

KEYWORDS

Education
Income
Economic development
Comparative analysis
Men
Women
Urban areas
Rural areas
Household surveys
Educational indicators
Mexico

The economic returns to education in Mexico: a comparison between urban and rural areas

Juan Luis Ordaz-Díaz

This study uses the Mincer equation to calculate the private economic returns to education in urban and rural areas of Mexico in the 1994-2005 period. The findings indicate that investing in education is profitable in both types of area. Returns to education were found to be greater in the countryside than in cities in most of the years analysed and at every level of education. Education in rural areas tends to be more profitable for women at the basic education levels and for men at the higher levels. In urban areas, education proved to be more profitable for men at the primary and higher levels and, in some years, for women at the lower and upper secondary levels.

Juan Luis Ordaz-Díaz
Agricultural Development Unit
ECLAC Subregional Headquarters
in Mexico
Lecturer, Faculty of Economics,
National Autonomous University
of Mexico
✉ juanluis.ordaz@cepal.org

I

Introduction

From a variety of theoretical standpoints, the accumulation of human capital is regarded as essential to economic and social progress. Although a number of factors – families, schools, businesses and so on – contribute to its formation, the debate about human capital generally centres on education as the main producer of capabilities (Carneiro, Hansen and Heckman, 2003).

Much of the theoretical debate on the role of education in economic growth and development is about whether education is economically productive. There is abundant evidence that the education levels of the population are closely correlated with economic development, but there is still disagreement as to whether education has contributed to economic development or whether the causality works the other way. On this point, human capital theory postulates that time spent both at school and at work directly increases workers' productivity and, consequently, their pay (Weiss, 1995). It is thus to education that the development and creation of skills and capabilities, translating into higher earnings in the market, are to be attributed.

If education is economically profitable, it ought to be an essential element in public policy design; consequently, it is important to know what benefits arise when individuals receive more years of education. One useful way of finding this out is to determine the economic returns to education, usually measured as the increase in earnings resulting from each additional year's schooling or the attainment of a certain educational level.¹ From the individual's point of view, these economic returns provide a measure of how much it is worth investing in additional schooling. From society's point of view, they can be an indicator of the relative scarcity of people with different education levels, and thus a guide to education policy.

The specialist literature includes a variety of studies that have set out to measure the economic returns to education in different countries. The most common procedure has been to estimate the Mincer (1974) equation by the ordinary least squares (OLS) method. This equation establishes a ratio between the log of individual earnings and years of education, work experience and the square of that experience. The years of education coefficient is interpreted as the economic return to an extra year's schooling.

Some studies have analysed the problems that can arise in seeking to identify what proportion of educated people's earnings is due to education and what proportion to their innate abilities, learning within the family or unobserved variables. There has been speculation that the OLS method might be underestimating returns, and alternative methodologies have accordingly been proposed (Griliches, 1977). The instrumental variables method has been among those most used, the difficulty here lying in the choice of instrument.

According to Carneiro and Heckman (2002), the instruments commonly used in the literature on education are invalid, as they are correlated with omitted abilities. Studies by Carneiro, Heckman and Vytlačil (2001) and Heckman and Li (2004) have shown that estimates of the economic return to education may be skewed because some individuals may choose (self-selection) not to participate in the labour market.² Methodologies have accordingly been proposed to correct possible biases in the estimates using parametric methods (such as Heckman's two-stage method) or semiparametric ones, in which a counterfactual structure is introduced and average treatment effects are calculated.

In Mexico, some studies have concentrated on calculating the economic returns to education,³ but

□ The author is grateful for the valuable comments of Braulio Serna Hidalgo, Juan Carlos Moreno, Gerardo Esquivel and an anonymous referee.

¹ The economic return is the percentage gain or loss on an investment, which means that the costs of the investment need to be considered for this to be calculated. In the case of the economic return to education, these costs are the earnings forfeited by studying.

² For some people, participation in the labour market is not aleatory and they choose not to participate in that market (they self-select) on the basis of the wage they expect. Thus, some non-working individuals may have chosen not to work because their market wage is below their reserve wage.

³ Examples are those of Carney (1967), Bracho and Zamudio (1994), Zamudio (1995), Rojas, Angulo and Velásquez (2000), Barceinas (2001), Sarimaña (2002), López-Acevedo (2004) and Rodríguez-Oreggia (2004).

most do not distinguish between urban and rural areas, even though the characteristics of the two are very different, and only examine developments over one or two years. One of the few studies that have sought to measure economic returns to education in rural areas of Mexico is that of Taylor and Yúnez-Naude (2000), who find that these returns manifest themselves as increased rural earnings in traditional farming activities, irrespective of the educational level; however, they do not observe positive effects on non-agricultural family income.

Rural areas are interesting to analyse, as they are highly disadvantaged in terms of poverty, inequality and low incomes. For policy purposes, it is important to know whether the economic returns to education differ between city and countryside. If they were higher in cities, the effect of educational investment (other things being equal) would be to heighten the inequality between the two. Conversely, if economic returns were higher in the countryside, education would be reducing inequality, making greater investment in it desirable. In a number of

studies, ECLAC has shown evidence that human capital formation has a decisive influence on labour productivity and thus on rural earnings and poverty reduction, as well as the overall well-being of the population (ECLAC/UNESCO, 1992; ECLAC, 2006).

The present study aims to shed some light on the matter, to which end it calculates the economic returns to Mexican education both in the countryside and in urban areas for the years 1994, 1996, 1998, 2000, 2002, 2004 and 2005. The data used come from the National Household Income and Expenditure Survey (ENIGH). To calculate these economic returns (hereinafter simply “returns”), Heckman’s two-stage method is used to estimate regressions corrected for self-selection.

The remainder of the article is structured as follows. Section II describes some aspects of the current situation of education in Mexico and conducts a comparison between urban and rural areas, and between Mexico and other countries. Section III describes the data used. Section IV presents calculations of education returns in Mexico. Lastly, section V sets forth the conclusions.

II

The current situation of education in Mexico

This section examines some aspects of the current state of education in Mexico; first rural and urban areas are compared, then Mexico is compared with other countries.

1. Comparison between rural and urban areas

In 1950, Mexico was a predominantly rural country. Since 1960 the urban population has been larger than the rural one, but the latter remains very substantial, representing 23.5% of the total population in 2005.

In general, the rural population tends to have lower education levels and receive a lower-quality education. In 2005, the urban illiteracy rate was 6.7%, while rural illiteracy was still almost double the 1994 urban rate. The situation was particularly serious in the case of women. Despite some progress, the female illiteracy rate in 2005 was still a very considerable 18.3% (table 1).

Rural areas also come off worse in terms of years of schooling. In 2005, the average time spent in education by rural residents was still less than the

national and urban figures for 1994. Once again, rural women were the most disadvantaged (table 2).

Given that by 2005 rural residents still fell short of the education level achieved in urban areas over a decade earlier, the education gap between urban and rural areas is probably somewhere in the region of 10 years. This indicates a need to accelerate education measures in the Mexican countryside.

TABLE 1

Mexico: illiteracy among the population aged 6 and over, 1994-2005
(Percentages)

	1994	2000	2005
National total	12.5	10.6	8.9
Urban areas	8.5	6.9	6.7
Rural areas	23.5	21.2	16.0
Rural women	26.7	24.1	18.3

Source: prepared by the author using ENIGH data for 1994, 2000 and 2005.

TABLE 2

Mexico: education of the population aged 15 and over, 1994-2005
(Years)

	1994	2000	2005
National total	6.5	7.4	8.1
Urban areas	7.4	8.3	8.9
Rural areas	3.7	4.4	5.6
Rural women	3.5	4.1	5.3

Source: prepared by the author using ENIGH data for 1994, 2000 and 2005.

TABLE 3

Mexico: students with inadequate reading performance in the sixth year of primary school and the third year of lower secondary school, by school type, 2000-2005
(Percentages)

6 th year primary	2000		3 rd year lower secondary	2000		2005	
	2000	2005		2000	2005		
Sample total	25	16	Total	27	26		
Private ^a	9	2	Private ^a	4	5		
Urban	22	12	General	28	21		
Rural	32	23	Technical	29	27		
Indigenous	51	29	Telesecundaria	33	42		
CONAFE ^b	35	36					

Source: INEE (2007a).

^a Includes urban and rural private schools.

^b National Council for Education.

TABLE 4

Mexico: poverty by area of residence, 2000-2005
(Percentages)

Poverty line	2000		2002		2004		2005	
	Urban areas	Rural areas	Urban areas	Rural areas	Urban areas	Rural areas	Urban areas	Rural areas
Food ^a	12.5	42.4	11.3	34.0	11.0	28.0	9.9	32.3
Capabilities ^b	20.2	49.9	17.2	42.6	17.8	36.2	15.8	39.8
Wealth ^c	43.7	69.2	41.2	64.3	41.1	57.4	38.3	61.8

Source: National Council for Social Policy Evaluation (CONEVAL), consulted at <http://www.coneval.gob.mx/coneval/>.

^a Food poverty (*pobreza alimentaria*): proportion of households whose per capita income is insufficient to cover food needs as given by the INEGI-ECLAC food basket.

^b Capabilities poverty (*pobreza de capacidades*): proportion of households whose per capita income is insufficient to cover basic consumption of food, health care and education.

^c Wealth poverty (*pobreza de patrimonio*): proportion of households whose per capita income is insufficient to cover basic consumption of food, clothing and footwear, housing, health care, public transport and education.

Increasing education coverage is very important, but so is providing a good-quality education. A useful measure of education quality is students' academic performance. Here again there are marked differences between city and countryside.

Table 3 shows the percentage of students with an inadequate reading performance in the sixth year of primary school and the third year of lower secondary (*secundaria*) school in 2000 and 2005. It is observed that, broadly speaking, primary students performed better than lower secondary students. Considerable differences can also be seen between urban and rural areas. In 2005, no more than 12% of students at primary schools located mainly in urban areas (private and urban schools) underperformed in reading, while at those located primarily in rural areas (rural and indigenous schools and those operated by the National Council for Education (CONAFE)) the figure was at least 23%. In lower secondary education, students at rural (telesecundaria) schools performed worst, and the learning divide between urban and rural areas at this education level was wider as a result.

One variable that probably reflects educational disparities is poverty, which in Mexico is greater in the countryside. Although it fell substantially in the 2000-2005 period (table 4), poverty can increase from one year to the next, as happened between 2004 and 2005.

In Mexico there is an inverse correlation between education and poverty. Table 5 shows that the higher people's education level is, the less likely they are

TABLE 5

Mexico: poverty by education level and area of residence
(Percentages)

Maximum education level	Food poverty		Capabilities poverty		Wealth poverty	
	Urban areas	Rural areas	Urban areas	Rural areas	Urban areas	Rural areas
No schooling or incomplete primary	18.8	47.0	28.6	55.8	57.6	76.0
Complete primary	14.4	37.7	22.4	45.3	53.1	69.0
Lower secondary	11.2	28.7	19.1	37.6	47.3	62.8
Upper secondary	5.2	13.9	8.7	20.6	26.4	44.5
Degree course	1.2	4.3	1.9	5.0	8.2	20.9

Source: prepared by the author using ENIGH data for 2005.

to be poor. It appears, however, that more years of education are needed in the countryside to ensure a low likelihood of a person's living in poverty. Among people who have completed primary school, 14.4% are in a situation of food poverty (*pobreza alimentaria*, considered to be extreme poverty)⁴ in cities and 37.7% in the countryside, whereas among those who have undertaken a degree course just 1.2% are in a situation of food poverty in cities and 4.3% in the countryside. Moderate poverty (*pobreza de patrimonio* or wealth poverty) affects 76% of individuals who have not completed primary education in the countryside and 57.6% in cities. Among those who have completed a degree course, 20.9% suffer from wealth poverty in the countryside and 8.2% in cities. Thus, if returns to education in the countryside were higher, education could be an instrument for reducing the inequality between the two.

2. Comparison with other countries

Mexico has progressed more than some other countries in terms of investment at certain education levels. Between 1995 and 2003, its expenditure on primary and lower secondary education rose by 49%, the largest increase of any Organisation for Economic Co-operation and Development (OECD) country after Turkey, Greece, Poland, New Zealand and Ireland. Mexican spending on tertiary education⁵ rose by 67% between 1995 and 2003, the second-largest increase among OECD countries. Mexican expenditure on education as a percentage of gross

domestic product (GDP) rose from 4.6% to 5.8% between 1995 and 2003, and in the latter year it was above the OECD average of 5.5% (OECD, 2007).

Although education investment increased in Mexico, the amount per student remained low in absolute terms. In 2003, spending per primary school student in Mexico was US\$ 1,656 a year at purchasing power parity, or just under a third of the OECD average of US\$ 5,450. In lower secondary education, Mexican expenditure per student was US\$ 1,918 a year or about a quarter of the OECD average, while spending on tertiary education was just over half the OECD average. When the comparison is with countries at a similar stage of development, the difference is mixed. Mexico spends more per student than Brazil but less than Chile or Israel at all education levels (OECD, 2007).

In the period from 2001 to 2005, countries such as Finland, the United States and Canada spent at least 2% of GDP on research and development (R&D). Mexico allocated 0.4% of GDP to this, a higher proportion than countries like Indonesia, Colombia, Kyrgyzstan and Uruguay but only about half the figure for Portugal, Brazil and Spain and five or six times less than the countries with the highest spending levels (INEE, 2007b).

A large proportion of Mexican education expenditure goes on current spending. It ranks second among OECD countries in the proportion of education expenditure going on current spending at the primary and lower secondary levels, and the share of current spending still looks high when compared to that of some countries with a similar development level, such as Brazil, Chile and Israel (OECD, 2007).

In 2006, the Programme for International Student Assessment (PISA) examined 15-year-old

⁴ See SEDESOL (2003) and CONEVAL (2006) for a detailed explanation of how poverty is measured in Mexico.

⁵ Tertiary education encompasses university education and advanced vocational programmes.

students in 57 countries. This OECD programme found that, on average, young Mexicans possessed a lower level of knowledge and skills than young people in more developed countries and, in some cases, than those in countries at a similar stage of development. Again, according to INEE (2007b), some 50% of young Mexicans do not attain the skill levels in reading, mathematics and science that they will need in their adult lives. This represents a major challenge for the Mexican education system.

Where returns to education are concerned, Patrinos (2008) states that these are generally higher in developing than in developed countries

and puts the average global return to education at 10%. According to Patrinos's calculations, returns in Mexico are slightly above this figure (11%). Latin American countries with higher returns than Mexico include Chile (12%), Guatemala (13%) and Brazil (16%). Countries with lower returns are Bolivia (10%) and the Bolivarian Republic of Venezuela (7%).

In summary, while Mexico has made progress with education, major challenges still lie ahead. It would be advisable to orient education spending more towards infrastructure and educational materials. Further progress is also needed in reducing educational inequality between rural and urban areas.

III

The data

The present analysis is based on the National Household Income and Expenditure Survey (ENIGH) conducted by the National Institute of Statistics, Geography and Informatics (INEGI), the institution responsible for generating and compiling statistical and geographical information on the territory, population and economy of Mexico. The survey yields data on the characteristics of households, the social and demographic characteristics of individuals and their income and expenditure, both monetary and non-monetary; it is representative nationally and at the urban and rural levels. The years studied are 1994, 1996, 1998, 2000, 2002, 2004 and 2005.

The sample was confined to individuals aged between 12 and 70. Individual quarterly earnings were used to calculate the returns to education. Observations lacking information on earnings and the number of hours worked were discarded.⁶

To carry out the analysis, the following variables were generated:

(1) No schooling or incomplete primary: takes a value of 1 if the person is illiterate or

progressed no higher than the fifth year of primary school.

(2) Complete primary: takes a value of 1 if the individual completed six years of primary schooling.

(3) Lower secondary (*secundaria*): is equal to 1 if the worker went through at least one and no more than three years of lower secondary schooling.

(4) Upper secondary (*preparatoria*): is equal to 1 if the worker went through at least one and no more than three years of upper secondary education.

(5) Degree course: has a value of 1 if the individual went through at least one year of higher education.⁷

(6) Education: completed years of education, estimated using the information supplied in the ENIGH code catalogue compiled by INEGI.

(7) Experience: this is work experience estimated as zero or the person's age minus years of education minus six, whichever is higher.

⁶ Note that people who were out of work or not in receipt of income were not removed from the sample. Some studies do remove them, including those of Bracho and Zamudio (1994) and Sarimaña (2002). Doing this can skew the results by increasing the apparent returns to education. When the unemployed population is not considered, the returns obtained may be reflecting the influence of skills on earnings to a greater extent, as many of the unemployed are likely to be less skilled than other people with a similar level of education.

⁷ It is known that a completed degree course may yield different returns to those produced by just one or two years of higher education. Nonetheless, individuals with a complete upper secondary education were found to earn less on average than those who had also spent a year in a degree course. For this reason, it was decided that all those with at least one year of higher education should be included in the degree course variable.

(8) Experience²: this is the square of work experience.

Table 6 presents some characteristics of the individuals included in the sample used for this study. The proportion of women is observed to be higher in urban areas than in rural areas in every year except 2004, while the opposite holds for men. The proportion of women in the sample ranges from 52.3% to 53.7% in urban areas, while that of men in rural areas is between 47% and 50.5%. The proportions are thus fairly stable in both cases. Individuals in urban and rural areas are very similar in average age; in no case does the difference exceed a year, and the average age rises slightly over the years. In every year of the sample, individuals in rural areas tend to have greater work experience than those in urban areas.

Generally speaking, urban areas contain a larger proportion of people with a higher level of education and rural areas of people with a lower level of education; in both, however, there was a substantial increase in education levels over the years. In 1994, for example, the proportion of individuals with complete primary schooling or less was 20.9% in urban areas, a figure that had fallen to 17% by 2005. The proportion of rural people with this same education level remained virtually unchanged between the same years (rising slightly from 22% to 22.1% in 2005). Meanwhile, the proportion of individuals with upper secondary education or above increased in both urban and rural areas, rising from 12.5% to 22.6% in the former and from 2.7% to 10.6% in the latter between 1994 and 2005.

TABLE 6

Mexico: characteristics of the individuals included in the sample, urban and rural areas, 1994-2005

	1994		1996		1998		2000		2002		2004		2005	
	Urban areas	Rural areas	Urban areas	Rural areas	Urban areas	Rural areas	Urban areas	Rural areas	Urban areas	Rural areas	Urban areas	Rural areas	Urban areas	Rural areas
Sex (%)														
Male	47.7	50.5	47.4	49.1	47.5	49.3	46.3	48.8	46.7	48.0	47.2	47.0	47.6	47.8
Female	52.3	49.5	52.6	50.9	52.5	50.7	53.7	51.2	53.3	52.0	52.8	53.0	52.4	52.2
Age (average in years)	31.9	31.9	31.7	31.6	32.4	33	32.4	32.9	33	33.6	33.8	34.5	34.1	34.3
Work experience (average)	18.5	21.8	17.9	21	18.4	22.1	18.2	22.1	18.5	22.5	19	22.7	19.2	22.2
Education (average)	7.4	4.1	7.8	4.6	8	4.9	8.3	4.9	8.5	5.2	8.8	5.7	8.9	6.1
Education (%)														
No schooling or incomplete primary	25.2	59.6	22.7	53.3	20.4	49.6	18.7	45.1	18.3	46.4	17.9	41.5	17.7	38.0
Complete primary	20.9	22.0	20.0	23.9	20.2	24.8	19.0	24.4	18.0	22.6	17.6	20.8	17.0	22.1
Lower secondary	30.9	14.5	31.5	18.6	32.5	20.1	31.5	23.7	31.6	22.5	28.6	25.6	28.7	26.0
Upper secondary	12.5	2.7	14.1	3.1	14.6	4.1	15.9	4.9	16.9	6.0	21.9	10.0	22.6	10.6
Degree course	10.6	1.1	11.7	1.1	12.2	1.5	14.8	1.9	15.1	2.6	14.0	2.1	14.1	3.4

Source: prepared by the author using ENIGH data for 1994, 1996, 1998, 2000, 2002, 2004 and 2005.

IV

The returns to education in Mexico, 1994-2005

In the specialist literature worldwide, Mincer's specification is the one most commonly used to calculate returns to education. It establishes that the log of earnings is a function of education, work experience and the square of that experience. Formally, we have:

$$\ln Y_i = \gamma + \phi E_i + \delta_1 Exp_i + \delta_2 Exp_i^2 + \varepsilon_i \quad (1)$$

where $\ln Y$ represents the log of earnings, E are years of education and Exp is work experience. The coefficient associated with education (ϕ) provides an estimate of the returns to this, as it represents the percentage change in income for a unitary change in education level.

There is a problem with equation (1): it does not consider whether individuals have decided (by self-selection) not to participate in the labour market; if that happens, the estimates from this method may be skewed.⁸ Furthermore, it assumes that returns are the same at each level of education. However, the Mincer equation is very important because it can be used to estimate the returns to education and is the basis for international comparisons. Given that the aim of the present study is to compare these returns between two geographical areas (rural and urban), this specification may be adequate. To reduce possible self-selection bias, however, the estimates will be corrected using Heckman's two-stage method, and a gender analysis will be carried out. To estimate the returns of each education level, a specification based on dummy variables will be carried out by education level.

Heckman's two-stage method is used to remove biases that may arise because all that surveys observe are the earnings of individuals whose reserve wage is below the market wage. Those whose reserve wage is above the market wage do not appear in the estimate. According to Heckman (1979), this situation may introduce biases into the estimators of the earnings

equation parameters similar to those generated by the omission of relevant variables in the model.

To illustrate Heckman's two-stage method, two equations are proposed:

$$Z_i^* = \gamma^T w_i + u_i \quad (\text{decision equation}) \quad (2)$$

$$y_i = \beta^T x_i + \varepsilon_i \quad (\text{interest equation}) \quad (3)$$

In this case they are, respectively, the equation for the participation of wage earners and the Mincer function (1). In equation (2), Z_i^* is the propensity to work, w_i is a vector of observed explanatory variables and u_i is an unobserved error term in the decision equation. In equation (3), y_i is the potential earnings level of a particular individual (expressed in logarithms), x_i is a vector of variables that influence the potential earnings level and ε_i is an error term in the interest equation, again unobserved.

y_i is observed if $Z_i^* > 0$. Thus:

$$E(y_i | y_i \text{ is observed}) = E(y_i | Z_i^* > 0) \quad (4)$$

For those not in work, $Z_i^* > 0$ and y_i is consequently equal to zero. The self-selection problem arises if the unobserved part of the decision to work (u_i) is correlated with the unobserved part of the result (ε_i). Empirically, in the first stage of this method a probit model is estimated in the decision equation used to calculate the inverse Mills ratio (λ) corresponding to the ratio between the density function and the cumulative distribution function of a normal function, evaluated at $\lambda T w_i$. At the second stage, λ is included as a regressor in the interest equation.

The final equation estimated is:

$$y_i | Z_i^* > 0 = \beta^T x_i + \beta_\lambda \lambda + \xi_i \quad (5)$$

If the estimated value of β_λ is other than zero, it may be concluded that self-selection exists.

Individual decisions to join the labour market may be affected by various factors. In this case, the

⁸ This type of problem is known in the specialist literature as self-selection bias. See Heckman (1979) and Lewis (1974) for a detailed explanation.

TABLE 7

Mexico: estimation of the income function of the basic Mincer model, 1994-2005

Variable	1994		1996		1998		2000		2002		2004		2005	
	Coef- ficient	t stat- istic	Coef- ficient	t stat- istic	Coef- ficient	t stat- istic	Coef- ficient	t stat- istic	Coef- ficient	t stat- istic	Coef- ficient	t stat- istic	Coef- ficient	t stat- istic
<i>Mincer model</i>														
Education	0.1336	54.6	0.1117	47.1	0.1121	37.9	0.1030	34.3	0.1129	51.4	0.1214	66.8	0.1188	65.0
Experience	0.0287	12.2	0.0252	11.2	0.0301	10.8	0.0216	7.4	0.0274	12.1	0.0264	13.2	0.0228	11.5
Experience ²	-0.0004	-10.1	-0.0003	-8.0	-0.0004	-8.2	-0.0002	-4.5	-0.0003	-8.7	-0.0003	-8.8	-0.0002	-6.8
Constant	5.8184	123.5	6.2572	135.3	6.3613	106.6	6.8606	113.6	6.8024	143.9	6.7769	161.1	6.8558	159.6
<i>Probit model</i>														
Sex	1.1655	83.0	1.1125	83.0	1.0343	67.3	1.1167	-67.0	1.0335	82.8	0.9594	90.3	0.9187	86.4
Experience	0.0824	53.8	0.0821	57.0	0.0756	46.4	0.0860	51.0	0.0894	71.5	0.0828	77.4	0.0818	77.0
Experience ²	-0.0012	-48.9	-0.0013	-52.0	-0.0011	-41.8	-0.0013	-46.2	-0.0014	-64.1	-0.0014	-72.3	-0.0013	-70.2
Education	0.0596	29.9	0.0635	32.6	0.0644	29.4	0.0645	27.3	0.0592	35.3	0.0482	35.7	0.0517	38.1
Residents	-0.0873	-18.8	-0.0845	-19.0	-0.1039	-19.0	-0.0849	-14.8	-0.0790	-18.2	-0.1181	-27.8	-0.1411	-32.7
Constant	-1.3276	-39.4	-1.3160	-40.7	0.8871	22.5	0.8859	21.0	0.7795	24.8	-1.0359	-40.2	-0.970	-37.6
<i>Inverse Mills ratio</i>														
Inverse Mills ratio	-0.2047	-7.4	-0.1907	-7.0	-0.2357	-6.6	-0.2948	-8.2	-0.1750	-6.0	-0.0825	-3.1	-0.2269	-8.4

Source: prepared by the author using ENIGH data for 1994, 1996, 1998, 2000, 2002, 2004 and 2005.

variables considered relevant were sex (which takes a value of 1 if the individual is a man), the number of residents in the household, years of education, work experience and the square of that experience.

Table 7 shows the estimate of the basic Mincer model, using Heckman's two-stage method.⁹ Three sections are presented, one showing the estimated coefficients of the basic Mincer model corrected for self-selection, another showing the coefficients of the probit model,¹⁰ in which the dependent variable takes the value 1 if the individual has at least one job, and lastly the coefficient of the inverse Mills ratio, which indicates the possibility of self-selection. The probit model shows statistically significant coefficients in all cases and indicates in all years that the probability of participating in the labour market is higher for men and increases to a certain extent with education level and work experience, while it declines as the number of residents in the household rises.

The estimate of the inverse Mills ratio proves to be statistically significant in all years, which suggests that there may be self-selection and thus

that the OLS estimates may be skewed. With this method, the results show that in 1994 an average individual's earnings rose by about 13% with each additional year of education; from 1996 to 2000 they increased by between 10.3% and 11.2%; and after 2000 they increased by over 11.3%. Thus, returns have tended to vary over the years, which may be due to a number of factors, such as changes in education quality and in the demand for workers with a certain level of qualifications, the supply of workers with particular levels of education, the distribution of employment between occupations, and economic growth.

As already indicated, the above specification assumes that the returns to education are the same at every level of the system. To obtain an estimate of returns by education level, a specification with dummy variables will be used as follows:

$$\ln Y_i | Z_i^* > 0 = \gamma + \sum_{i=1}^k \beta_i D_i + \delta_1 Exp_i + \delta_2 Exp_i^2 + \beta_\lambda \lambda + \xi_i \quad (6)$$

where D_i represents each of the dummies of each education level i . The levels considered in this case are: (1) no schooling or incomplete primary, (2) complete primary, (3) lower secondary, (4) upper secondary and (5) degree course.

⁹ All the estimates presented in this paper were carried out using OLS and in most cases slightly lower results were obtained. The results obtained with the OLS method can be found in Ordaz (2007).

¹⁰ Referring in this case to the probability of a person having at least one job.

Psacharopoulos (1993) argues that for this type of specification, the returns to the i -th educational level r_i can be estimated by calculating the difference between the D_i and D_{i-1} coefficients and then dividing this by n_i , i.e., by the number of school years corresponding to level k .¹¹ In other words:

$$r_i = \frac{(\beta_i - \beta_{i-1})}{n_i} \quad (7)$$

Since one of the goals of this study is to ascertain whether returns to education differ between rural and urban areas, equation (6) was estimated for each separately. The results are presented in the appendix, and they indicate once again that all the coefficients are statistically significant. The presence of the self-selection problem is also found to be a possibility, since the estimated coefficient of the inverse Mills ratio is statistically significant in all years for both types of area.

On the basis of this information, formula (7) was used to estimate returns by education level (table 8), indicating the percentage by which income from education rises with each level.

These findings can be used to analyse the evolution of private returns to education in urban and rural areas of Mexico in the 1994-2005 period. To facilitate comparison of the results, the information given in table 8 was used to prepare figures 1 and 2, shown below.

One important observation deriving from the results is that studying is a profitable activity in Mexico, since all education levels offer positive returns in all the years analysed. Another is that returns have tended to change over the years.

For rural areas, it is observed that lower secondary education offered the best returns at the start of the period, and that these increased towards the end of the period as higher levels of education were attained. The trend of returns to primary education was downward between 1994 and 1998, upward between 1998 and 2002 and downward in the closing years of the period.

Returns to lower secondary education fell substantially between 1994 and 2000, only to rise sharply thereafter. Returns to upper secondary education grew throughout the period, while returns

TABLE 8

Mexico: returns by education level, selected years in the 1994-2005 period
(Percentages)

	Rural	Urban
1994		
Complete primary	6.7	4.4
Lower secondary	9.7	7.1
Upper secondary	8.1	10.5
Degree course	9.6	9.6
1996		
Complete primary	5.2	3.7
Lower secondary	7.4	7.6
Upper secondary	9.9	9.0
Degree course	9.1	8.4
1998		
Complete primary	4.6	5.2
Lower secondary	5.3	5.8
Upper secondary	10.1	7.4
Degree course	7.5	10.6
2000		
Complete primary	6.0	3.7
Lower secondary	3.0	2.3
Upper secondary	12.0	7.4
Degree course	13.0	8.1
2002		
Complete primary	7.7	4.9
Lower secondary	7.6	4.0
Upper secondary	11.2	5.4
Degree course	9.8	8.2
2004		
Complete primary	5.9	4.2
Lower secondary	8.0	3.6
Upper secondary	11.3	6.9
Degree course	16.3	11.3
2005		
Complete primary	5.2	3.3
Lower secondary	9.8	4.9
Upper secondary	12.6	8.4
Degree course	14.9	9.9

Source: prepared by the author using ENIGH data for 1994, 1996, 1998, 2000, 2002, 2004 and 2005.

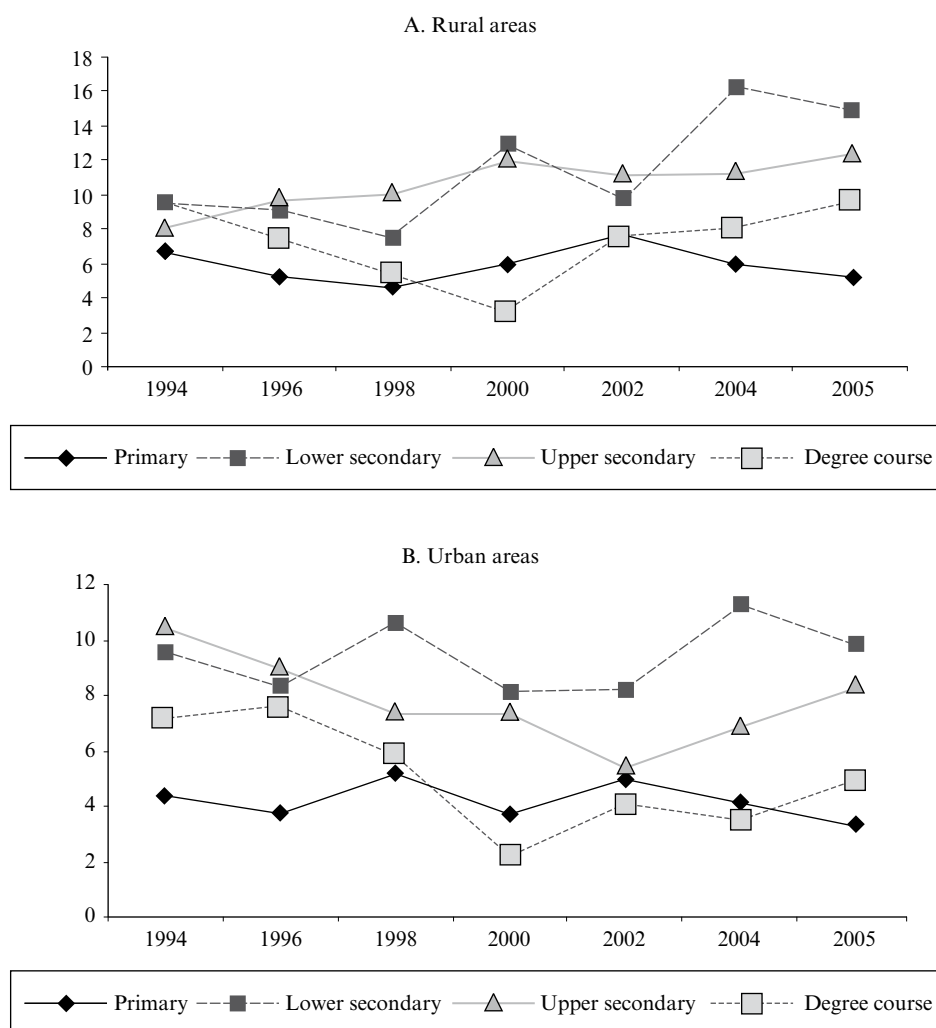
to higher education fell in 1994-1998 before tending to increase again (figure 1).

According to Esquivel (2008), inequality in rural Mexico has taken the form of an inverted U. It rose significantly between 1996 and 2000 and started to decline from 2002. In other words, it followed the opposite course to returns from lower secondary education. The initial increase in this inequality could have been influenced by the decline in returns from higher and primary education between 1994 and 1998, while its subsequent reduction may have been largely due to the tendency for returns to increase across all education levels after 1998. Thus, education seems to be contributing to a reduction of inequality in Mexico.

¹¹ The number of years of education taken for this study are six for primary, three for lower secondary, three for upper secondary and five for higher education.

FIGURE 1

Mexico: returns to education by education level, rural and urban areas, 1994-2005
(Percentages)



Source: prepared by the author using data from table 9.

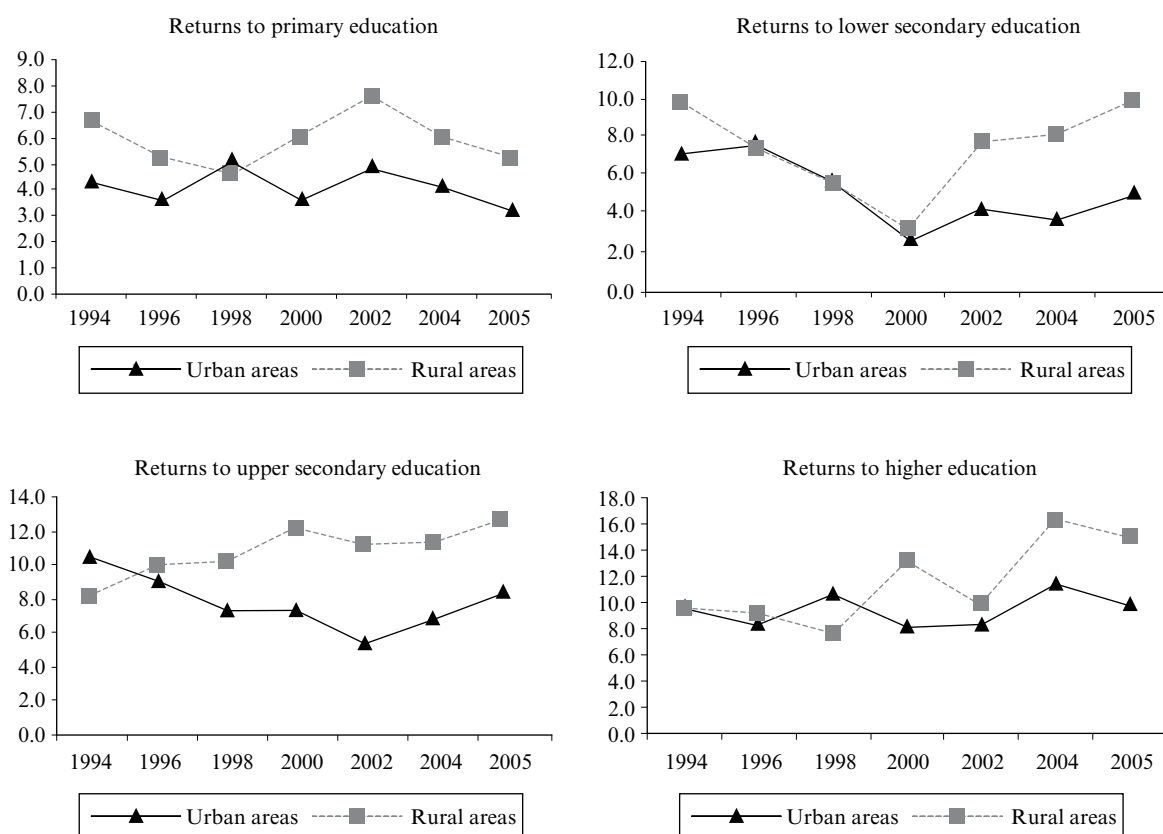
In urban areas, upper secondary education was the level offering the highest returns in the early part of the 1994-2005 period,¹² followed by degree courses. Economic yields from primary education displayed a fairly stable trend between 1994 and 2002, but began to decline in the final years of the period. Returns to lower and upper secondary

education changed roughly in tandem, although lower secondary returns were always less great: the trend was downward for both from 1994 and then upward, first (after 2000) for lower secondary and then (after 2002) for upper secondary education. After the end of the 1990s, it was higher education that yielded the greatest returns. By the end of the period, a straightforward pattern had emerged: the higher the education level, the higher the return (see figure 1 again). The relatively stable trend of returns to primary education and the rising trend in higher education returns may go some way towards

¹² This finding agrees with that obtained by Barceinas (2001), who also finds that upper secondary education was the level yielding the highest returns across the whole population of Mexico in 1994.

FIGURE 2

Mexico: returns to education by education level, urban and rural areas, 1994-2005
(Percentages)



Source: prepared by the author on the basis of table 9.

explaining the steady reduction of inequality in urban areas of Mexico identified by Esquivel (2008) for the 1994-2006 period.

As can be appreciated, at the start of the period indicated it was enough to have gone through upper secondary education in urban areas, or lower secondary in rural areas, to obtain the greatest returns from education. Now, however, higher education is required for this. Thus, the market appears to be rewarding the best-qualified most.

The information shown in figure 2 is interesting: in most years and at every level of education, returns to education in the period analysed were higher in rural than in urban areas.

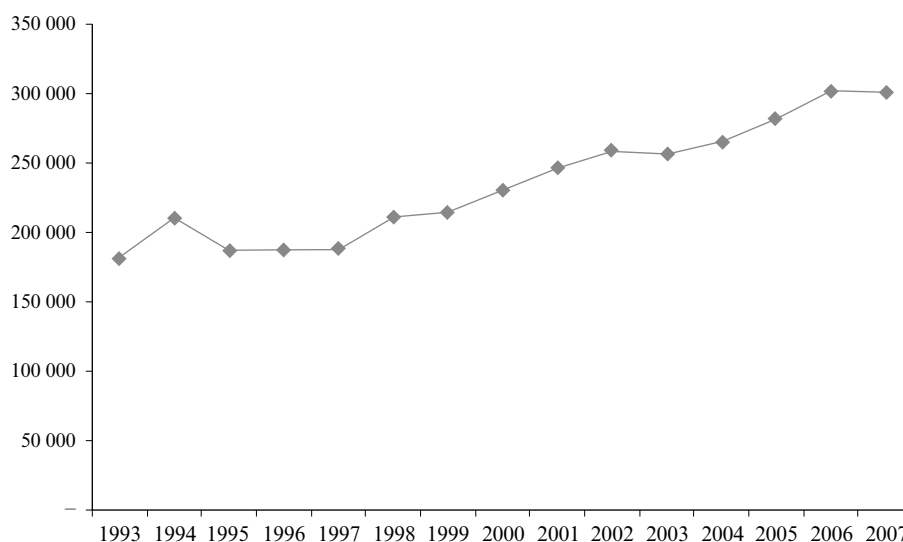
Primary education returns were higher in urban areas in 1998 only, and lower secondary education returns in 1996 and 1998 only. Returns to upper

secondary education were higher in urban areas in 1994 alone. Returns to higher education at the start of the 1994-2005 period were similar in both types of area, but were higher in rural areas from 1990 onward. This means that moving up one education level yielded a larger increase in earnings in rural than in urban areas. Generally speaking, returns increased by most in rural areas from the late 1990s onward. This situation could be partly due to higher education spending by the Mexican public sector from 1997 onward, chiefly in the countryside via the programme known originally as Progresa and now as Programa Oportunidades. Figure 3 shows that expenditure on education for social development in the period grew strongly from the late 1990s onward.

To check the consistency of the results and analyse whether there were any gender differences,

FIGURE 3

Mexico: programmable public-sector expenditure^a on education for social development, 1993-2007
(Millions of 2002 pesos)



Source: Office of the President (2007).

^a In Mexico, programmable expenditure (*gasto programable*) is an administrative category that covers most direct spending by central government, including education outlays.

education returns were estimated for men and women in both rural and urban areas (table 9).¹³ This table also includes national GDP and agricultural GDP growth rates for each year *t* and each year *t-1* in the 1994-2005 period.

On the basis of these results, and comparing the two sexes in rural areas, returns from primary education were found to be higher for men in 1998 and 2000 only. At the lower and upper secondary levels the findings were heterogeneous: returns were higher for women in some years and for men in others. On average, returns from higher education were greater for women until 2000 and for men in the other years. Thus, yields from primary education for men and women in rural areas appear to be strongly associated with agricultural GDP growth rates, which may be because the remuneration of workers with few qualifications largely depends on the economic situation of farming. At the other education levels there appears to have been some association with

GDP growth in the year concerned or the previous one in the 1990s, but this association subsequently tended to disappear, perhaps because of greater support for education in rural areas.

When men and women in urban areas are compared, it is found that men tend to obtain higher returns from primary education. In lower and upper secondary education there is no clear pattern: men obtained higher yields in some years and women in others. In urban areas, it was more profitable for men to have higher education than for women, with the estimates showing greater returns for men in all years.

In the latter years of the period, returns from basic (primary) education in rural areas were found to be greater for women than for men, but those from the highest educational level (degree course) were found to be greater for men.

In urban areas, men tend to obtain greater returns from the lowest and highest education levels (primary and degree course), but at the intermediate levels (lower and upper secondary) returns were higher for women in some years.

Again in urban areas, there seems to be some association between national GDP growth and returns

¹³ These findings were obtained by applying equation (7) to the coefficients obtained in regressions corrected for self-selection, in each type of area, for men and women. All the coefficients obtained are statistically significant at 99%.

TABLE 9

Mexico: returns to education, by sex, 1994-2005
(Percentages)

	1994	1996	1998	2000	2002	2004	2005
<i>Rural women</i>							
Complete primary	9.1	7.6	4.4	4.9	8.6	6.5	5.4
Lower secondary	8.9	6.2	9.3	6.5	9.2	8.1	7.8
Upper secondary	4.7	12.0	6.5	6.7	9.3	11.6	12.8
Degree course	12.4	12.5	10.9	13.1	8.8	8.8	10.0
<i>Rural men</i>							
Complete primary	5.9	3.8	5.5	6.2	6.0	5.4	4.5
Lower secondary	10.1	7.8	4.2	2.7	4.5	6.1	10.2
Upper secondary	10.3	7.1	13.6	12.1	12.0	8.7	8.8
Degree course	7.2	7.2	5.2	10.7	13.0	18.1	17.8
<i>Urban women</i>							
Complete primary	2.4	3.3	5.3	2.5	3.3	3.2	3.6
Lower secondary	6.4	6.7	10.3	5.0	6.4	3.0	3.1
Upper secondary	11.3	8.7	8.6	7.6	5.3	4.5	8.1
Degree course	3.8	7.9	9.8	5.1	6.5	7.9	6.4
<i>Urban men</i>							
Complete primary	4.8	4.1	5.0	4.3	5.6	4.6	2.8
Lower secondary	6.9	8.0	3.0	2.2	3.6	4.6	6.8
Upper secondary	9.0	9.9	7.3	6.8	6.2	7.2	7.8
Degree course	12.0	8.9	12.0	9.8	8.5	12.8	10.2
Gross domestic product (GDP) at year t (% growth)	4.5	5.1	4.9	6.7	0.8	-4.2	2.8
GDP at year t-1 (% growth)	1.9	-6.2	6.8	3.7	-0.2	1.4	-4.2
Agricultural GDP at year t (% growth)	0.9	3.6	0.8	0.6	0.1	2.5	-2.6
Agricultural GDP at year t-1 (% growth)	2.9	0.9	0.2	3.6	3.5	3.1	2.5

Source: prepared by the author using ENIGH data for 1994, 1996, 1998, 2000, 2002, 2004 and 2005.

to primary education, and this is more marked in the case of men. Where the other education levels are concerned it is likely that other factors weigh more heavily, since no clear association with GDP is detected.

On the whole, women in rural areas obtained greater returns from education than those in urban areas in most of the years studied and at all education levels. Something similar can be seen in the case of men. In both cases, the gap in terms of

education returns has widened since the late 1990s in favour of the rural population.

When all subgroups at all education levels are compared, rural women are found to have obtained the greatest returns from primary education in recent years.

This analysis indicates that the main findings hold good: people in rural areas obtained greater returns from education on average in most of the years analysed. The estimates are thus statistically robust.

V

Conclusions

This study has shown that, educationally, rural areas in Mexico lag well behind urban ones. On average, the rural population is educated for a shorter time and to a lower standard. Returns to education are found to have been greater in rural areas in most years and at every level of education.

When distinguished by sex, the main findings hold up: returns to education are greater for the rural population than for the urban population. It can thus be said that the estimates arrived at are consistent.

There are gender differences in education returns in Mexico. In rural areas, returns to the basic levels of education are greater for women, while at the higher levels they are greater for men. In urban areas, the primary and higher education levels tend to yield greater returns for men, but returns from the intermediate levels (lower and upper secondary) are higher for women in some years.

These findings are not just descriptive, but may be a pointer to how Mexican education should be invested in. Given that returns to education are higher in rural areas and that the highest levels of poverty are encountered there, education could lead to a gradual diminution of inequality. Higher investment in education is therefore desirable. As has been shown, furthermore, education has an inverse relationship to poverty. While education may increase the earnings of individuals, however, educated people will not be able to make productive use of their skills unless the right economic and institutional conditions exist in the country. It has been shown that in some cases economic growth appears to influence education returns.¹⁴

These returns may be seen as an incentive for people to invest in themselves; even so, there are people in Mexico, particularly those on low incomes, who are hardly in a position to invest in their own or their children's education. State action is therefore

needed to stimulate educational investment and help poor families to make this investment. More also needs to be done to raise the quality of education in Mexico, which could help to increase the returns from it.¹⁵

Some authors have discussed the importance of human capital investment to promote growth and efficiency and help reduce inequality. Becker (1995) argues that education is the most effective way for people living in poverty to improve their economic status, and Sylwester (2002) that allocating more resources to education could reduce economic inequality within a country.

The participation of women is important if quality of life in rural areas is to be improved, as they usually provide health and preventive care services and are responsible for their children's nourishment. As this study has shown, however, rural women have the lowest average education levels of anyone in the country, even though they obtain greater returns than anyone else from primary education and greater returns than people in urban areas from the higher education levels. This suggests that it would be economically rational to invest in female education in rural areas.

Physical capital can complement human capital. This study has shown that there is relatively little investment in education infrastructure in Mexico. If there were more capital spending in education, in both rural and urban areas, returns to human capital would very probably increase.

Education can be linked to production. Different studies have shown that farmers obtain greater yields if they improve their knowledge and skills, as this allows them to use technology more efficiently (World Bank, 2005). Thus, increased education in rural areas, in combination with production-related elements, can significantly improve know-how, technology use and agricultural productivity, and hence living standards in these areas.

¹⁴ A study on Latin America (Duryea and Pagés, 2002) shows that improving the economic and institutional environment may substantially increase productivity and reduce poverty. Another study (Ruiz-Nápoles, 2007) finds that a large proportion of the unemployed population in Mexico has been through higher education, which indicates that there are distortions in the labour market.

¹⁵ Card and Krueger (1996) present evidence that improvements in education quality may markedly raise the returns to education.

APPENDIX

Mexico: estimation of the earnings function with dummy variables, 1994-2005

Variable	Rural		Urban	
	Coefficient	t-statistic	Coefficient	t-statistic
1994				
<i>Mincer's model</i>				
Complete primary	0.4029	10.2	0.2637	7.5
Lower secondary	0.6926	13.7	0.4761	13.0
Upper secondary	0.9365	11.0	0.7914	17.7
Degree course	1.4145	13.0	1.2706	27.8
Experience	0.0148	4.1	0.0198	5.9
Experience ²	-0.0003	-5.0	-0.0003	-4.6
Constant	6.1358	93.6	6.7869	102.9
<i>Probit model</i>				
Sex	1.3888	60.7	1.0212	56.7
Experience	0.0784	29.8	0.0908	46.4
Experience ²	-0.0010	-25.8	-0.0015	-43.1
Education	0.0702	16.3	0.0698	28.0
Residents	-0.0743	-10.3	-0.0940	-15.4
Constant	-1.4458	-25.0	-1.4167	-32.8
Inverse Mills ratio	-0.3296	-8.5	-0.2895	-7.7
1996				
<i>Mincer's model</i>				
Complete primary	0.3127	8.3	0.2244	6.7
Lower secondary	0.5344	11.4	0.4523	13.1
Upper secondary	0.8317	10.7	0.7234	17.3
Degree course	1.2862	12.3	1.1414	26.4
Experience	0.0116	3.4	0.0225	7.1
Experience ²	-0.0002	-3.2	-0.0003	-5.8
Constant	6.5737	107.2	6.9595	108.9
<i>Probit model</i>				
Sex	1.4113	59.6	0.9591	58.2
Experience	0.0738	28.0	0.0904	51.0
Experience ²	-0.0010	-24.0	-0.0015	-47.2
Education	0.0799	17.6	0.0718	30.6
Residents	-0.0559	-7.7	-0.1036	-18.2
Constant	-1.4660	-24.8	-1.3707	-34.1
Inverse Mills ratio	-0.3417	-9.0	-0.2222	-6.1
1998				
<i>Mincer's model</i>				
Complete primary	0.2782	5.7	0.3120	7.0
Lower secondary	0.4376	7.3	0.4859	10.8
Upper secondary	0.7414	7.4	0.7071	13.2
Degree course	1.1155	8.9	1.2382	22.8
Experience	0.0129	2.9	0.0267	6.7
Experience ²	-0.0002	-3.6	-0.0003	-4.6
Constant	6.8426	77.7	6.9799	86.7
<i>Probit model</i>				
Sex	1.2059	45.5	0.9534	49.9
Experience	0.0651	22.2	0.0886	43.4
Experience ²	-0.0008	-17.6	-0.0015	-41.0
Education	0.0824	16.5	0.0660	24.9
Residents	-0.0759	-8.2	-0.1163	-17.0
Constant	-1.3632	-20.0	-1.2115	-26.2
Inverse Mills ratio	-0.4400	-8.3	-0.2328	-5.0
2000				
<i>Mincer's model</i>				
Complete primary	0.3576	6.7	0.2200	4.7
Lower secondary	0.4472	7.3	0.2886	6.2
Upper secondary	0.8085	8.3	0.5094	9.5
Degree course	1.4605	11.8	0.9153	17.0
Experience	0.0119	2.6	0.0128	3.2
Experience ²	-0.0002	-2.2	-0.0001	-1.6
Constant	6.9743	79.2	7.7336	95.7

Variable	Rural		Urban	
	Coefficient	t-statistic	Coefficient	t-statistic
<i>Probit model</i>				
Sex	1.3874	46.5	0.9879	48.7
Experience	0.0758	24.8	0.0957	46.1
Experience ²	-0.0010	-21.3	-0.0016	-42.7
Education	0.0700	12.9	0.0670	23.6
Residents	-0.0865	-8.7	-0.0833	-11.8
Constant	-1.4352	-19.5	-1.3753	-28.7
Inverse Mills ratio	-0.3094	-6.1	-0.4099	-8.6
2002				
<i>Mincer's model</i>				
Complete primary	0.4606	10.7	0.2968	9.0
Lower secondary	0.6873	13.9	0.4183	12.7
Upper secondary	1.0237	13.4	0.5806	15.1
Degree course	1.5147	13.6	0.9922	24.6
Experience	0.0119	3.2	0.0175	6.0
Experience ²	-0.0001	-2.3	-0.0002	-4.0
Constant	6.7715	91.2	7.7627	125.7
<i>Probit model</i>				
Sex	1.2856	53.8	0.8830	61.2
Experience	0.0781	31.1	0.0948	64.5
Experience ²	-0.0010	-26.2	-0.0015	-58.4
Education	0.0732	17.3	0.0712	36.7
Residents	-0.0692	-8.3	-0.0686	-13.6
Constant	-1.4971	-25.0	-1.3963	-40.9
Inverse Mills ratio	-0.2555	-5.9	-0.3431	-9.0
2004				
<i>Mincer's model</i>				
Complete primary	0.3563	8.5	0.2510	8.6
Lower secondary	0.5972	12.6	0.3585	12.8
Upper secondary	0.9376	15.6	0.5655	19.6
Degree course	1.7512	22.5	1.1318	36.3
Experience	0.0214	5.9	0.0158	6.4
Experience ²	-0.0003	-5.1	-0.0002	-5.0
Constant	6.8106	94.6	7.8704	161.3
<i>Probit model</i>				
Sex	1.2900	57.3	0.8593	70.9
Experience	0.0776	33.5	0.0883	71.6
Experience ²	-0.0011	-29.7	-0.0015	-67.9
Education	0.0570	16.3	0.0489	31.4
Residents	-0.0989	-11.1	-0.1213	-25.0
Constant	-1.2954	-22.8	-1.0128	-34.2
Inverse Mills ratio	-0.2506	-5.9	-0.2224	-7.0
2005				
<i>Mincer's model</i>				
Complete primary	0.3103	8.0	0.1989	3.4
Lower secondary	0.6034	14.4	0.3472	9.2
Upper secondary	0.9806	18.0	0.5984	17.1
Degree course	1.7263	24.5	1.0913	31.1
Experience	0.0216	6.4	0.0099	3.9
Experience ²	-0.0003	-5.5	-0.0001	-2.7
Constant	6.8803	102.6	8.0998	158.8
<i>Probit model</i>				
Sex	1.2091	58.3	0.8106	65.0
Experience	0.0783	37.0	0.0862	68.8
Experience ²	-0.0011	-32.6	-0.0014	-63.7
Education	0.0511	16.3	0.0552	34.5
Residents	-0.1190	-14.7	-0.1474	-28.7
Constant	-1.1431	-22.1	-0.9623	-31.5
Inverse Mills ratio	-0.2783	-6.8	-0.4589	-13.5

Source: prepared by the author using National Household Income and Expenditure Survey (ENIGH) data for 1994, 1996, 1998, 2000, 2002, 2004 and 2005.

(Original: Spanish)

Bibliography

- Barceinas, F. (2001): Capital humano y rendimientos de la educación en México, doctoral thesis, Barcelona, Universitat Autònoma de Barcelona, unpublished.
- Becker, G. (1995): *Human Capital and Poverty Alleviation*, Human Resources Development and Operations Policy, Working Paper, No. 14458, Washington, D.C., World Bank.
- Bracho, T. and A. Zamudio (1994): Los rendimientos económicos de la escolaridad en México, 1989, *Economía mexicana. Nueva época*, vol. 3, No. 2, Mexico City, Centro de Investigación y Docencia Económicas (CIDE).
- Card, D. and A. Krueger (1996): School resources and student outcomes: an overview of the literature and new evidence from North and South Carolina, *Journal of Economic Perspectives*, vol. 10, No. 4, Nashville, Tennessee, American Economic Association.
- Carneiro, P., K. Hansen and J. Heckman (2003): *Estimating Distributions of Treatment Effects with an Application to the Returns to Schooling and Measurement of the Effects of Uncertainty of College Choice*, NBER Working Paper, No. 9546, Cambridge, Massachusetts, National Bureau of Economic Research.
- Carneiro, P. and J. Heckman (2002): The evidence on credit constraints in post-secondary schooling, *Economic Journal*, vol. 112, No. 482, Oxford, United Kingdom, Royal Economic Society.
- Carneiro, P., J. Heckman and E. Vytlačil (2001): *Estimating the Returns to Education When It Varies Among Individuals*, Working Paper, Chicago, University of Chicago.
- Carnoy, M. (1967): Rates of returns to schooling in Latin America, *The Journal of Human Resources*, vol. 2, No. 3, Madison, University of Wisconsin Press.
- CONEVAL (Consejo Nacional de Evaluación de la Política de Desarrollo Social) (2006): Aplicación de la metodología del comité técnico para la medición de la pobreza 2000-2005. Available at: <http://www.coneval.gob.mx/coneval/pdf/Nota%20Tecnica%20%202000-2005.pdf>.
- Duryea, S. and C. Pagés (2002): *Human Capital Policies: What They Can and Cannot Do for Productivity and Poverty Reduction in Latin America*, Research Department Working Paper, No. 468, Washington, D.C., Inter-American Development Bank.
- ECLAC (Economic Commission for Latin America and the Caribbean) (2006): *México: crecimiento agropecuario, capital humano y gestión del riesgo* (LC/MEX/L.686), Mexico City, ECLAC Subregional Headquarters in Mexico.
- ECLAC/UNESCO (Economic Commission for Latin America and the Caribbean/United Nations Educational, Scientific and Cultural Organization) (1992): Education and knowledge: basic pillars of changing production patterns with social equity, *Libros de la CEPAL*, No. 33 (LC/G.1702/Rev.2-P), Santiago, Chile. United Nations publication, Sales No. S.92.II.G.6.
- Esquivel, G. (2008): Markets, the State and the Dynamics of Inequality: the case of Mexico, Mexico City, unpublished.
- Griliches, Z. (1977): Estimating the returns to schooling: some econometric problems, *Econometrica*, vol. 45, New York, The Econometric Society.
- Heckman, J. (1979): Sample selection bias as a specification error, *Econometrica*, vol. 47, No. 1, New York, The Econometric Society.
- Heckman, J. and X. Li (2004): Selection bias, comparative advantage and heterogeneous returns to education: evidence from China in 2000, *Pacific Economic Review*, vol. 9, No. 3, Oxford, Blackwell Publishing.
- INEE (Instituto Nacional para la Evaluación de la Educación) (2007a): *La calidad de la educación básica en México 2006*, Mexico City.
- _____ (2007b): *PISA 2006 en México*, Mexico City.
- Lewis, H.G. (1974): Comments on selectivity bias in wage comparison, *The Journal of Political Economy*, vol. 82, No. 6, Chicago, University of Chicago Press.
- López-Acevedo, G. (2004): Mexico: evolution of earnings inequality and rates of returns to education (1988-2002), *Estudios económicos*, vol. 19, No. 2, Mexico City, Centro de Estudios Económicos, El Colegio de México.
- Mincer, J. (1974): *Schooling, Experience, and Earnings*, New York, Columbia University Press.
- OECD (Organisation for Economic Co-operation and Development) (2007): *Education at a Glance, 2006*, Paris.
- Ordaz, J. (2007): *México: capital humano e ingresos. Retornos a la educación, 1994-2005*, Estudios y perspectivas series, No. 90, LC/L.2812-P, Mexico City, ECLAC Subregional Headquarters in Mexico. United Nations publication, Sales No. S.07.II.G.143.
- Patrinos, H. (2008): Heterogeneous Returns in the Labor Market, unpublished.
- Presidencia de la República (2007): *Primer informe de gobierno*, Mexico City.
- Psacharopoulos, G. (1993): *Returns to Investment in Education: A Global Update*, Policy Research Working Paper, No. 1067, Washington, D.C., World Bank.
- Rodríguez-Oreggia, Eduardo (2004): Institutions, geography and the regional evolution of returns to schooling in Mexico, Mexico City, Instituto de Investigaciones sobre Desarrollo Sustentable y Equidad Social, Universidad Iberoamericana-Santa Fe, unpublished.
- Rojas, M., H. Angulo and I. Velásquez (2000): Rentabilidad de la inversión en capital humano en México, *Economía mexicana. Nueva época*, vol. 9, No. 2, Mexico City, Centro de Investigación y Docencia Económicas (CIDE).
- Ruiz-Nápoles, P. (2007): El empleo como reto macroeconómico en México, unpublished.
- Sarimaña, E. (2002): Rendimiento de la escolaridad en México: una aplicación del método de variables instrumentales para 1998, *Gaceta de economía*, year 7, No. 14, Mexico City, Autonomous Technological Institute of Mexico.
- SEDESOL (Secretariat of Social Development) (2003): Medición del desarrollo. México, 2000-2002, Mexico City, unpublished.
- Sylwester, K. (2002): Can education expenditures reduce income inequality?, *Economics of Education Review*, vol. 21, No. 1, Amsterdam, Elsevier.
- Taylor, Edward J. and Antonio Yúnez-Naude (2000): Selectivity and the returns to schooling in a diversified rural economy, *American Journal of Agricultural Economics*, vol. 82, No. 3, Columbus, Ohio, Agricultural & Applied Economics Association.
- Weiss, A. (1995): Human capital vs. signaling explanations of wages, *The Journal of Economic Perspectives*, vol. 9, No. 4, Nashville, Tennessee, American Economic Association.
- World Bank (2005): *Agricultural Growth for the Poor: An Agenda for Development*, Washington, D.C.
- Zamudio, A. (1995): Rendimientos a la educación superior en México: ajuste por sesgo utilizando máxima verosimilitud, *Economía mexicana. Nueva época*, vol. 4, No. 1, Mexico City, Centro de Investigación y Docencia Económicas (CIDE).