RESEARCH PROPOSAL

EDUCATION AND DEVELOPMENT IN LOW INCOME COUNTRIES: How to Improve the Efficiency and Effectiveness of Education Policies.

Introduction

The Ecuadorian government, as most of the Latin American countries, introduced a series of stabilization programs during the 1980s and the 1990s. These policies led to important reductions in social expending in most countries. In Ecuador, for example, social spending as percentage of the GDP reduced from 12.7% in 1981 to 8.6% in 1992 (Vos, et, al, 2002). Poverty levels and inequality increased in most countries during the 1980s and Ecuador was not the exception. Despite this decline in social spending, Ecuadorian educational results improved during the 1980s. For example, from 1982 to 1990, the average years of schooling of the adult population grew from 5.1 to 6.7, and the net primary school enrolment rate increased from 68.6% to 88.9%. There was also an improvement in educational inputs in the same period. For example, the pupil-teacher ratio for primary education fell from 36 in 1980 to 30 in 1990.

During the 1990s, Ecuador engaged in drastic economic reforms. Trade, financial and capital account liberalization was accompanied by labor and fiscal reforms. The objective of these reforms was to reduce state intervention and open up the economy to world markets. Poverty levels and inequality decreased in the second half of the 1990s. Social expenditures recovered, especially at the end of the 1990s. Educational outcomes are mixed. For example, the average number of years of schooling of the adult population continued to increase from 6.7 to 7.3 between 1990 and 2001, but the net primary enrolment rate stagnated around 90% (from 88.9% to 90.1%). In contrast, educational inputs show remarkable improvements during the same period. The pupil-teacher ratio for primary education declined from 30 in 1990 to 23 in 2001. The quality of education worsened though. According to information from the Ecuadorian System of Educational Achievements Measurement (“*Sistema Nacional de Medición de Logros*”) test scores for mathematics and language (out of 20) decreased from 9.7 and 10.7 to 8.5 and 9, respectively for the second grade of primary education. A similar deterioration is observed for learning tests for students in sixth and tenth grade. Repetition and dropout rates also increased during the 1990s. This disappointing performance contrasts with educational goals. The decade of the 1990s was the decade of “Education for All”, and Ecuador also subscribed to several international declarations emphasizing the importance of education. In addition, at the end of the 1990s, the Ecuadorian government engaged in new programs aiming at improving the access to primary education and school achievements: cash transfer programs (the “Bono Solidario” and “Beca Escolar”) and a School-meal program (“Programa de Alimentacion Escolar”) were established and expanded, among other objectives in order to, increase access to schooling of the poorer segments of the population. As these are fairly recent, their precise impact on educational outcomes is not clear yet.

Finally, the trade and financial reforms of the 1990s have led to increased demand for skilled labor and further inequality between skilled and unskilled workers (Vos, 2002)[1]. This suggests the importance of improving the access to primary and secondary school in order to support to the new economic growth process. In addition, improving the country's competitiveness requires specific labor skills to be developed by the educational system. In this sense it is important to evaluate which are the main skills that should be emphasized by the educational system to enhance economic growth and improve competitiveness.

Research question

The main objective of this research is to analyze what are the determinants of educational performance in Ecuador, and, in particular, of the quality of learning outcomes and the importance of education for economic development. Further, we wish to answer the question whether access to education is a sufficient condition for improvement of social well-being and economic growth, or whether further importance should be given to more educational quality.

The main hypothesis is that both access and quality are necessary to improve social well being and economic growth.

Educational access is related to the capability of households to send their children to school. This capability is influenced by socio-economic and demographic characteristics of households and children, and by supply-side elements. With regard to this aspect the core question is: *What are the most cost-effective policies to improve school enrolment?*.

Educational quality is usually analyzed in terms of efficiency and effectiveness (Edwards, 1992). Efficiency can be analyzed from two perspectives: internal and external. In relation to the internal efficiency, schools are defined as more efficient when they achieve their goals without wasting resources. Traditional indicators of internal efficiency are dropout, repetition and promotion rates. External efficiency defines schools as more efficient if, among other things, students will receive more earnings from future labor participation. Educational returns are typically used to analyze external efficiency. In this sense, it is important to know which labor skills must be developed by the educational system to improve labor productivity. Improving labor productivity would increase earnings and economic growth.
Effectiveness is related to students' cognitive skills. Traditionally, standardized tests have been used to analyze student's proficiency.
The research question related to this point is: *What type of education policies are more cost effective to improve educational quality, both in terms of school efficiency (internal and external), and school effectiveness?*

Finally, once the more cost-effective policies are identified it is important to analyze their political feasibility. The research question in this case is: *What is the political feasibility of most cost-effective educational policies?*

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[1] Vos uses a cut off point of 9 years of formal education to distinguish between skilled and unskilled workers.

Literature review

Access to schooling

According to the mainstream economic approach to analyze school enrolment, the decision to enroll children in school is based on a cost-benefit analysis made by the household. Parents decide to enroll children if the cost-benefit relationship is favorable. The costs associated with schooling are direct and indirect. The direct costs include inter alia fees, uniforms, books, tuition fees and transport cost. The indirect cost is the reduction in household income due to the reduction of child labor. The expected addition to a child's human capital is among the main benefit associated with schooling (Gertler and Glewwe, 1990).

In Ecuador some studies analyze the determinants of primary and secondary school enrollment using this conventional approach. (Younger, et al, 1997, Ponce, et, al, 2002).

Most of the studies about enrolment do not take into account neither the supply-side elements, nor household capabilities. In this sense it is important to include both elements in the theoretical framework. According to Amartya Sen, poverty is a consequence of an "entitlements"[2] failure. Two notions are important to understand Sen's approach; functionings, which are the achievement of various doings and beings, and capabilities, which are the ability to achieve such functionings. Functionings and capabilities can be related to material aspects (e.g. to be well-nourished, to be enrolled in school, etcetera) as well as to non-material aspects (e.g. to participate in public meetings). (Dreze and Sen, 1989).

Being enrolled in school can be seen as a functioning and the decision to enroll children in school can be seen as dependent on household capabilities. When a household decides not to enroll children in school, it can be seen as an entitlement failure. This failure can be due to a failure in household own endowments or due to a failure in publicly provided endowments. In this sense, the decision to enroll children in school depends on both household endowments as well as on public services.

This research will develop more in depth this approach, and will use this theoretical framework to construct econometric models to analyze primary school enrolment in Ecuador, taking into account both household capabilities and public provision of educational inputs.

Educational outcomes

The impact of inputs on student achievement and test scores

In developed countries the prevailing view among economists is that there is neither a strong nor a systematic relationship between school inputs and student test scores. (Coleman, 1966; Hanushek, 1986; 1989, 1996). However, in recent years this conclusion has been subject to greater scrutiny. Hedges, Line and Greenwald (1994), for example, reexamined the studies analyzed by Hanushek, and using an alternative methodology they found that the data show systematic positive relations between resource inputs and school

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[2] Entitlement, according to Sen, is the protected command and access to resources or to a bundle of goods.

outcomes. Ferguson (1992), for instance, shows that greater literacy skills among instructors, reduction in class size, and more experienced teachers all lead to improvements in average student scores on standardized tests.

Finally, most of the studies find a positive impact of inputs on educational attainment (Hanushek, 1996).

In developing countries empirical evidence is also not conclusive. Some studies find significantly positive relation between school inputs and test scores, while others find no systematic or strong association. (Harbison and Hanushek,1992; Glewwe and Jacoby, 1994; Glewwe, 1995; Kingdon, 1996).

In sum, there is no conclusive evidence about the impact of school inputs on students test scores for both, developed and developing countries.

The impact of inputs on labor productivity

Card and Krueger (1992) show that resource-rich schools produce graduates who earn more than graduates from schools where resource endowments are meager. Their results suggest that there is a significant and meaningful relationship between the cost and quality of education inputs on the one hand, and earnings gains attributable to educational attainment on the other. However, in relation with the same topic, Julian Betts (1995) finds that school characteristics do not have any statistically significant or meaningful effect on future earnings of students. A possible explanation of these apparently contradictory results is that they have different analytical levels. Card and Krueger used state-level variables for inputs, while Betts used school-level variables. (Burtless, 1996). In sum, again no conclusive empirical evidence appears available regarding the impact of school inputs on labor productivity.

Another set of studies, especially applied to developing countries, analyzes the relationship between cognitive skills and labor productivity. (Boissiere, et al, 1985 ; Glewwe, 1996; Angrist and Lavy, 1997.). They find that including cognitive skills in the earnings equation has a strong explanatory power. From a policy point of view this kind of analysis could help to identify what are the most relevant skills required to enhance earnings. In this case empirical evidence is more conclusive about the impact of specific skills on labor productivity.

Methodological issues

Most of the studies cited above suffer from methodological problems:

1.- Bias due to omitted variables. The failure to include variables such as parental background, state level political variables, children innate ability, and so on, may bias the measured effect of school resources both on test scores and on future earnings. If excluded variables are correlated with one or more of the included variables, estimates will be biased

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and inconsistent. The disturbance variance will be incorrectly estimated. In consequence, the usual confidence interval and hypothesis-testing procedures are likely to produce misleading conclusions about the statistical significance of the estimated parameters. (Gujarati 1995).
For example, since the children of wealthier parents often attend schools with better inputs, and since family background is thought to exert an independent effect on children's education and economic outcomes, there may be a spurious positive association between school resources and measured outcomes. (Card and Krueger, 1996).

2.- <u>Bias due to errors of measurement.</u> Errors of measurement in the explanatory variables generate biased and inconsistent estimates. Most of the studies contain a substantial amount of measurement errors, especially in years of schooling and cognitive skills.

3.- <u>Specification of the dependent variable</u>. Most of the studies use test scores in level form. These studies have been criticized due to the cumulative character of knowledge. Evaluating students at one point in time may be biased if this cumulative element is not taken into account. Alternatively, the change in score over two points in time can be used (value added approach).

4.- <u>Sample selection</u>. Especially in many developing countries, some children never attend school, grade repetition is quite common, and high rates of dropout are observed. In this regard, years of schooling are endogenous. In this case, the endogenous explanatory variable becomes stochastic and is usually correlated with the disturbance term creating biased estimates.

There are important new methodological developments in econometrics to correct some of these problems. The Heckman estimation procedure to correct for selection bias, use of instrumental variables, and so on, are possible paths to correct some of the above cited problems. (Greene, 1993).

Non-conventional methods have also been used to overcome these methodological problems. Instead of estimating education production functions or wage earnings equations, some studies have tried to conduct a series of randomized experiments, one per school characteristic, to evaluate the impact of changes in school and teacher characteristics on learning and school enrolment (those are also called experimental impact evaluation). The basic idea of this kind of studies is to compare two population groups of observation that have no systematic differences other than the one group receives the treatment ("treatment group") and the other does not ("control group"). The simplest method is to take a sample of the population of interest and randomly divide the sample into "treatment" and "control" groups. Differences in the variables of interest across the two groups are unbiased estimates of the effect of the treatment. (Glewwe, 2002).
In relation to access to school, some impact evaluations of targeted and conditional cash transfer programs[3] find significantly positive impact on enrolment. For example, "Progresa" from Mexico and "Bolsa Escola" from Brazil are found to have such impact. With respect to test scores, most of experimental evaluations find a positive impact of

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[3] That is conditional on school enrolment.

inputs on test scores, such as school feeding, learning materials, textbooks, and so on. However, even with these methods, evidence is not conclusive and some studies find no significant impact of inputs on tests scores. (Heyneman et. al. 1981; Heyneman et al, 1984; Glewwe, Kremer and Moulin, 2001; Glewwe et, al. 2002, cited in Glewwe 2002).

Proposed research methodology

In methodological terms the basic idea of this research proposal is to use, on the one hand, conventional methodologies (based on advanced econometric models and correcting the problems outlined above), and, on the other hand, randomized experiments to evaluate what school policies are more cost-effective to improve education in Ecuador.

Specifically, in relation to access to schooling, the research will generate an econometric model to analyze the determinants of school enrolment taking into account both household capabilities and supply-side factors. Based on this model the impact of cash transfers and other target programs on enrollment will be estimated. On the other hand, a randomized experiment will be used. Ecuador currently is implementing a new cash transfer program called Human Development Bonus ("Bono de Desarrollo Humano"). The program consists of a cash transfer of US$ 15 dollars per month, conditioning families to send children to school and to make use of health centers. A randomized base line survey design will be used to evaluate the impact of the program on enrolment rates, and on school attainment. The idea is to compare outcomes from both analyses in order to find the best instruments to correct econometric estimations. In this way, experimental results will be the reference for correcting conventional estimations.

In relation to school efficiency, an econometric model will be used to estimate an educational production function for Ecuador. To explain student test scores, the production function will include variables to control for children's innate abilities, family background, sample selection, etcetera. In addition a value added approach will be used. As an explanatory variable participation in the Ecuadorian lunch program will be incorporated to analyze the impact of the program on test score. Again, this will be complemented with an experimental design impact evaluation. Ecuador has a nutritional program called School Feeding Program ("Programa de Alimentación Escolar"). The program consists of providing breakfast and lunch for students attending public schools. In this case also a randomized design will be used to evaluate the program impact. Standardized tests will be applied to a sample from the "control" and the "treatment" group. Differences between test scores from control and treatment group are the impact of the program. These results will be compared with the results from the production function previously constructed using conventional techniques. The idea, again, is find the best instruments to correct conventional estimations using experimental results as reference.

In relation to cognitive skills and labor productivity, the research will incorporate in the Ecuadorian employment and unemployment survey cognitive skills questions to analyze the impact of these variables on earnings. The idea of this part is find what aspects of the actual school curricula should be emphasized to strength education impact on labor productivity.

Finally, to analyze the political feasibility of policies found as being more cost-effective a qualitative approach will be used. The basic idea is to evaluate different positions held by social actors and stakeholders involved in the educational process. Qualitative techniques as focus group and life interviews will be used in this part.

The data

Schooling determination model

To analyze school enrolment the latest available living standards measurement survey will be used[4]. This data will be merged with information from the Ministry of Education to incorporate supply-side information. For the impact evaluation of the cash transfer program a baseline (applied in June 2003) as well as the follow-up survey (which is going to be applied in June 2004) will be used[5].

Education production function

To construct the education production function a survey will be applied in two periods of time. In this panel, students will be evaluated using standardized tests. Child, family and school characteristics will be also taken in each application. The idea is to apply standardized test to a sample from the control and treatment groups selected for the impact evaluation of the schooling feeding program[6].

Labor productivity

Currently the Latin American Faculty of Social Sciences (FLACSO) conducts the urban survey of employment and unemployment. The idea for this part is to include a module with some cognitive skills questions to evaluate their impact on earnings. The advantage is that this research will count with the support of FLACSO.

Scientific contributions

This research hopes to make two important contributions. On the one hand, a new theoretical approach will be developed to understand schooling determinants, in contrast with the conventional model based on the willingness to pay and the utility maximization criteria. This new approach, based on Sen's theoretical contributions, will emphasize households' capabilities and public action in providing education. On the other hand, this research will contribute to methodological developments by finding adequate instruments to correct estimation problems in conventional econometric models. Such finding will be based on experimental evaluation methods as reference.

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[4] This household survey will be conducted through 2004 by the National Institute of Statistics.
[5] These surveys are being implemented by the Technical Secretariat of the Social Cabinet.
[6] This impact evaluation will be conducted by the Technical Secretariat of the Social Cabinet.

In addition, a specific contribution to the Ecuadorian government is that this research will find the most cost-effective policies to improve educational outcomes.

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