

# The Distribution of Mexico's Public Spending on Education

Gladys Lopez-Acevedo (LCSPE) and Angel Salinas (LCC1C)<sup>1</sup>

## Abstract<sup>2</sup>

Research has shown that education in Mexico has played a crucial role in the process of earnings formation and that returns to education have increased only in the higher levels of education and in the upper tail of the conditional earnings distribution. This paper examines the public educational expenditure patterns in the face of possible further increases in earnings inequality. Several benefit-incidence analysis are carried out bringing together two important and unique sources of information *unit cost per student by state and by educational level* as well as data from the households income and expenditures surveys.

Some of the most interesting results are: i) at national level the poorest income groups receive the bulk of primary education subsidy (federal plus state expenditures), while at higher levels of education they receive progressively smaller subsidies. ii) Government's educational expenditure pattern changes across regions. That is, in the North Region primary education is near equality line and regressive for other levels of instruction. In the Central Region, primary schooling lies above the equality line while lower secondary is very close to it. Upper secondary and tertiary instruction benefit the richest income deciles. In the South Region, basic education is very progressive, upper secondary is at the equality line and tertiary education level lies below the 45-degree line. In Mexico City, the cumulative distribution at all levels of education, except for primary, is far below the 45-degree line.

It is also shown that public expenditures at the tertiary level is more regressive than the pattern of household expenditure. A large share of public resources given to this level of education tends to favor non-poor students in urban areas. This paper argues that a strategy to reallocate the education public expenditures from a higher to a lower level of instruction in order to favor the poor groups, would have to involve the development of higher educational credit markets. Meaning that, the government's appropriate role could be to help overcome market failures in the financial sector, which limit the availability of long-term finance for investments in higher education. These failures can be corrected through student loan programs or means-tested financial aid and scholarship programs. These programs are rarely devoid of subsidy components, but they are preferable to a direct, cost-free provision of services because the subsidy is more closely targeted to the source of market failure.

The paper is part of a comprehensive work meant to build a poverty and inequality strategy for Mexico.

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## ***INTRODUCTION***

Research has shown that education has played a crucial role in the process of earnings formation and that the returns to education have increased only in the higher levels of education and in the upper tail of the conditional earnings distribution<sup>3</sup>. In this context, it is essential to analyze the impact of the public educational expenditure on school enrollment, the groups that have been benefited with the public expenditure, and the public expenditure trends. Thus, this paper investigates government's educational expenditure patterns in the face of possible further increases in earnings inequality. In doing so, a benefit-incidence analysis is carried out using unit cost per student by state and by educational level.

This paper is structured as follows: Section 1 presents a short description of the data. Section 2 has a brief review of the educational system in Mexico. Section 3 discusses the two elements of the benefit-incidence analysis: enrollment and educational expenditures in Mexico, also examines the distribution of total subsidies allowance for each state, across the levels of education and income deciles. Section 4 compares the education subsidies by levels of schooling for 1994 and 1996. The last section presents the concluding remarks.

## ***1 DATA***

This paper uses the data from the National Household Income and Expenditures Survey (ENIGH) for 1996. The ENIGH is collected by the *Instituto Nacional de Estadística, Geografía e Informática* (INEGI). This survey is available for 1984, 1989, 1992, 1994 and 1996<sup>4</sup>. Each survey is representative at national level, urban and rural areas. For 1996, the ENIGH is also representative for the states of Mexico, Campeche, Coahuila, Guanajuato, Hidalgo, Jalisco, Oaxaca and Tabasco.

The survey design was stratified, multistage and clustered. The final sampling unit was the household and all the members within the household who were interviewed.<sup>5</sup> In each stage, the selection probability was proportional to the size of the sampling unit. Then, it is necessary to use the weights<sup>6</sup> in order to get suitable estimators. The available information can be grouped in three categories:

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

In addition, data from the Dirección General de Planeación, Programación y Presupuesto (DGPPyP, Ministry of Education) regarding educational government expenditures (Federal plus state) assigned to the different levels of schooling for each state is used in order to calculate the unit costs.

## ***2 PUBLIC EDUCATIONAL SYSTEM***

The structure of Mexico's educational system has the following main characteristics described as follows. First, there is basic education, which is the government's priority. The basic education system consists of: i) early childhood education (or pre-school), which is optional for children 3

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<sup>3</sup> Lopez-Acevedo, Gladys et al.(1999)

<sup>4</sup> The sample in a given year is independent from another.

<sup>5</sup> The sample size for 1996 is as follows: households 14,042 and individuals 64,359.

<sup>6</sup> The weights should be calculated according to the survey design and corresponds to the inverse of the probability inclusion.

to 5 years old and ii) mandatory primary education where the official entry age is 6 and ideally should be completed in 6 years. In fact, due to late enrollment and grade repetition, however, the target population is 6 to 14 years; iii) mandatory lower secondary school consist of a 3-year cycle, and it is intended for children ages 12 to 16. At this level, the structure is divided in two areas: general and vocational/technical. In parallel, the system also includes the *telesecundaria*, a distance education program designed to reach remote areas through the transmission of recorded lessons via television network supported by face to face assistance from tutors.

The next level, following basic education, is middle level education with options available to students who may choose technical schools and upper secondary education. The duration of these programs is 3 years. A high percentage of the students go for *bachillerato* also called upper-secondary which allows them to pursue tertiary instruction. On the other hand, a demand for technical studies has been increasing steadily in recent times. Finally, there is tertiary education. This level of education encompasses three lines of study: a system of federal technological institutes, state and autonomous universities, and teacher-training institutes. There is at least one university for each state, and the large universities have campuses in various cities.

### **3 ENROLLMENT AND PUBLIC EXPENDITURES IN THE BENEFIT INCIDENCE ANALYSIS**

The benefit-incidence methodology, which is applied in this paper, ranks individuals into groups by income deciles. It then draws information on individual public school enrollment by state and decile to tally up numbers of beneficiaries of each group. These numbers are then multiplied by the government's unit cost of provision allowance for each state and educational level. This provides a profile of distribution for a specific category of educational public expenditures throughout the distribution of income or the "benefit incidence". Thus this technique assumes that the benefit derived from education is equal to the government cost of providing this service.

The incidence analysis brings together two sources of information. First, data from income-expenditure surveys (ENIGH) used to construct the deciles. The ENIGH surveys identify the educational level, type of school and total income/expenditure. Second, government expenditures (Federal plus state) on education assigned to the different levels of schooling for each state from the Direccion General de Planeacion, Programacion y Presupuesto, DGPPyP, (Ministry of Education) used for calculating unit costs.

Equity issues are then analyzed using the Lorenz Curves based on the pattern of government subsidies to education received by different population groups, highlighting the results of changes in the use of educational services and changes in government's expenditures for education by levels and by state.<sup>7</sup>

#### **3.1 ENROLLMENT RATES**

As shown in table 1, variability of enrollment between poor and non-poor individuals is not substantial at the primary educational level. However, urban areas show slightly larger primary enrollment rates than in rural areas, which might be explained by higher accessibility and affordability to the private system. Enrollment rates for the educational levels beyond primary and probable lower-secondary levels decrease dramatically, particularly for the extremely poor, thus resulting in an increase in the educational gap between poor and non-poor. Tables 1.A and 2.A in the Annex show enrollment by educational level and types of schools used in the benefit incidence analysis.

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<sup>7</sup> For a review see Dominique Van de Walle and Kimberly Nead (1995).

**Table 1. Total and Public Enrollment Rate by Poverty Status, Location and Level of Education  
1996. INEGI/CEPAL poverty line**

Poverty Status	Urban		Rural		Total	
	All	Public	All	Public	All	Public
<b>Primary (6-11 years old)</b>						
Extreme	93.2	93.2	93.5	93.5	93.3	93.3
Moderate	96.4	96.4	94.6	94.6	96.0	96.0
Non-poor	96.1	95.7	96.4	96.3	96.1	95.7
Total	95.4	95.2	93.9	93.9	94.9	94.7
<b>Lower Secondary (12-14 years old)</b>						
Extreme	49.1	48.9	29.0	28.8	37.9	37.6
Moderate	68.7	68.8	51.0	51.2	64.8	64.9
Non-poor	81.4	81.3	59.5	59.8	79.1	78.8
Total	68.5	67.7	36.8	36.6	58.4	57.4
<b>Upper Secondary (15-17 years old)</b>						
Extreme	23.5	21.4	6.9	5.9	14.5	12.9
Moderate	39.6	36.8	22.2	21.7	36.0	33.5
Non-poor	61.7	54.0	24.5	21.8	58.0	50.1
Total	45.7	39.8	12.8	11.7	36.4	31.2
<b>University (18-24 years old)</b>						
Extreme	3.4	2.9	0.4	0.4	1.8	1.6
Moderate	7.4	7.0	2.3	2.2	6.4	5.9
Non-poor	24.0	17.6	5.9	5.4	22.0	16.1
Total	15.3	11.5	2.0	1.8	12.0	8.9

Source: Own calculations based on ENIGH, 1996

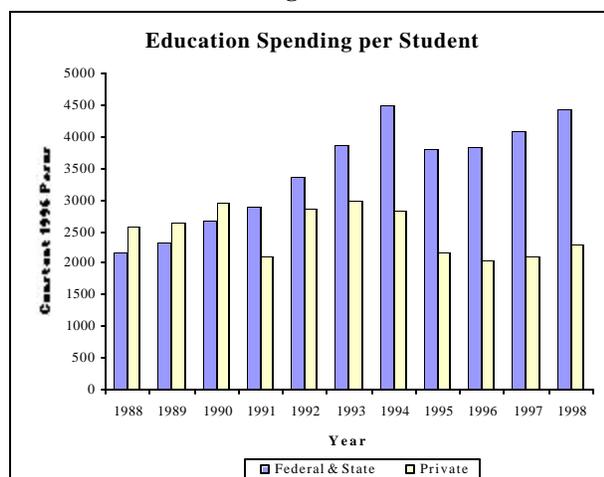
Given that coverage at primary level and the first years of lower secondary is already sizable and decreasing due to demographic factors which cause the population in this group to stagnate and start to shrink at the beginning of the next century.<sup>8</sup> This in turn frees some resources so that coverage may be increased at the upper-secondary level.

### 3.2 PUBLIC EDUCATIONAL EXPENDITURES

Total public educational spending per student in Mexico increased steadily up to 1994 and peaked in 1998, even though the total student population increased from 26 million in 1994 to 28 and a half million in 1998. By 1998, total spending in education increased by 5.2 percent of GDP, less than a full percentage point above the 4.9% of GDP reached in 1995. The federal government currently accounts for close to 80% of total sector spending.

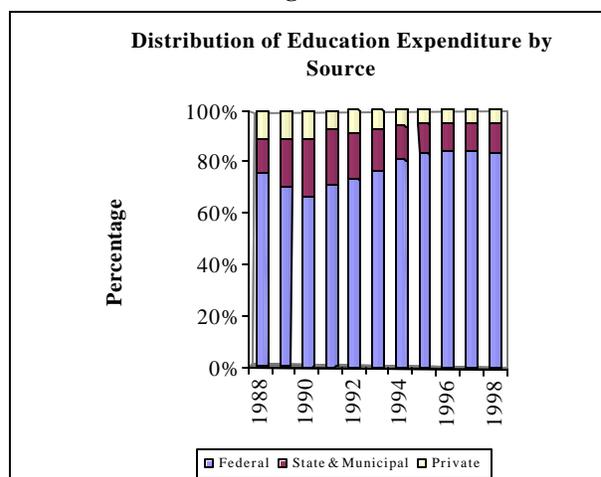
<sup>8</sup> From 1973-1994, there was a change in the population structure: the population ages between one year through 14 dropped 36%, between those 15 and 64 increased 59.8% and the age group over 65 rose 4.2%.

**Figure 1**



Source: IV Informe de Gobierno, 1998

**Figure 2**



Source: IV Informe de Gobierno, 1998

A desegregation of public expenditures in education by instruction level for 1994 and 1996 is shown below. Public expenditures in primary and lower secondary absorb a large proportion (59% in 1996) of federal budgetary resources for formal education services. Yet, public expenditures in upper secondary and tertiary level were 13.7% and 27.3% each respectively. Another observation about the evolution of educational public spending evolution is that it has become more egalitarian in per-capita terms across different schooling categories.<sup>9</sup> In the early 1980s, the amount of federal spending per university student was 10 times the amount spent per primary student. This ratio fell to around 7 times in the early 1990s. Federal spending on the other levels relative to the primary level indicates a similar decline, even though the absolute amounts increased at all levels. In 1996, upper-secondary received 1.5 as much as each primary school student and each university student received five times as much as a primary student, compared to 2.1 and 6.8 in 1994, respectively (tables 2 and 3).

**Table 2. Federal and State Expenditures on Public Education, 1994 (Thousands of current pesos)**

	Primary	Lower Secondary	Upper Secondary	Tertiary
Federal Expenditure	17,947,229	8,603,383	6,610,913	13,141,420
State Expenditure	N/A	N/A	N/A	N/A
Total Expenditure	17,947,229	8,603,383	6,610,913	13,141,420
Enrollment	13,593,797	4,661,522	2,386,758	1,461,189
Subsidy per Student (pesos)	1,320	1,846	2,770	8,994
Primary Student equivalence	1.00	1.40	2.10	6.81

Sources: ENIGH 94 and DGPPyP (1999), SEP

**Table 3. Federal and State Expenditures on Public Education, 1996 (Thousands of current pesos)**

	Primary	Lower Secondary	Upper Secondary	Tertiary
Federal Expenditure	33,328,323	13,394,898	10,884,850	21,651,986
State Expenditure	8,920,249	4,747,407	1,869,710	2,210,962
Total Expenditure	42,248,572	18,142,304	12,754,560	23,862,948
Enrollment	13,802,395	4,972,116	2,767,993	1,459,820
Subsidy per Student (pesos)	3,061	3,649	4,608	16,347
Primary Student equivalence	1.00	1.19	1.51	5.34

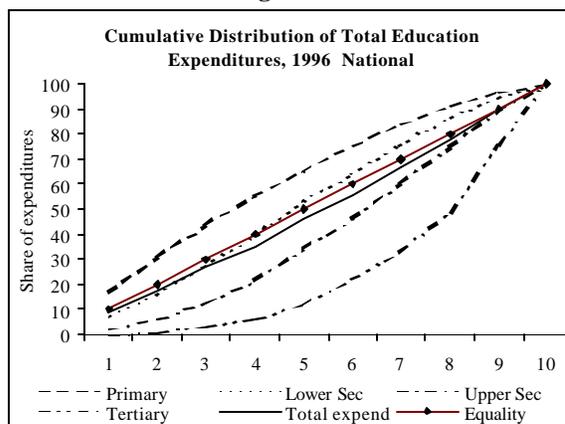
<sup>9</sup> IV Informe de Gobierno, 1998.

### 3.3 BENEFIT INCIDENCE ANALYSIS

Next, a comparison was made between the cumulative distribution of the various education sub-sectors and the distribution of per capita annual total and federal public educational expenditures. Before said, in order to derive the cumulative distribution for various educational levels, individual public school enrollment by state and decile is multiplied by the government's unit cost of provision allowance for each state. This is also done subsequently by region and state.

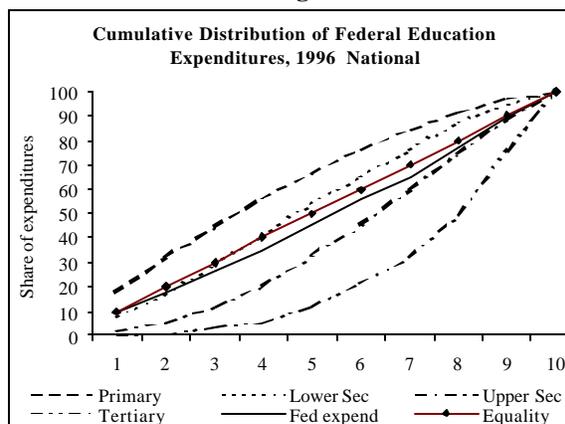
Figures 3 and 4 show the cumulative distribution *by total and federal educational expenditures* for all of Mexico. One of the main messages is that the poorest income/expenditures deciles receive the bulk of the primary education subsidy. This same group, at higher levels of education receives progressively smaller subsidies. This indicates that primary education is very progressive and lower-secondary education is basically neutral. Upper-secondary schooling, benefits the middle and upper classes. Finally, the tertiary level is strongly regressive in that it mainly benefits the richest deciles. At national level, public expenditures seem quite equal, as shown by the fact that the expenditure line lies very close to the 45 degree diagonal.

Figure 3



Source: ENIGH 96 and DGPPyP, SEP

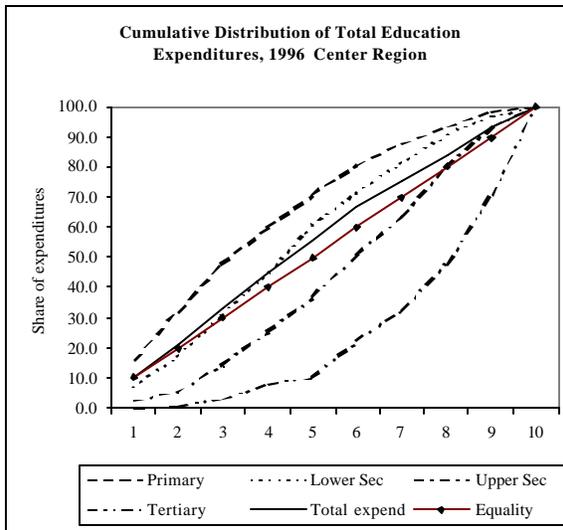
Figure 4



Source: ENIGH 96 and DGPPyP, SEP

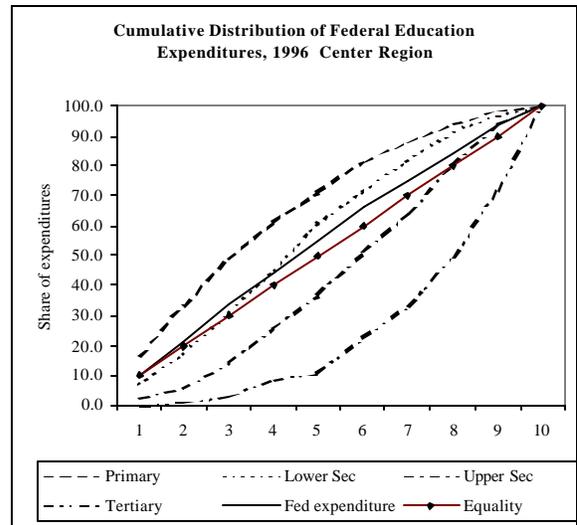
When desegregated by region, see figures 5 and 6, it becomes evident that the educational inequality in the Central Region of Mexico leads the national pattern. Still, in the Central Region, the curve for total and federal schooling expenditures lies above the equality line. This implies that on average total schooling expenditures for that region are more uniformly distributed than the national pattern.

**Figure 5**



Source: ENIGH 96 and DGPPyP, SEP

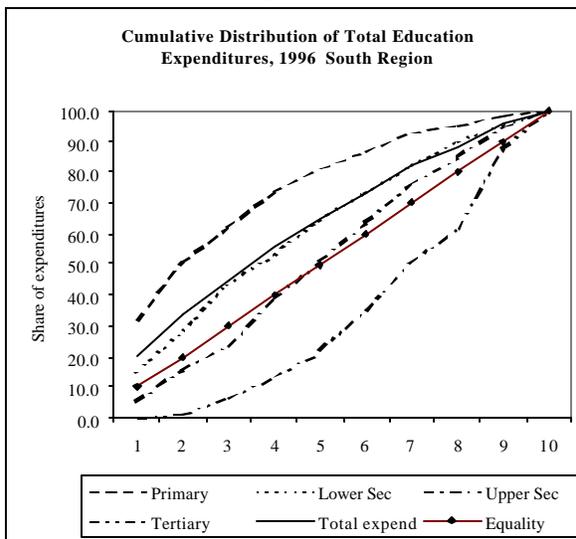
**Figure 6**



Source: ENIGH 96 and DGPPyP, SEP

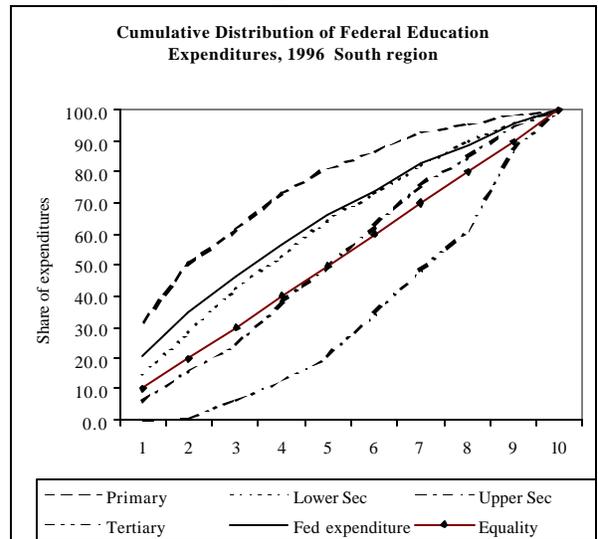
The distribution of the average subsidy in the South Region and Tabasco State lies above the average distribution for the North Region (figures 7 through 10). One plausible explanation is the higher concentration of the enrollment in the lower deciles (mainly in primary) in the South Region and Tabasco compared to the concentration in the North, where the students are in the medium and top deciles. In the South, public enrollment is highly progressive particularly for primary school, as shown by the fact that public school enrollment is above and far from the 45-degree diagonal. It should also be mentioned that public education spending in upper-secondary in Tabasco is basically neutral at high level of income, while progressive at the bottom of the distribution.

**Figure 7**



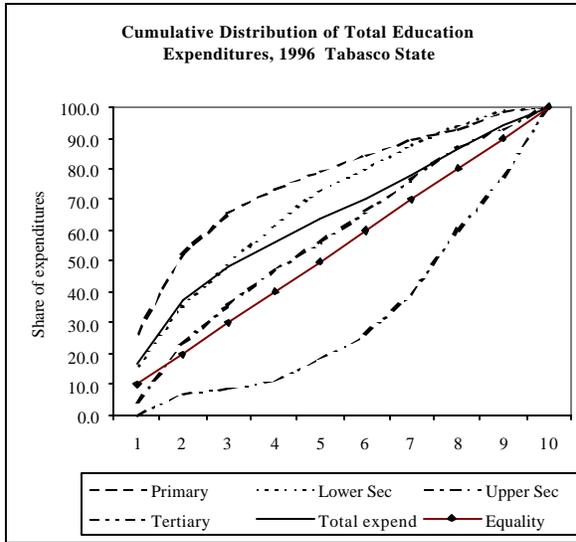
Source: ENIGH 96 and DGPPyP, SEP

**Figure 8**



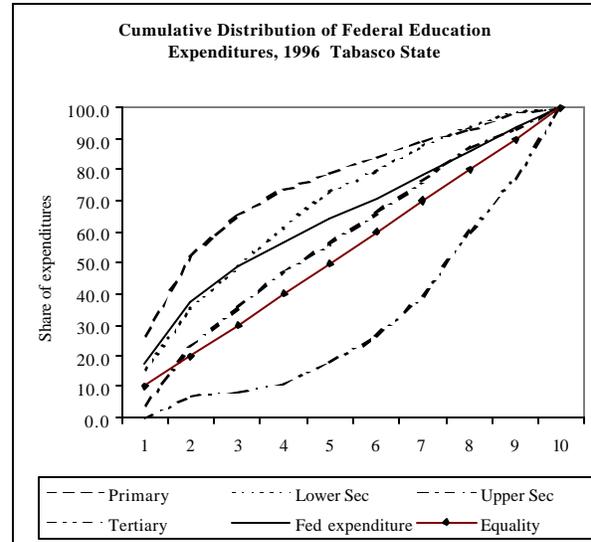
Source: ENIGH 96 and DGPPyP, SEP

**Figure 9**



Source: ENIGH 96 and DGPPyP, SEP

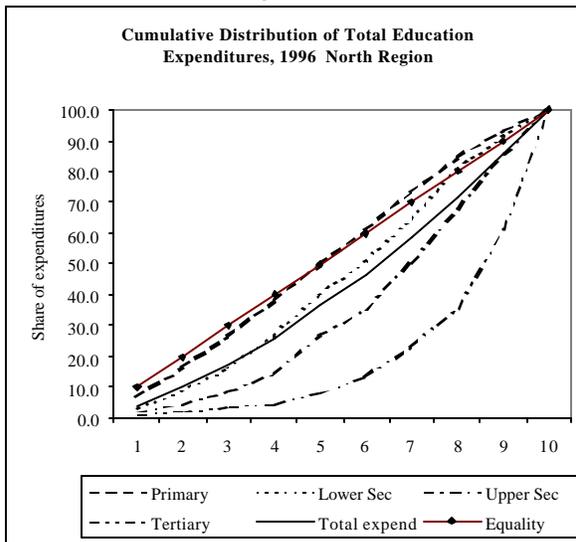
**Figure 10**



Source: ENIGH 96 and DGPPyP, SEP

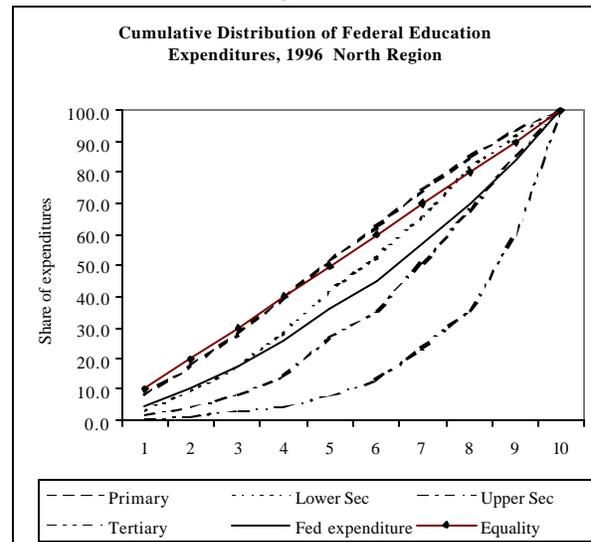
In the North Region (figures 11 and 12), the cumulative distribution of educational subsidy lies below the 45 degree diagonal, except for primary schooling, which is near the equality line. In general, this can be explained by both larger populations in the medium and top deciles and higher enrollment rates in higher levels, which probably reflect higher incomes in the North Region and easier access to schools.

**Figure 11**



Source: ENIGH 96 and DGPPyP, SEP

**Figure 12**

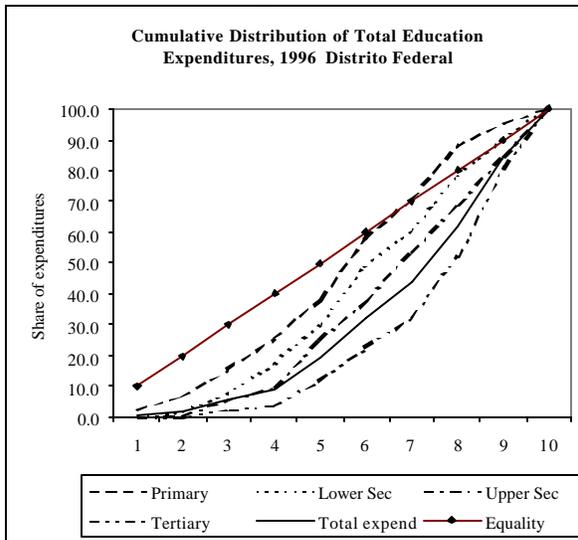


Source: ENIGH 96 and DGPPyP, SEP

The distribution of per capita public expenditures in Mexico City (figures 13 and 14) is far below the 45 degree diagonal indicating that it is very regressive. Public expenditures in primary level are progressive for the high-income deciles, in that the primary curve lies above the 45 degree axis and it is much more progressive than the distribution of per capita expenditures, reflecting the fact that fewer higher income children attend public primary schools. Spending at

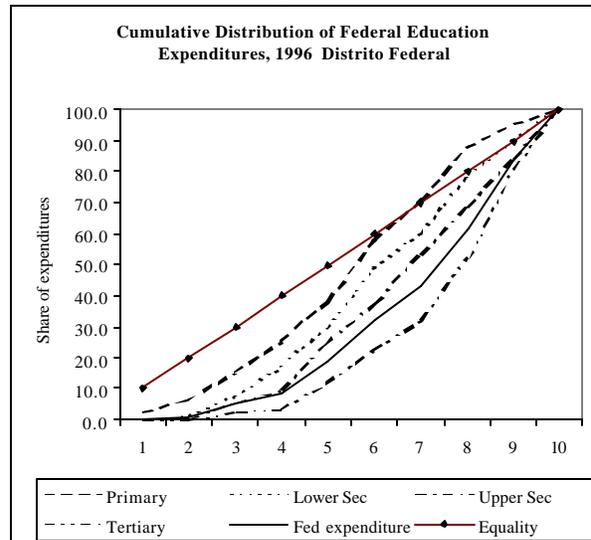
the lower and upper secondary level is more progressive than the public expenditures, although the curves still lie below the 45 degree diagonal. Only university instruction is more regressive than the average distribution of total expenditures. Interestingly, public expenditures in education in Nuevo Leon (see figures 15 and 16) are far below the 45-degree diagonal following a pattern similar to Mexico City.

**Figure 13**



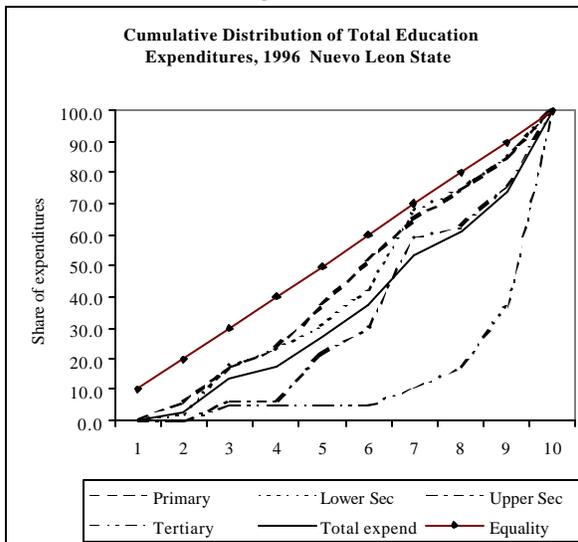
Source: ENIGH 96 and DGPPyP, SEP

**Figure 14**



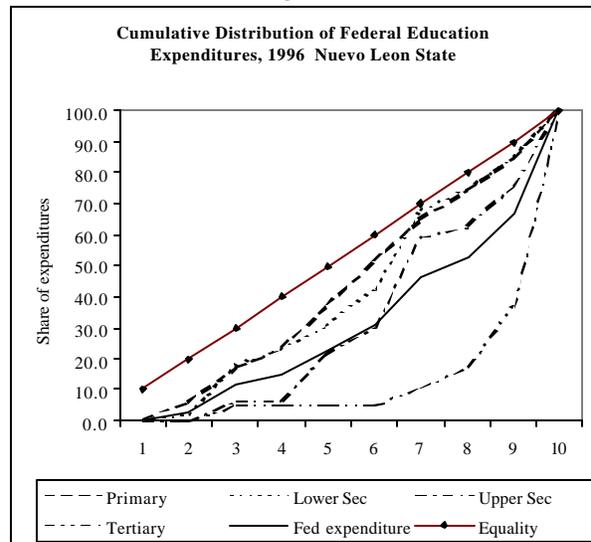
Source: ENIGH 96 and DGPPyP, SEP

**Figure 15**



Source: ENIGH 96 and DGPPyP, SEP

**Figure 16**



Source: ENIGH 96 and DGPPyP, SEP

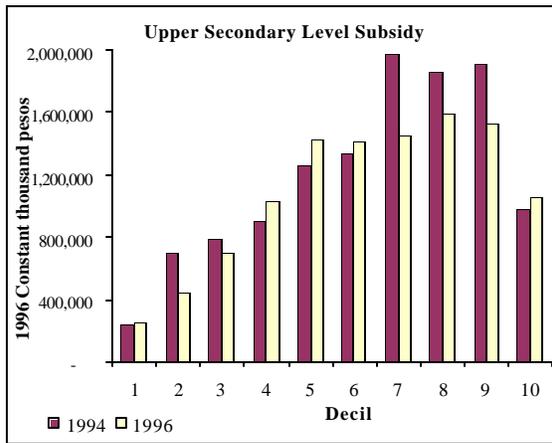
The evidence presented suggests that public subsidies for education, particularly at the tertiary level, are regressive. A large share of public resources is given to the high-income level students. A strategy to reallocate public expenditures from tertiary to secondary level in order to favor the poor would involve a comprehensive agenda that would meet the challenges posed in upper-secondary level such as financing and quality of education.

**4 COMPARISON OF THE FEDERAL SUBSIDY DISTRIBUTION FOR 1994 AND 1996**

This section compares the year 1994 and 1996 to assess a change over time in the targeting of education spending. Figures 17 through 20 show the subsidy received by students in each income decile for all levels of education in 1994 and 1996. As indicated, the subsidy in primary level increased from 1994 through 1996. Such increment was slightly higher for the bottom income decile as compared to the top deciles. In contrast, subsidies decreased from 1994 to 1996 for the lower secondary level. Such reduction had a higher impact on deciles 6 through 9. For upper secondary educational level, per capita subsidies decreased on average by 200,000 thousand pesos for students in deciles 7 through 9. Finally, the tertiary level also experimented a reduction of approximately 1,000,000 thousand pesos in the ninth decile.

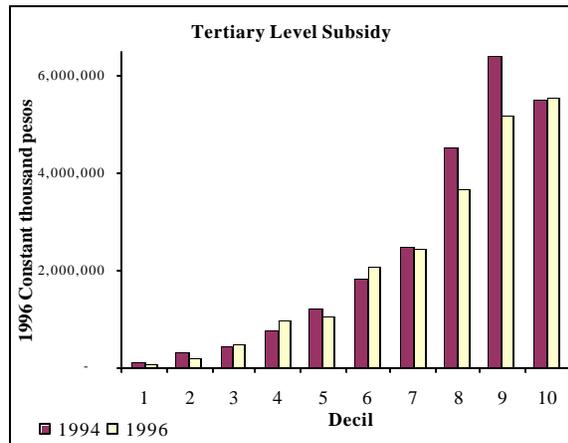
In both years, the pattern is progressive for the primary level, as it was found in the previous section, meaning that the subsidy is higher for the poor. On the other hand, the subsidy for upper secondary and tertiary levels is still regressive, benefiting mainly the non-poor, although, the distribution of subsidy has become more egalitarian in 1996 compared to 1994. For lower secondary educational level, the middle income groups receive most of the subsidy.

**Figure 17**



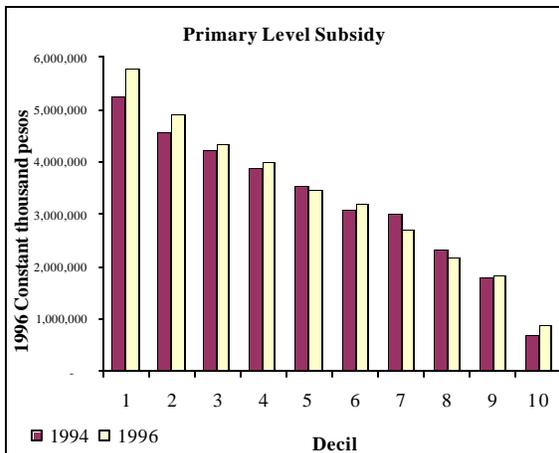
Source: ENIGH 96 and DGPPyP, SEP

**Figure 18**



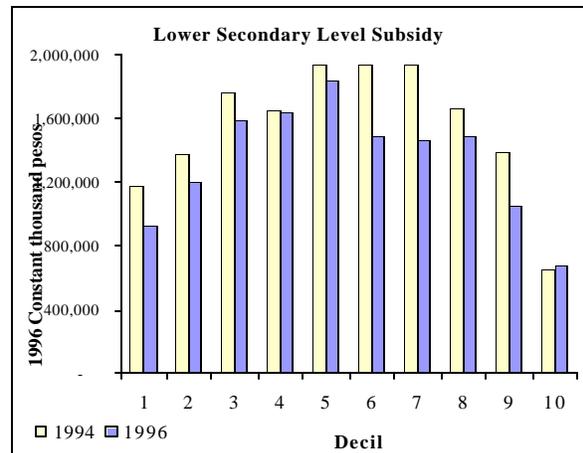
Source: ENIGH 96 and DGPPyP, SEP

**Figure 19**



Source: ENIGH 96 and DGPPyP, SEP

**Figure 20**



Source: ENIGH 96 and DGPPyP, SEP

## 5. CONCLUSIONS

Enrollment rates for the educational levels beyond primary and probable lower-secondary levels decrease dramatically, particularly for the extremely poor, thus resulting in an increase in the educational gap between poor and non-poor. Given that coverage at primary level and the first years of lower secondary is already sizable and that demographic pressure is decreasing, the population of this group is virtually stagnated and will start to shrink at the beginning of the next century. This in turn frees some public resources, which can eventually be used to increase coverage at the upper-secondary level.

Government spending per student steadily increases until 1994 and stays the same until 1995, peaking again in 1998. On the other hand, after 1994, government spending per student becomes better distributed. Nevertheless, government spending still favors tertiary education. Spending on education continues to be concentrated in the federal sector, which accounts for over 80 percent of total sector spending.

Another noteworthy observation about the evolution of public spending on education in Mexico is that it has become a little bit more egalitarian in per-capita terms across different schooling categories. By moving towards a more evenly distribution of per capita spending across different levels, equity seems to have improved. At the same time, the external environment changed in a manner that raised the relative return to higher education, thereby tending to make more efficient what had initially been an inefficient allocation of resources.

With respect to the public educational expenditures by income strata, the results indicate that at national level the poorest income groups receive the bulk of primary education subsidy (federal plus state expenditures). This same group, at higher levels of education receives progressively smaller subsidies and the pattern changes across regions. In the North Region, primary education is near equality line and regressive for other levels of instruction. In the Central Region, primary schooling lies above the equality line while lower secondary is very close to it. Upper secondary and tertiary instruction benefit the richest income deciles. In the South Region, basic education is very progressive, upper secondary is at the equality line and tertiary education level lies below the 45 degree line. In Mexico City, the cumulative distribution at all levels of education, except primary, is far below the 45-degree diagonal.

At national level, public subsidy for primary education slightly increases from 1994 through 1996. By contrast, subsidies for all other levels of education decreased. The pattern of primary subsidy for both years is progressive meaning that the subsidy is higher for the poor. On the other hand, subsidies for tertiary education are regressive, benefiting primarily the non-poor. Overall, the distribution is slightly more egalitarian in 1996 than in 1994. Federal educational expenditures on upper secondary level tend to be regressive. In 1994, the pattern was more regressive than in 1996. For lower secondary, the middle income groups receive the bulk of the subsidy. The public educational system can improve its targeting to the poor by increasing its focus on the secondary (lower and upper) levels versus university levels.

Public expenditure at the tertiary level is more regressive than the pattern of household expenditure. A large share of public resources given to this level of education tends to favor non-poor students in urban areas. A strategy to reallocate the educational public expenditures from a higher to a lower level of instruction in order to favor the poor groups, would have to involve the development of higher educational credit markets. Meaning that, the government's appropriate role could be to help overcome market failures in the financial sector, which limit the availability of long-term finance for investments in higher education. These failures can be corrected through student loan programs, or means-tested financial aid and scholarship programs. These programs are rarely devoid of subsidy components, but they are preferable to a direct, cost-free provision of services because the subsidy is more closely targeted to the source of market failure.

## ANNEX

**Table 1.A Enrollments by type of school, 1994**

<b>Education level</b>	<b>Public</b>	<b>Private</b>	<b>Others</b>	<b>Total</b>
Primary	13,593,797	895,913	40,689	14,530,399
Lower Secondary	4,661,522	388,806	12,004	5,062,332
Upper Secondary	2,386,758	778,587	49,385	3,214,730
Tertiary	1,461,189	530,754	1,503	1,993,446

Source: ENIGH 94

**Table 2.A Enrollments by type of school, 1996**

	<b>Public</b>	<b>Private</b>	<b>Others</b>	<b>Total</b>
Primary	13,802,395	768,748	1,746	14,572,889
Lower Secondary	4,972,116	326,229	4,153	5,302,498
Upper Secondary	2,767,993	875,129	15,782	3,658,904
Tertiary	1,459,820	580,962	7,680	2,048,462

Source: ENIGH 96

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