.025	0.28
Other Current Income	1.533	0.34	1.578	0.39	1.777	0.28	1.536	0.37	1.575	0.38	1.896	0.82
Non Monetary Current Income												
Auto-Consumption	0.124	-1.26	0.557	-0.36	0.397	-3.89	0.15	-1.02	0.582	-0.29	0.312	-3.25
Non Monetary Payment	0.913	-0.13	0.791	-0.33	1.392	0.50	1.035	0.08	0.937	-0.15	1.489	0.89
Gifts	0.889	-0.56	0.893	-0.50	1.192	1.45	0.927	-0.45	0.922	-0.46	1.113	0.85
Housing Imputed Rent	1.028	0.45	1.01	0.16	0.767	-2.65	1.002	0.02	0.985	-0.21	0.795	-2.09
Financial Income	1.338	1.51	1.405	1.73	1.634	3.75	1.429	2.49	1.524	2.94	1.563	3.96

Source: own calculations based on Enigh Survey.

Table 5 reinforces the tentative finding that people at the top decile protected their income flows with financial and other capital assets during the crisis. However, the fall in labor earnings was higher than the increase in their financial income.

We now examine the factors and mechanisms that have been driving income inequality.

4. STATIC DECOMPOSITION

This section aims at evaluating the contribution of a set of variables to labor earnings inequality in Mexico, either related to individual attributes, as schooling and age, or from participation in the labor market, as position in occupation and economic sector. The idea is to measure the reduction in inequality that results from excluding the differences in average labor earnings among workers in different groups formed by those variables. When the exercise is conducted for a single variable, this reduction is said to be the *gross contribution* of such a variable to the overall labor earnings inequality. When a variable is added to a model that contains all the remaining ones, the change in the gross contribution of these two models is called the *marginal contribution* of the added variable. In other words, the gross contribution can be regarded as the uncontrolled explanatory power of a given variable, and the marginal contribution as its explanatory power controlled by a set of other seemingly relevant variables. Annex 2, in section 2.4, reviews all the different decomposition methods and results generated in the Mexican case.

Before proceeding to the decomposition exercise, it is worth to review the conclusions of other recent studies in relation to the evolution of income inequality and some variables that are important in the process of labor earnings formation.

Cragg and Epelbaum (1996) show that both average wage and educational skill premium, which is defined as the percentage increase in wages over the primary schooling group, have increased substantially for more educated workers. In other words, the higher the level of education the larger the increase in the average wage is, which in turn leads to an increase in inequality. They also examined whether the high demand for skilled labor is industry specific, task specific or simply general education. In order to assess the marginal contribution of other factors that are not related to education, these factors are controlled by a set of dummy variables that describe the industry and task specific effects. The authors concluded that the industry-specific effect was small and that the task-specific effect (occupational variable) explained half of the growing wage dispersion from 1987 to 1993. This conclusion, however, may not be correct, as occupation might be considered an endogenous variable, which is determined by education. As shown on table A1.4 in Annex 1, educational level and occupational variables are highly correlated. In contrast, the correlation between education and other variables are low. Hence the occupation variable should be carefully handled in any kind of analysis.

The results for the exercise of static decomposition are shown in table 6[6]. Education (the result of the interaction between demand and supply) is by far the variable that accounts for the largest share of inequality in Mexico, both in terms of its gross and marginal contributions. The gross contribution, i.e., its explanatory power when is considered alone, amounts to one fifth of total inequality in 1994. The marginal contribution, i.e., the increase in the explanatory power when it is added to a model that already has the other variables, is remarkably stable and meaningful. It is worth pointing out that the difference between the two contributions increased in the 1989-1994 period, indicating that the degree of correlation and other variables has been going up, i.e., the "indirect" effects are becoming more important.

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[6] The results are based on the methodology described in Annex 2, section 2.2.

Table 6. Contribution to the Explanation of Labor Earnings Inequality (%)

	1989		1992		1994		1996	
Variables	**Gross**	**Marginal**	**Gross**	**Marginal**	**Gross**	**Marginal**	**Gross**	**Marginal**
Education	12.0	11.1	16.0	14.0	20.0	16.9	17.0	15.0
Pos. in Occupation	3.0	3.3	6.0	4.6	2.0	2.4	3.0	2.4
Economic Sector	1.0	2.3	1.0	2.3	3.0	1.7	1.0	2.3

Source: Own calculations based on ENIGH Survey.

The other variables considered seem to be much less important. However, position in occupation in 1992 and economic sector in 1994 appear to be more important. This can be interpreted, as evidence that the interaction between these variables and education has became more intense in those years. That is, workers' skills were more relevant for the determination of their type of participation in the labor market, as well as for their position across different economic segments of the economy.

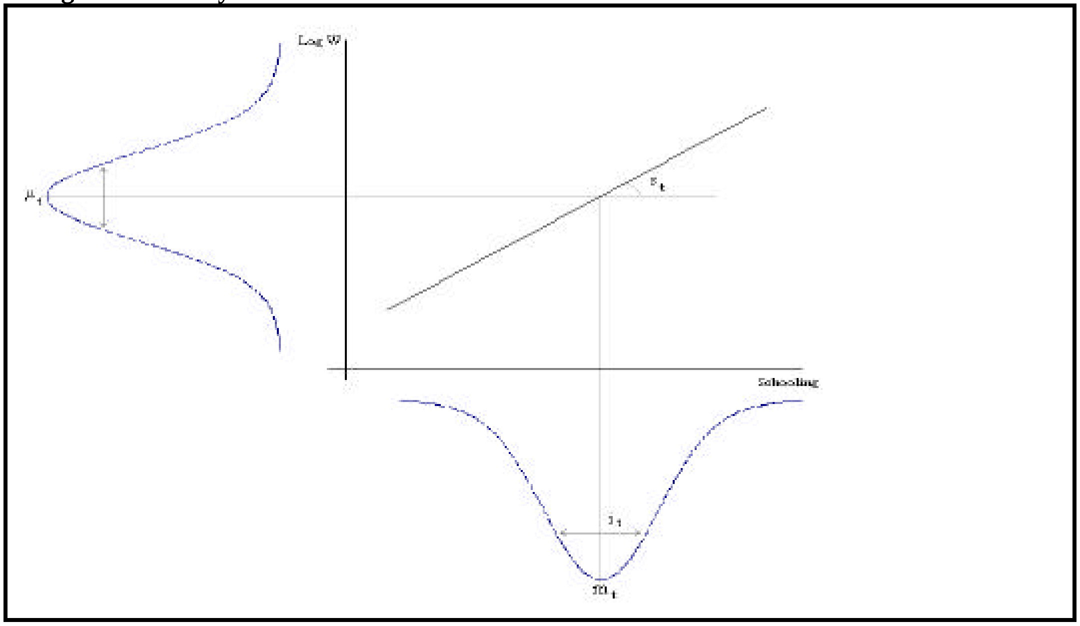
The analysis of these results leads to the conclusion that education is a key variable for the understanding of inequality in Mexico. Even though this is to some extent a remarkable finding, it comes as no surprise in the Latin American context. The results for some countries in the region, where similar exercises were carried out, are reported on table A5.2 in Annex 5. Mexico stays on the average range for Latin American countries, and displays a situation close to that observed in Argentina and Peru. However, education seems to be more important for inequality in Brazil, and much less important in Colombia and Uruguay. It is important to stress the fact that this is a comparison in relative terms. Given that in Peru, where education has a similar explanatory power, there is a lower degree of inequality compared to Mexico, the absolute contribution of education is higher in Mexico. As a matter of fact, in absolute terms, the contribution of education to inequality in Mexico is the second highest in Latin America, next only to Brazil. Moreover, what seems to be particularly interesting in the Mexican experience is the fact that the significance of education has been increasing over time.

5. THE DYNAMIC DECOMPOSITION

In order to address the relationship between education (the result of the interaction between supply and demand) and inequality it is necessary to explain the role of the labor market, since the way it works determines the labor earnings differentials among workers with different educational attributes. Thus, this relationship can be viewed as being determined by two elements: (i) the distribution of education itself; and (ii) the way the labor market rewards educational attainment. The first element reflects a pre-existing social stratification that already entails some inequality, due to reasons other than the workings of the labor market itself. The second is associated to the degree of growth of this pre-existing inequality into labor earnings inequality due to the performance of the labor market (i.e. demand behavior).

The diagram below shows the distribution of education in the horizontal axis (m_t is an indicator of the average schooling of the labor force and i_t represents its dispersion) while the vertical axis has the distribution of labor earnings. The first quadrant depicts the interaction between the pre-existing conditions (the distribution of education) and the workings of the labor market, through the steepness s_t of the income profile related to education. Therefore, at a point of time: (i) the higher m_t is, the larger the average earning will be. (ii) The lower i_t is, the smaller the inequality will be. And (iii) the higher s_t is, the bigger the growth of pre-existing disparities, and, accordingly, the higher the labor earnings inequality will be. As these indicators change over the time, there are going to be alterations in the income distribution induced by them. Changes in i_t, assuming s_t constant, will change labor earnings inequality due to changes in the composition of the labor force (the so-called allocation/population effect), whereas changes in s_t will produce alterations in the labor earnings differentials (the income effect).

Figure 1. An Stylized View of the Interaction Between Education and the Labor Market



Barros and Reis (1991) developed three synthetic measures for the indicators m_t (average schooling), i_t (schooling inequality), and s_t (income profile), based directly on the definition of the Theil T index[7]. The figures for Mexico from 1984 to 1996 are presented in the table below. As it can be seen, there was some improvement on average schooling from 1984 to 1996. On the other hand, between 1984 and 1994 the inequality of the distribution of education increased, whereas the income profile, which is related to the returns to schooling, has become much steeper. Meaning that, there was a shift in demand towards high skilled labor that was not met by the increase in supply probably due to the increased rate of skill-biased technological change, whose transmission to Mexico may be facilitated by the increased openness of the economy.

Table 7 Synthetic Indicators of Schooling Distribution and Income Profile

Year	1984	1989	1992	1994	1996
m^t	0.468	0.525	0.516	0.527	0.538
i^t	0.083	0.073	0.075	0.075	0.072
s^t	0.083	0.124	0.161	0.203	0.175

Source: Own estimates based on ENIGH
1/ Labor force was limited to individuals who are: i) working as employee, employer or self employed; ii) between 12 and 65 years old; iii) living in urban areas; iv) working 20 hours or more per week; v) with positive income; vi) having the attributes of interest defined.
2/ Annex 1 presents how the groups categories are defined

The methodology applied here is the dynamic decomposition. This tool permits translating this stylized view in quantitative results, giving one a better understanding of the socio-economic transformations responsible for changes in the distribution. Besides permitting the identification of the relevant individual variables, it also helps understand the nature of their contribution for the evolution of inequality over time.

[7] See Annex 2 in section 2.3.

The results of the decomposition of the variations in the Theil T index for different intervals of time are shown in the table below[8]. The first point to highlight is the fact that, when the variables are considered alone, education has the highest gross contribution to the explanation of changes in labor earnings distribution. Second, both the allocation and the income effect were positive in all periods. This means that the changes in the distribution of education and in the relative labor earnings among educational groups were always in phase with the alterations in the labor earnings distribution. Namely, when the income profile related to education became steeper and the inequality of education increased, the labor earnings distribution worsened (as in the 1984-1992, 1984-1994, and 1984-1996 periods), and vice-versa (as in the 1994-1996 period).

Third, the income effect is always the prevalent one. Even the decrease in inequality observed between 1994 and 1996 is partially explained by the changes in relative income (it is possible to see, in table 7, that the income profile related to education became less steep in this period). Therefore, it seems reasonable to conclude that the income effect is the leading force underlying the increase in inequality, and that, in turn, suggests that the workings of the labor market, and its interaction with the educational policies, should be thoroughly examined.

Fourth, it is worth pointing out that the significance of changes in the distribution of education remains high even when one controls for changes in other relevant variables. As a matter of fact, with the exception of the 1994-1996 crisis period, the marginal contribution of position in occupation and economic sector are usually negative. This means that the changes in these variables contributed to reduce the effects induced by changes related to education, as most of the time they work in the direction of reducing inequality after the influence of education is accounted for.

Table 8. Results of the Dynamic Decomposition

Period	Variable	Allocation	Income	Gross	Marginal
	Education	**-9.8**	**52.1**	**42.4**	**26.6**
1984-1992	Pos. in Occupation	21.1	18.2	39.3	13.8
	Sector	-17.7	2.5	-15.2	-19.5
	Education	**-3.6**	**63.0**	**59.5**	**46.0**
1984-1994	Pos. in Occupation	6.2	-1.2	5.1	-2.8
	Sector	-7.8	11.5	3.7	-11.4
	Education	**-7.4**	**59.4**	**51.9**	**34.5**
1984-1996	Pos. in Occupation	14.6	1.3	15.9	-9.7
	Sector	-27.2	3.7	-23.5	-15.1
	Education	**5.7**	**68.4**	**74.1**	**76.6**
1994-1996	Pos. in Occupation	-15.8	-12.4	-28.2	29.5
	Sector	21.8	25.0	46.8	21.0

Source: Own estimates based on ENIGH
1/ Labor force was limited to individuals who are: i) working as employee, employer or self employed; ii) between 12 and 65 years old; iii) living in urban areas; iv) working 20 hours or more per week; v) with positive income; vi) having the attributes of interest defined.
2/ Annex 1 presents how the groups categories are defined

The last period, from 1994 to 1996, deserves special comment. First because inequality was substantially reduced. Secondly because, once more, there were alterations associated with education, now working in the other direction, and such alteration appear to be the main factor responsible for the reduction in inequality. Notice that during this period, the gross and the marginal contribution of education increased substantially compared to the other. As it can be seen from the synthetic indicators, there was a small improvement in the distribution of schooling during the period and, a sizable decrease in the steepness of income profile related to education. Nonetheless, the income effect is more important than the allocation effect in explaining the

[8] The results are based on the methodology described in Annex 2, section 2.2.

decreased in inequality. All other variables, as observed for other periods, also contributed to an improvement in inequality.

Table A5.3 in Annex 5 shows the results of the same kind of decomposition for Brazil, Argentina and Peru. The significance of education as an explanation of ***changes in inequality*** seems to be a common pattern in Latin American countries. Moreover, the relevance of the income effect over the allocation (population) effect is also a trait shared by all countries where a similar analysis was carried out. Interestingly, in the Mexican case the figures are above those for other countries (in a shorter period of time length, one should stress). That means that the changes in the structure of supply and demand for labor, which are greatly affected by the educational and macroeconomic policies followed by the country and/or their interaction with the workings of the labor market, were particularly relevant for the labor earnings distribution.

6. Education, Economic Crisis and Inequality

Section 4 and 5 showed that in the pre-crisis period education exacerbated inequality while economic sector and position in occupation reduce it. Moreover, it was not the distribution of schooling, as reflected by the i_t indicator, that worsened inequality but the increase in the gap of the rewards to education between the top decile and the rest of the income groups. On the other hand, in the crisis period, education, position in occupation and economic sector reduced inequality. As shown in Section 2, the crisis severely affected labor earnings of the top income decile. This section shows that the top income decile is most of the skilled labor force that works in the Non tradable sector, which suffered the largest looses from the crisis. The top decile is likely to be managers in the financial and rent sector or top CEOs in the service sector but not the firm owners. Table A1.7 in Annex 1 presents the Gross Domestic Product (GDP) growth by economic sector. It is clear that the 1995 economic crisis had different impact on each economic sector. As expected, those sectors linked to the domestic market experienced a considerable recession. Notice that Financial, Personal and Civil Services had a zero or negative growth in 1994 through 1996. In aggregate terms, table 7 reports the GDP growth by Tradable and Non-tradable sectors. One can see there that the tradable goods sector (e.g., basic metallic; metallic goods; machinery and equipment; chemical goods and textile industry) responded positively to the crisis, growing at an annual average rate of 5.14%, from 1994 to 1996. On the other hand, the Non-tradable sector suffered looses form the economic crisis, with a decrease of an annual average of 4.46%, in the same period.

Table 7. Gross Domestic Product Growth by Tradable and non Tradable goods

	1994-1995	1994-1996	1995-1996
Total	-6.22	-1.40	5.14
Tradable Goods[1/]	-3.49	5.14	8.94
Non Tradable Goods[2/]	-7.55	-4.46	3.34
Electricity, Gas and Water	2.15	6.83	4.58

Source: Own estimates based on Banco de Informacion Economica, INEGI.

1/ Tradable goods include Agriculture, Forestry, Fishing, Mining and Manufacturing Industry

2/ Non Tradable goods include the other economic sectors except Electricity, Gas and Water

Based on the National Employment Survey tables A1.5 and A1.6 in Annex 1 show the employment share within economic sector by educational level and within level of education by economic sector, respectively in 1997. From those figures, three points deserve to be stressed. First, Financial, Personal, and Civil Services are relatively more intensive in the use of high-skilled labor. Second, Agriculture, Forestry and Fishing are characterized by more intensive use of low-skilled labor. Third, in a surprising way, the manufacturing industry, in contrast to what seems to be the common wisdom, cannot be characterized as a sector that uses high-skilled labor. Furthermore, Lopez-Acevedo and Salinas (1999a) showed that there has been a significant upgrade in terms of years of schooling from 1988 to 1997 and also pointed out the next results for the same period: i) Financial and Social services industries became relatively more intensive in the use of high-skilled labor. ii) The primary sector, together with the non-manufacturing industry and other services, were characterized by a more intensive use of low-skilled labor. And, iii) the manufacturing industry is not characterized as a sector that intensively uses high-skilled labor. Accordingly, the distribution of schooling by economic sector observed in 1997 is the result of the interacting of several structural variables rather than the economic crisis.

Tables 8 and 9 presents the distribution of educational level by income decile within income group and within educational level, respectively. Notice that the top decile is the high skilled labor force, i.e. 62.5 percent of the top decile has an upper secondary or a higher level of education and 65.9 percent with University Complete belongs to this income group. On the other hand, the bottom 20 percent has low level of education, i.e. 90 percent of this income group has on average primary complete or a lower level of education and 30 percent with primary incomplete level of education belongs to this income group. Tables A1.7 and A1.8 in Annex 1, shows these shares in 1996.

Table 8. Share of educational level by income decile within income group, 1994

Income Decile	Primary Incomplete	Primary Complete	Lower Secondary Complete	Upper Secondary Complete	University Complete	Total
I	72.6	21.8	4.9	0.7	0.0	100.0
II	62.4	28.0	8.1	0.8	0.6	100.0
III	56.3	30.5	10.9	1.9	0.4	100.0
IV	47.7	31.9	17.6	2.7	0.2	100.0
V	38.2	33.6	23.0	4.5	0.8	100.0
VI	30.2	33.8	27.5	6.7	1.7	100.0
VII	23.7	30.1	35.5	8.8	2.0	100.0
VIII	21.2	29.2	31.3	14.1	4.2	100.0
IX	16.5	22.3	29.9	21.5	9.8	100.0
X	7.0	10.3	20.2	30.0	32.5	100.0
Total	34.1	26.6	22.1	10.7	6.5	100.0

Source: Own estimates based on ENIGH94 survey

Table 9. Share of educational level by income decile within educational level, 1994

Income Decile	Primary Incomplete	Primary Complete	Lower Secondary Complete	Upper Secondary Complete	University Complete
I	16.0	6.2	1.7	0.5	0.0
II	13.9	8.0	2.8	0.6	0.7
III	14.4	10.0	4.3	1.6	0.6
IV	13.0	11.2	7.4	2.3	0.2
V	10.6	11.9	9.8	4.0	1.1
VI	9.0	13.0	12.7	6.4	2.6
VII	7.4	12.0	17.0	8.7	3.3
VIII	7.2	12.6	16.3	15.2	7.5
IX	5.8	10.0	16.1	24.0	18.0
X	2.7	5.1	12.0	36.8	65.9
Total	100.0	100.0	100.0	100.0	100.0

Source: Own estimates based on ENIGH94 survey

Table 10 shows that since trade liberalization started high skilled labor force within sector probability has been higher compared to that of the low skilled labor force. This result is reversed for the between sector change probability. Thus the high skilled labor force usually moves within their sector rather than across sectors. Furthermore, it is clear from the table 10 that there has been a re-composition of the labor force across sectors. In the late 80s, 70.2% of the non skilled labor force employed in the Financial and Rent Services Sector moved to other sectors while 77% of the high skilled labor force employed in this sector stayed in it.

Table 10. Transition Probabilities of Being in the Same Sector, Change Within Sector and Change Between Sector by School Level[1/]

Sector	1988-1989			1992-1993			1996-1997		
	Not Change	Sector Change Within	Sector Change Between	Not Change	Sector Change Within	Sector Change Between	Not Change	Sector Change Within	Sector Change Between
Incomplete upper secondary or lower									
Primary Sector	46.4	14.4	39.3	28.5	46.8	24.7	47.8	13.6	38.6
Manufacturing Industry	52.7	24.5	22.7	53.6	23.1	23.4	56.9	24.5	18.6
Non Manufacturing Industry	45.6	11.8	42.6	50.3	7.6	42.1	46.9	9.4	43.7
Commerce	48.0	16.2	35.7	60.3	14.0	25.6	53.6	17.7	28.7
Financial and Rent Services	25.7	4.1	70.2	35.6	8.0	56.4	67.6	2.7	29.6
Transportation/communication	65.1	6.7	28.2	71.7	8.0	20.2	72.5	8.4	19.0
Social Services	59.0	21.2	19.8	61.6	18.3	20.2	66.9	14.7	18.4
Other Services	59.7	8.8	31.5	65.7	4.9	29.4	60.5	2.3	37.2
Weighted average	54.2	17.5	28.3	58.7	15.3	26.0	59.2	14.6	26.1
Complete upper secondary or higher									
Primary Sector	41.3	0.0	58.7	42.3	6.1	51.6	35.4	21.2	43.4
Manufacturing Industry	42.3	29.9	27.8	50.7	24.7	24.6	53.2	27.4	19.3
Non Manufacturing Industry	57.7	8.1	34.1	51.0	15.4	33.6	54.0	6.5	39.4
Commerce	41.9	13.6	44.4	52.2	15.4	32.4	51.6	15.4	33.0
Financial and Rent Services	77.0	1.3	21.6	69.2	6.1	24.7	66.2	18.6	15.1
Transportation/communication	50.9	18.9	30.2	74.7	8.3	17.0	69.6	6.1	24.4
Social Services	55.1	34.0	10.9	63.8	23.2	13.0	71.5	18.2	10.3
Other Services	45.1	4.4	50.4	56.5	0.5	43.0	56.5	1.4	42.0
Weighted average	51.1	25.1	23.8	59.1	19.1	21.8	64.0	17.4	18.7

Source: Own calculations based on the ENEU survey (3rd quarter).
The length of time is one year.
The sample includes those in the labor force and in the panel
1/ Sector change within sector was defined according to change between sub-sector

Thus, the top decile protected their income flow with financial and other capital assets during the crisis. However, they could not protect themselves from the fall in their labor earnings because most of them were working in the non-tradable sector (e.g. Financial, Rent, Personal and Civil Service sectors) and were not able to re-negotiate their salaries or found it unattractive to move to other sectors.

7. CONCLUDING REMARKS

The analysis showed that the 1995 crisis had a major negative impact on the income share of the top decile mainly through a reduction in their labor earnings share. The increase in the capital and financial income did not offset the drastic reduction in labor earnings of the top decile. In large part, it explains the overall fall in income inequality after the crisis. Moreover, labor earnings is a growing source of income inequality, which deserves special attention.

The results from the decomposition analysis indicate that, during the financial crisis, education, position in the occupation and economic sector explained the fall in income inequality. The decrease in inequality observed between 1994 and 1996 is partially explained by the changes in relative income (it is possible to see, in table 7, that the income profile related to education became less steep in this period). Therefore, it seems reasonable to conclude that the income effect is the leading force underlying the increase in inequality, and that, in turn, suggests that the workings of the labor market, and its interaction with the educational policies, should be thoroughly examined.

Another noteworthy observation is that the significance of changes in the distribution of education remains high even when one controls for changes in other relevant variables. As a matter of fact, with the exception of the 1994-1996 crisis period, the marginal contribution of position in occupation and economic sector are usually negative. This means that the changes in these variables contributed to reduce the effects induced by changes related to education, as most of the time they work in the direction of reducing inequality after the influence of education is accounted for. The 1994-1996 period, deserves special comment. First because inequality was substantially reduced. Secondly because, once more, there were alterations associated with education, now working in the other direction, and such alteration appear to be the main factor responsible for the reduction in inequality. As it can be seen from the synthetic indicators, there was a small improvement in the distribution of schooling during the period and, a sizable decrease in the steepness of income profile related to education. All other variables, as observed for other periods, also contributed to an improvement in inequality.

It was also found that the high-skilled labor force is concentrated both in the top decile and in the non-tradable sector such as financial services. These sectors were the hardest hit from the recession. Thus, it is plausible to think that the individuals working in those sectors were unable to re-negotiate their salaries or, as shown by the transition probabilities, did not move to other sectors because sector specific skills or because in the long run it was unattractive for them to move to other sectors.

The ENIGH 1998 aggregate results indicate that inequality increased after 1996, which is entirely coherent with the macroeconomic set up that shows that the non-tradable sector has recovered from the economic crisis. Thus, high skilled labor force working in that sector must have experienced an increase in their labor earnings.

ANNEX 1. DATA SOURCES

The National Household Income and Expenditure Survey (ENIGH) was used in this study. This survey is collected by the Instituto Nacional de Estadística, Geografía e Informática (INEGI) and is available for 1984, 1989, 1992, 1994 and 1996[9]. Each survey is representative at the national level, urban area and rural area. For 1996, the ENIGH is also representative for the states of Mexico, Campeche, Coahuila, Guanajuato, Hidalgo, Jalisco, Oaxaca and Tabasco.

For each year the survey design was stratified, multistage and clustered. The final sampling unit is the household and all the members within the household were interviewed. In each stage, the selection probability was proportional to the size of the sampling unit. Then, it is necessary the use of weighs[10] in order to get the suitable estimators.

The table below shows the sample size for each year.

Table A1.1 Sample Size by Year

Year	Number of households	Number of persons
1984	4,735	23,756
1989	11,531	56,727
1992	10,530	50,378
1994	12,815	59,835
1996	14,042	64,359

The available information can be grouped into three categories:

- Income and consumption: the survey has monetary, no monetary and financial items.
- Individual characteristics: social and demographic, i.e., age, enrollment to school, level of schooling, position at work, economic sector, etc.
- Household characteristics.

Category Selection

For the purpose of the analysis, the individuals in the sample were classified according to their educational level, position in occupation, sector of activity and geographical region in the following categories:

a) Educational level

i) Primary incomplete: no education and primary incomplete (one to five years of primary)
ii) Primary complete: primary complete and secondary incomplete (one or two years)
iii) Secondary complete: secondary complete and preparatory incomplete (one or two years)
iv) Preparatory complete: preparatory complete and university incomplete
v) University complete: university complete (with degree) and postgraduate studies

b) Position in occupation

i) Worker or employee
ii) Employer

[9] The sample in a given year is independent from another.
[10] The weights should be calculated according to the survey design and corresponds to the inverse of the probability inclusion.

iii) Self employed

c) Sector of activity

i) Agriculture
ii) Manufacturing
iii) Construction
iv) Commerce
v) Services
vi) Other (utilities, extraction, transports, financial services, communications, etc)

d) Geographical regions

i) North: Baja California, Baja California Sur, Coahuila, Chihuahua, Durango, Nuevo Leon, Sinaloa, Sonora, Tamaulipas and Zacatecas
ii) Center: Aguascalientes, Colima, Guanajuato, Hidalgo, Jalisco, Mexico, Michoacan, Morelos, Nayarit, Puebla, Queretaro, San Luis Potosi and Tlaxcala
iii) South: Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz and Yucatan
iv) Distrito Federal.

Group Selection

The labor force was limited to individuals who are:

i) working as employee, employer or self employed[11];
ii) between 12 and 65 years old;
iii) living in urban areas;
iv) working 20 hours or more per week;
v) with positive income;
vi) having the attributes of interest defined.

The number of persons in the survey that belong to the labor force is shown in the next table.

Table A1.2 Sample size for the labor force

Year	Number of persons	% of the total sample
1984	3,892	16.4
1989	10,401	18.3
1992	8,752	17.4
1994	10,982	18.4
1996	12,996	20.2

According to the groups mentioned before, the number of cases is presented next.

[11] The respective categories: workers without payment and cooperative's member were excluded because of the sample size.

Table A1.3 Sample size by variable and year

Variable	1984	1989	1992	1994	1996
Education Level					
Primary Incomplete	1,246	1,951	1,879	2,387	2,736
Primary Complete	1,299	3,006	2,501	2,975	3,411
Secondary Complete	803	2,875	2,489	3,014	3,734
Preparatory Complete	389	1,614	1,168	1,617	1,915
University Complete	245	955	715	989	1,200
Position in Occupation					
Employee	3,175	8,604	7,188	8,843	10,207
Employer	126	311	393	450	610
Self employer	681	1,486	1,171	1,689	2,179
Total	3,982	10,401	8,752	10,982	12,996

Table A1.4 Pearson Correlation among explanatory variables

	1988			
	Education	Occupation	Econ. Sector	Status
Education	1.00			
Occupation	0.64	1.00		
Econ. Sect.	0.08	0.10	1.00	
Status	0.05	0.06	-0.04	1.00
Spearman's rho[1/]	0.58			
	1992			
	Education	Occupation	Econ. Sector	Status
Education	1.00			
Occupation	0.63	1.00		
Econ. Sect.	0.06	0.02	1.00	
Status	0.08	0.08	-0.04	1.00
Spearman's rho[1/]	0.60			
	1997			
	Education	Occupation	Econ. Sector	Status
Education	1.00			
Occupation	0.64	1.00		
Econ. Sect.	0.09	0.04	1.00	
Status	0.11	0.09	-0.06	1.00
Spearman's rho[1/]	0.62			

Source Own calculation based on ENEU Survey.
1/ It refers to Spearman's correlation between education and occupation.

Table A1.5 Employment share within economic sector by level of education

	Primary Incomplete	Primary Complete	L. Secondary Complete	U Secondary Complete	University	Total
Agriculture, Forestry and Fishing	57.3	28.1	10.7	2.7	1.2	100.0
Mining	15.1	19.8	30.7	13.9	20.4	100.0
Manufacturing Industry	20.4	30.8	30.5	10.0	8.2	100.0
Construction	36.5	33.8	16.3	5.5	7.9	100.0
Electricity, Gas and Water	6.7	21.1	26.3	16.5	29.4	100.0
Commerce, Restaurants and Hotels	21.6	28.9	27.6	13.7	8.1	100.0
Transport and Communication	12.6	30.4	29.0	16.8	11.2	100.0
Financial and Rent Services	5.7	9.7	24.0	16.2	44.3	100.0
Civil Services	8.8	13.9	33.7	16.3	27.2	100.0
Personal and other services	19.3	23.3	25.5	9.5	22.4	100.0
Total	28.7	26.7	23.2	9.6	11.8	100.0

Source: Own calculations based on the National Employment Survey, ENE 1997.

Table A1.6. Employment share within level of education by economic sector

	Primary Incomplete	Primary Complete	L. Secondary Complete	U Secondary Complete	University	Total
Agriculture, Forestry and Fishing	48.5	25.5	11.2	6.8	2.5	24.2
Mining	0.3	0.4	0.7	0.8	0.9	0.5
Total Manufacturing industry	11.8	19.1	21.8	17.4	11.5	16.6
Construction	6.0	6.0	3.3	2.7	3.1	4.7
Electricity, Gas and Water	0.1	0.4	0.6	0.9	1.3	0.5
Commerce, restaurants and Hotels	16.3	23.3	25.6	30.8	14.8	21.5
Transports and communications	1.8	4.7	5.1	7.2	3.9	4.1
Financial and Rent Services	0.8	1.5	4.2	6.9	15.3	4.1
Civil Services	1.3	2.2	6.2	7.3	9.8	4.3
Personal and other services	13.1	17.0	21.3	19.3	36.9	19.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Own calculations based on the National Employment Survey, ENE 1997.

Table A1.7. Share of educational level by income decile within income group, 1996

Income Decile	**Primary Incomplete**	**Primary Complete**	**Lower Secondary Complete**	**Upper Secondary Complete**	**University Complete**	**Total**
I	66.2	26.6	6.9	0.4	0.0	100.0
II	56.4	28.9	13.4	1.3	0.1	100.0
III	45.0	33.8	17.4	3.4	0.3	100.0
IV	40.1	33.2	21.1	4.9	0.7	100.0
V	35.8	31.3	26.9	5.2	0.8	100.0
VI	31.7	27.8	29.9	8.8	1.8	100.0
VII	23.7	29.9	33.2	10.7	2.6	100.0
VIII	19.0	26.0	34.3	15.3	5.5	100.0
IX	13.9	19.4	31.3	23.8	11.6	100.0
X	5.8	10.3	22.3	30.7	30.9	100.0
Total	31.1	25.9	24.5	11.8	6.6	100.0

Source: Own estimates based on ENIGH96 survey

Table A1.8. Share of educational level by income decile within educational level, 1996

Income Decile	Primary Incomplete	Primary Complete	Lower Secondary Complete	Upper Secondary Complete	University Complete
I	16.7	8.1	2.2	0.2	0.0
II	15.4	9.5	4.6	0.9	0.1
III	12.7	11.4	6.2	2.5	0.4
IV	11.6	11.6	7.7	3.7	1.0
V	10.9	11.5	10.4	4.1	1.1
VI	10.4	10.9	12.4	7.6	2.8
VII	7.8	11.7	13.8	9.2	3.9
VIII	7.0	11.5	16.0	14.9	9.5
IX	5.2	8.7	14.8	23.3	20.4
X	2.4	5.1	11.8	33.5	60.8
Total	100.0	100.0	100.0	100.0	100.0

Source: Own estimates based on ENIGH96 survey

Table A1.7. Percentage Gross Domestic Product growth by Economic Sector

	1994-1995	1994-1996	1995-1996
Total	-6.22	-1.40	5.14
Agriculture, Forestry and Fishing	0.86	4.46	3.57
Mining	-2.68	5.21	8.11
Total Manufacturing Industry	-4.94	5.36	10.83
Food, Beverages and Tobacco	0.04	3.38	3.34
Textile industry	-6.31	8.39	15.69
Timber Industry	-7.81	-1.43	6.93
Paper, and Editing Industry	-7.59	-6.42	1.27
Chemical Goods	-0.92	5.59	6.57
Non Metallic Mineral	-11.66	-4.55	8.06
Basic Metallic Industry	4.07	23.59	18.76
Metallic Goods, Machinery and Equipment	-10.27	9.72	22.27
Other Manufacturing Industries	-10.17	2.78	14.42
Construction	-23.46	-15.99	9.77
Electricity, Gas and Water	2.15	6.83	4.58
Commerce, Restaurants and Hotels	-15.53	-11.48	4.80
Transport and Communication	-4.93	2.70	8.03
Financial and Rent Services	-0.32	0.25	0.57
Personal and Civil Services	-2.32	-1.34	0.99
Tradable Goods[1/]	-3.49	5.14	8.94
Non Tradable Goods[2/]	-7.55	-4.46	3.34
Electricity, Gas and Water	2.15	6.83	4.58

Source: Own estimates based on Banco de Informacion Economica, INEGI.

1/ Tradable goods include Agriculture, Forestry, Fishing, Mining and Manufacturing Industry

2/ Non Tradable goods include the other economic sectors except Electricity, Gas and Water

ANNEX 2. METHODOLOGICAL NOTE

2.1 GINI INDEX

The Gini Index is defined by

$$GI = \frac{2\operatorname{cov}[Y, F(Y)]}{m} \qquad (1)$$

where:

- Y is the distribution of per capita income $Y=(y_1,\ldots, y_n)$, where y_i is the per capita income of individual i, $i=1,\ldots,n$
- m is the mean per capita income
- $F(Y)$ is the cumulative distribution of total per capita income in the sample (i.e. $F(Y)=[f(y_1),\ldots f(y_n)]$ where $f(y_i)$ is equal to the rank of y_i divided by the number of observations (n))[12].

Gini decomposition

Equation (1) can be rewritten and expanded into an expression for the Gini coefficient that captures the "contribution to inequality" of each of the K components of income (see Leibbrandt (1996)).

$$GI = \sum_{k=1}^{K} R_k G_k S_k \qquad (2)$$

where:

- S_k is the share of source k of income in total group income (i.e. $S_k=m_k/m$)
- G_k is the Gini coefficient measuring the inequality in the distribution of income component k within the group
- R_k is the Gini correlation of income from source k with total income[13].

The larger the product of these three components, the grater the contribution of income from source k to total inequality.

[12] Both the covariance and cumulative distribution are computed using the household weights

[13] R_k is defined as: $R_k = \frac{\operatorname{cov}[Y_k, F(Y)]}{\operatorname{cov}[Y_k, F(Y_k)]}$

2.2 THEIL T INDEX[14]

This index was calculated as follows[15]:

$$T = \left(\frac{1}{n}\right)\sum_{i=1}^{n}\left(\frac{Y_i}{\overline{Y}}\right)\ln\left(\frac{Y_i}{\overline{Y}}\right) \qquad (3)$$

where:

Y_i	is the income of the *i*-th individual
$\overline{Y}$	is the average income
n	is the population size.

Static Decomposition of the Theil Index

If the population is divided into G groups with n_g observations each, it is then possible to write (3) as:

$$T = \sum_{g=1}^{G}\left(\frac{1}{n}\right)\sum_{i=1}^{n_g}\left(\frac{Y_{ig}}{\overline{Y}}\right)\ln\left(\frac{Y_{ig}}{\overline{Y}}\right) \qquad (4)$$

where:

Y_{ig} is the income of the *i*-th individual of the *g*-th population subgroup.

If we now define $b_g = n_g / n$ and $Z_g = \overline{Y}_g / k$ where $\overline{Y}_g$ is the average income of the *g-th* group and *k* is a reference income, it is possible to show, after some algebraic manipulation, that *T* can be expressed as:

$$T = \left(\frac{1}{k}\right)\sum_{g=1}^{G} b_g\, Z_g \ln Z_g - \ln k + \left(\frac{1}{k}\right)\sum_{g=1}^{G} b_g\, Z_g\, T_g \qquad (5)$$

where:

k=Ó$b_g Z_g$

T_g is the Theil index for the *g*-th group.

The first two terms on the right hand side of (5) correspond to the between group inequality, and the third one to the within group inequality.

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[14] Theil's T is sensitive to changes at the bottom and the top tail of the distribution.

[15] The mathematical notation from this part as far as the section 2 follows Ramos (1990).

Choosing the mean income as the reference income, i. e., $Z_g = a_g = \bar{Y}_g \big/ \bar{Y}$, expression (5) simplifies to:

$$T = \sum_{g=1}^{G} a_g \; b_g \ln a_g + \sum_{g=1}^{G} a_g \; b_g \; T_g \qquad (6)$$

The first term in (6) is said to be the between group inequality, and the second term the within group inequality.

Dynamic Decomposition Analysis

By totally differentiating (6), we have:

$$dT = \sum_{g=1}^{G} \frac{\partial T}{\partial b_g} d\, b_g + \sum_{g=1}^{G} \frac{\partial T}{\partial a_g} d\, a_g + \sum_{g=1}^{G} \frac{\partial T}{\partial T_g} d\, T_g \qquad (7)$$

- The first term on the right hand side is the population allocation effect (changes in *T* caused exclusively by population shifts);
- The second term is the income effect (changes in *T* induced exclusively by changes in standardized mean incomes), and;
- The third one is the internal effect (changes in *T* caused by changes in internal dispersion).

It can be shown that:

$$\frac{\partial T}{\partial b_g} = a_g \ln a_g - a_g \sum_{g=1}^{G} a_g \; b_g \; (1 + \ln a_g) + a_g \; T_g - a_g \sum_{g=1}^{G} a_g \; b_g \; T_g \qquad (8)$$

$$\frac{\partial T}{\partial a_g} = b_g (1 + \ln a_g) - b_g \sum_{g=1}^{G} a_g \; b_g \; (1 + \ln a_g) + b_g \; T_g - b_g \sum_{g=1}^{G} a_g \; b_g \; T_g \qquad (9)$$

$$\frac{\partial T}{\partial T_g} = a_g \; b_g \qquad (10)$$

Replacing (8), (9), and (10) into (7) and simplifying we obtain

$$dT = \sum_{g=1}^{G} a_g \left(\ln a_g + T_g - T - 1 \right) \, d\, b_g + \sum_{g=1}^{G} b_g \left(\ln a_g + T_g - T \right) \, d\, a_g + \sum_{g=1}^{G} \left(a_g \, b_g \right) d\, T_g \qquad (11)$$

The three terms on the right hand side of (10) correspond to the allocation, income, and internal effects, respectively.

For estimation purposes, equation (11) must be approximated. The convention used in the empirical exercises was to evaluate the expression at the middle points.

2.3 LEVEL, INEQUALITY AND THE INDICATOR OF STEEPNESS OF THE INCOME PROFILES IN EDUCATIONAL LEVEL

Ramos (1990) used three synthetic measures for the indicators m_t (average schooling), i_t (schooling inequality), and s_t (income profile), based directly on the definition of the Theil Index.

The calculations of the principal parameters a_g, b_g, and T_g (see equation 5), could determine the changes in the distribution by level of education (*g* groups in this category). These parameters allow us to analyze the trend in educational income differentials, the distribution of the population in each level of education and the inequality among them.

Three synthetic measures are used to summarize the changes related to education:

m_t is the average level of schooling for the year *t*.

i_t is the degree of inequality in the distribution of education for year *t*.

s_t is the variations in the income ratios associated with education for year *t*.

These measures can be calculated as follows:

$$m_t = \sum_g a_g^* b_g^t$$

$$i_t = \frac{\sum_g a_g^* b_g^t \log(a_g^*)}{\sum_g a_g^* b_g^t} - \log\left(\sum_g a_g^* b_g^t\right)$$

$$s_t = \frac{\sum_g a_g^t b_g^* \log(a_g^t)}{\sum_g a_g^t b_g^*} - \log\left(\sum_g a_g^t b_g^*\right)$$

where:

a_g^* is the standardized income of educational category *g* for the reference year

b_g^t is the fraction of the labor force in the *g*-th educational category in year *t*

b_g^* is the value b_g in the reference year.

s_t can be understood as an indicator of the relative steepness of the income profiles related to education. If one fixes the fraction of the labor force in each educational group, it follows that the steeper the income profile the larger the between group inequality.

i_t corresponds to the Theil T index that would prevail in a population with no inequality within the educational groups, and where the group incomes were proportional to the group average incomes in the base year.

2.4. DECOMPOSITION ANALYSIS METHODS

Fields (1996) decompose total population inequality in a sum of different variables or elements, each being the explanatory variable in the labor earnings function. This will help us to answer two questions: how much income inequality is explained by each right hand side variable in a given point in time? and how much of the difference in inequality between groups or dates is explained by each variable. Notice that this technique assumes that we know the correct specification of the model.

Formally, the above methodology can be written as

$$Y = Z'B$$

where:

$Y = ln\,(W)$ is the vector of the logarithm incomes
$Z = (1, X_1, \ldots, X_J, å)$ is the matrix of explanatory variables and error term
$B = (a\ , ß_1, \ldots, ß_J, 1)'$ is the regression coefficient vector.

Then,

$$s_j = \frac{\operatorname{cov}(b_j Z_j, Y)}{s^2(Y)} = \frac{b_j s\,(Z_j) corr(Z_j, Y)}{s\,(Y)}$$

where:

s_j is the relative factor weight and $\Sigma\, s_j = R^2$ (determination coefficient)

The contribution of factor j to the change in the inequality measure $I(.)$ between time 0 and time 1 is:

$$\Delta_j \left[I(.) \right] = \frac{s'_j\, I'(.) - s_j I(.)}{I'(.) - I(.)}$$

where:

s_j is the relative factor weight for year 0
s'_j is the relative factor weight for year 1.

Fields also proposes a break down of the change in factor's contribution into the following: the change in the coefficient of the factor or variable, the change of the standard deviation of the variable and the change in the correlation between the variable and labor earnings.

Bourguignon et al. (1998) carried out a decomposition of the effects of changes in an entire distribution, rather than on a scalar summary statistic. This methodology was proposed originally by Almeida dos Reis and Paes de Barros (1991) and Juhn, Murphy and Pierce (1993) and later generalized by Bourguignon et al.

The methodology, by means of micro simulations, decomposes the changes in income distribution into different effects. Bouillon, et. al. (1998) used this technique in the case of Mexico decomposing the change into the return effect, the population effect, the error term effect and the residual effect.

This can be expressed as follows, let $D(y)=D(ß, X, e)$ be the income distribution measure and define:

$y=Xß + e$,

where:

X is the set of demographic variables,

$ß$ is the set of prices and

e the error terms.

If y is the income in year 0 and y' in year 1, it can be show that the change in income distribution can be expressed as:

$D = D(y')- D(y) = ß(X', e') + X(ß, e) + e(ß', X') + \{e(ß, X') -e (ß', X')\}$

where:

$ß(X', e') = D(ß', X', e') - D(ß, X', e')$	is the return effect
$X(ß, e) = D(ß, X', e) - D(ß, X, e)$	is the population effect
$e(ß', X') = D(ß', X', e') - D(ß', X', e)$	is the error term effect
$\{e(ß, X') -e (ß', X')\}$	is the residual effect

Notice that the analysis makes the following assumptions:

- Income is correctly expressed as a linear combination;
- In order to compute $D(ß, X', e)$ the residuals in the second year are re-scaled to the second year of reference by a constant such that the variance in that year is the same as the variance of the residuals in the first year. This in turn implies the assumption that the distribution of *e y e'* just differs by the variance.

Cesar Bouillon, Arianna Legovini and Nora Lustig (1999) and Cesar Bouillon, Arianna Legovini and Nora Lustig (1998) used this methodology. In these documents, although the assumption of unchangeable dispersions, of the regression error terms, does not significantly restrict the model's results, it is questionable to use the variance instead of a proper inequality index. That means that one measure for the within inequality is used and other for the between inequality.

Miguel Székely (1995), in order to explain the inequality changes between two points in time applied the following formula:

$$C_B(p) = \frac{T'_B(p) - T_B(p)}{T' - T}$$

where:

p	is the partition or division of the population
$T'_B(p)$	is the Theil index between group in year *1*
$T_B(p)$	is the Theil index between group in year *0*
$C_B(p)$	is the percentage of the change in inequality explained by the variables in p
T'	is the Theil index in year *1*
T	is the Theil index in year *0*.

It is important to note that this methodology does not allow us to separate the income from the allocation effect.

ANNEX 3. EVOLUTION OF INEQUALITY

Table A3.1. Decomposition of Total Current Income

Income Source	**Gini coeficient by income source**	**Share in Total income**	**Gini correlation with total income rakings**	**Contribution to Gini coefficient of total income**	**Percentage share in overall Gini**
1984					
Labor Earnings	0.6428	0.4688	0.7249	0.2184	46.0
Monetary income excluding labor earnings	0.7568	0.3191	0.6470	0.1562	32.9
No monetary current income	0.6067	0.2120	0.7750	0.0997	21.0
Total	0.4744	1.0000	1.0000	0.4744	100.0
1989					
Labor earnings	0.6128	0.4635	0.7562	0.2148	41.0
Monetary income excluding labor earnings	0.8185	0.3109	0.7410	0.1886	36.0
No monetary current income	0.6541	0.2256	0.8187	0.1208	23.0
Total	0.5242	1.0000	1.0000	0.5242	100.0
1992					
Labor earnings	0.6440	0.4541	0.7790	0.2278	42.9
Monetary income excluding labor earnings	0.8129	0.2848	0.7316	0.1694	31.9
No monetary current income	0.6079	0.2611	0.8449	0.1341	25.2
Total	0.5313	1.0000	1.0000	0.5313	100.0
1994					
Labor earnings	0.6690	0.4932	0.8123	0.2680	50.2
Monetary income excluding labor earnings	0.7948	0.2550	0.6827	0.1384	25.9
No monetary current income	0.6051	0.2518	0.8365	0.1274	23.9
Total	0.5338	1.0000	1.0000	0.5338	100.0
1996					
Labor earnings	0.6514	0.4725	0.7870	0.2422	46.7
Monetary income excluding labor earnings	0.7924	0.2802	0.6884	0.1529	29.4
No monetary current income	0.6026	0.2472	0.8325	0.1240	23.9
Total	0.5192	1.0000	1.0000	0.5192	100.0

Source: Own estimates based on ENIGH

ANNEX 4. DECOMPOSITION RESULTS USING ENIGH DATA

Table A4.1 General Statistics for the Static Decomposition[1/]

	1984		1989		1992		1994		1996	
	Between	**Within**	**Between**	**Within**	**Between**	**Within**	**Between**	**Within**	**Between**	**Within**
Education[2/]										
Primary Incomplete	-0.10	0.07	-0.07	0.04	-0.08	0.06	-0.08	0.03	-0.07	0.03
Primary Complete	-0.03	0.08	-0.06	0.09	-0.08	0.05	-0.08	0.05	-0.07	0.04
L-Secondary Complete	0.04	0.05	-0.02	0.08	-0.02	0.08	-0.04	0.09	-0.04	0.08
U-Secondary Complete	0.07	0.04	0.07	0.07	0.10	0.08	0.09	0.08	0.09	0.08
University Complete	0.11	0.04	0.20	0.11	0.24	0.09	0.30	0.11	0.26	0.11
Total	**0.08**	**0.28**	**0.12**	**0.39**	**0.16**	**0.36**	**0.20**	**0.36**	**0.17**	**0.35**
Position in Occupation[2/]										
Employee	0.01	0.25	-0.05	0.32	-0.03	0.33	0.00	0.41	0.00	0.36
Employer	0.05	0.04	0.08	0.08	0.13	0.10	0.06	0.06	0.07	0.08
Self-employer	-0.03	0.05	-0.01	0.09	-0.04	0.04	-0.04	0.06	-0.04	0.04
Total	**0.02**	**0.34**	**0.03**	**0.48**	**0.06**	**0.46**	**0.02**	**0.53**	**0.03**	**0.48**
Sector[2/]										
Agriculture	-0.03	0.05	-0.02	0.02	-0.01	0.06	-0.02	0.02	-0.01	0.04
Manufacturing	0.00	0.06	-0.03	0.08	-0.01	0.11	-0.03	0.09	-0.02	0.09
Construction	-0.01	0.02	-0.01	0.07	-0.02	0.03	-0.02	0.03	-0.02	0.04
Commerce	0.01	0.07	0.02	0.12	-0.01	0.09	-0.02	0.08	-0.02	0.08
Services	0.02	0.10	0.03	0.17	0.04	0.17	0.09	0.23	0.06	0.19
Others	0.03	0.04	0.02	0.04	0.03	0.05	0.04	0.07	0.03	0.06
Total	**0.01**	**0.35**	**0.01**	**0.50**	**0.01**	**0.51**	**0.03**	**0.52**	**0.01**	**0.50**

Source: Own estimates based on ENIGH

1/ Labor force was limited to individuals who are: i) working as employee, employer or self employed; ii) between 12 and 65 years old; iii) living in urban areas; iv) working 20 hours or more per week; v) with positive income; vi) having the attributes of interest defined.

2/ Annex 1 presents how the groups categories are defined

ANNEX 5. INTERNATIONAL COMPARISONS

Table A5. 1. Ratio of Income Share of the Highest 10 Percent to the Lowest 40 Percent Household Income Distribution

Low Income Countries[1/]		High Income Countries[1/]		Latin American Countries[2/]	
China	1.6	Australia	1.7	Argentina	2.8
Egypt	1.3	Belgium	1.0	Bolivia	3.6
India	1.4	Canada	1.4	Brazil	5.6
Ivory Coast	1.6	France	2.1	Chile	4.4
Kenya	4.7	Germany	1.3	Costa Rica	2.5
Madagascar	2.2	Italy	1.4	Ecuador	4.9
Nigeria	2.4	Japan	1.0	El Salvador	3.5
Pakistan	1.2	New Zealand	1.8	Mexico	4.4
Sri Lanka	1.1	Spain	1.0	Panama	4.9
Tanzania	1.7	Sweden	1.0	Paraguay	5.7
Uganda	2.0	Switzerland	1.8	Peru	2.6
Vietnam	1.5	United Kingdom	1.9	Uruguay	2.2
Zimbabwe	4.6	United States	1.6	Venezuela	2.7

Sources: [1/] World Development Report (1996).
[2/] IDB (1998).

Table A5.2 Contribution of Education to Income Inequality. International Comparison

Country	Author(s)	Period	Gross Contribution (%)
Latin America	Altimir and Piñera (1982)	1966/74	17-38
Argentina	Fiszbein (1991)	1974/88	16-24
Brazil	Ramos and Trindade (1992)	1977/89	30-36
	Vieira (1998)	1992/96	30-35
Colombia	Reyes (1988)	1976/86	29-35
	Moreno (1989)	1976/88	26-35
Costa Rica	Psacharapoulos et alt. (1992)	1981/89	23-26
Peru	Rodríguez (1991)	1970/84	21-34
Uruguay	Psacharapoulos et alt. (1992)	1981/89	10-13
Venezuela	Psacharapoulos et alt. (1992)	1981/89	23-26

Table A5.3 Education and Inequality Variation: Brazil, Argentina and Peru

Country	Author(s)	Period	Explanatory Power (%)[1/]	Income Effect (%)
Brazil	Ramos and Trindade (1992)	1977/1989	6-20	10-17
Argentina	Fiszbein (1991)	1974/1988	54-56	38-46
Peru	Rodríguez (1991)	1970/1984	32-47	34-43

[1/] The explanatory power is the income plus the allocation/population effect.

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