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OPERATIONAL EDUCATION INDICATORS

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Operational Education Indicators

by

George Psacharopoulos

ABSTRACT

The focus of analytical work in the field of education has changed over the years. The scope has expanded to include complementary fields such as psychology, sociology, anthropology and political science. This paper reviews sector analysis methods which can be used to provide the necessary information for policy reform. Too often decisions are made on education policy with insufficient analytical groundwork. It provides information on the most fundamental indicators which can be measured, including costs, benefits (student achievement, earnings), equity, and quality.

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I. Introduction

Gone are the days when the economics of education literature could be annotated in the handful of items in Mark Blaug's (1966) first bibliography on the subject. The explosion of literature in the field is such that these days a similar bibliography would occupy several volumes, if not an encyclopedia on its own (for a modest attempt, see Psacharopoulos 1987).

The analytical work that has already been done covers a wide range of topics. Given the many dimensions "economics of education" has taken, it is difficult to provide an overview of what we already know. For example, it has been merged with labor economics, and entered into complementary fields such as psychology, sociology, anthropology and political science.

There are however a critical list of analytical topics that are important for answering the most common policy questions governments face today regarding education.

II. Analytical Fads

But let us first establish some broad trends of analysis in this field. Among the many themes and sub-themes that have occupied the pages of journals and books, one can discern three clear analysis highways during the last three decades.

Table 1. Analytical Issues in Education, Over Time

Period	Rate of Return	Screening	Externalities
1960s	X		
1970s	X	X	
1980s	X	X	X

The field essentially started in the late fifties/early sixties with estimates of the profitability of investment in education (see Becker 1960). The seventies witnessed the challenge to the social returns to education by the formulation of the screening hypothesis (see Arrow 1973, among many others). And the eighties saw a revival of attempts to estimate the effect of education on economic growth by means of "endogenous" models that allegedly catch much of education's positive externalities (see Lucas 1988, Romer 1990).

III. Policy-Oriented Indicators

Beyond the pure academic interest, analysis of the economics of education takes place in order to guide fundamental policy decisions that transcend levels of economic development. Educational reform is one of the most debated issues in contemporary society. For example, the issue could be how to improve the quality of education in the United States (to match the enviable performance of Asian countries on educational achievement Olympics), or how to cover more children aged 6-12 years with basic education in a sub-Saharan African country.

Table 2. A Taxonomy of Fundamental Education Indicators

A. First Level Analysis**1. Unit cost of education**

- By schooling level
- By curriculum type
- Of pedagogical inputs
- In public and private institutions

2. Benefits of education

- Learning outcomes
- Earnings/productivity of graduates
 - By schooling level
 - By curriculum type
 - In public vs. private sectors

B. Second Level Analysis**1. Efficiency assessment**

- Cost-effectiveness analysis
- Cost-benefit analysis

2. Equity assessment

- Costs incidence
 - Benefits incidence
-

Table 2 presents what I consider to be the most fundamental indicators that must be undertaken in order to arrive at more informed policy decisions in education. The list skimps on some more traditional education indicators (such as enrollment and student-teacher ratios) for two reasons. First, most of such indicators are already used in Bank work. Second, I want to emphasize what we should be doing in addition.

The taxonomy is based on the (hopeful) belief that the ultimate two concerns of the policy maker (or politician, or whoever makes the ultimate decision) is (should be) (a) the efficiency with which resources are being used in education, and (b) the way such resources and benefits are distributed in the population. These concerns correspond to the efficiency and equity arguments of a standard social welfare function.

On Costs. The first fundamental input for decisions in education is the unit cost per student or graduate, by level of schooling, i.e., primary, secondary, university, post-graduate; by curriculum type, i.e., general versus vocational track in secondary education, or by type of faculty in higher education. Such cost must be decomposed by the many inputs that enter into the production function of education, e.g., teachers' salaries, rental-cost-equivalent of school buildings, textbooks, materials and supplies. Unit costs of private schools should be juxtaposed to those for public schools.

Costs must be broken down into public and private, the latter referring to what the student actually bears, whereas the former refers to the total resource cost of schooling,

regardless of who pays it. A significant part of the cost of schooling, especially in post-compulsory education levels, is the opportunity cost of student time.

It is important to know the unit social (resource) cost of education. On decisions at the margin, one must know, for example, how many primary school places are being sacrificed in order to create one university place. Equally, one must know what is the unit cost of different types of curricula in secondary education, and also the per student cost of university faculties. Actually, it is astonishing how many decisions on investment in certain levels (beyond primary) and types of education are being made without explicit consideration of the cost of such provision, let alone the expected benefits.

On Benefits. We can distinguish two grand classes of educational benefits. One refers to the immediate educational outcome, and this is student learning. The other is the eventual labor market outcome, referring of course only to those who will enter the labor market, often measured by the graduate's earnings.

Student achievement can be measured by any of the standard ways, e.g. by asking the student to take a test both at the beginning and at the end of the schooling period in order to record the achievement value added, which in turn can be related to the pedagogical inputs that went into the learning process. Assessing student achievement as the end product is very important for two reasons. First, many students will never enter the labor market, or at least the formal modern wage sector. Hence, for them this is practically the only educational outcome

one can measure. But among non-formal-labor-market participants market outcomes can be measured by imputing shadow wages, (à la Jamison and Lau 1982). Second, even among those who will engage solely in "household production," literacy can contribute to a long series of beneficial outcomes, such as better sanitation conditions for all family members, contraception application and reduced fertility.

Graduate earnings can be decomposed by the same dimensions as educational costs, i.e., they can refer to graduates of the different levels of education, alternative curriculum types, public or private education, and among people working in the public and private sector of the economy. The latter distinction is very important in order to approximate the productivity of graduates, as measured by the earnings of those working in the competitive sector of the economy. But recording the earnings of graduates in the public sector is useful too, as this sector can set the signals to which prospective students respond.

It is also important to know the absolute (and therefore, relative) salaries of graduates of the educational system, for studying issues of equity and the factors determining income distribution (see below).

Cost-effectiveness Analysis. Once the above primary analysis ingredients are available, it is only a small step to assessing the efficiency with which resources are being used in education.

For example, the coefficients of an educational production function can be related to the cost of providing the respective educational inputs. This analysis can lead to policy conclusions that one could not have imagined before, such as determining what inputs are more effective in raising student achievement. (For an excellent application of this approach in Brazil, see Harbison and Hanushek 1992).

Similarly, the information of the costs and earnings/productivity differentials can easily be combined to produce rates of return to investment in education, along all the dimensions according to which the costs and benefits have been disaggregated, e.g., by level of schooling or curriculum type. (For a recent compilation of studies, see Psacharopoulos 1993).

We need more estimates of the returns to education by curriculum type in secondary education and especially higher education, as well as to investments in training. Evidence on this issue can establish investment priorities in the presence of limited funds, whether public or private. Private rates of return by level of education can guide decisions on the distribution of public subsidies to different levels of schooling and income group of the recipient (see below).

If we axiomatically accept basic education and literacy as a *sine qua non* right of every person on this earth — a very tall order to be achieved soon — then, other than for academic reasons, one need not waste time in estimating further returns to primary education. Whatever these monetary returns are — and they have proved to be very high in empirical estimations — they are irrelevant when the population's literacy is at stake. Every child should graduate from

see Hansen and Weisbrod 1969) has not yet become part of the standard tools for deciding the allocation of resources to education in most countries.

The incidence of education benefits is a very important ingredient in this debate. So it is important to record who attends the different levels of schooling, say college, and who does not, by socioeconomic background.

Once such analyses are available, decisions regarding educational policy become more transparent. Even if political expedience often overrules scientific findings, it is important to know what the student/family/nation forgoes.

Methodology. The above short list of analysis topics in the economics of education hides important methodological issues. As a rule of thumb, I would go for

- Micro, within-country time-series, rather than international comparisons. (countries differ in many things other than education, that are very difficult to control for)
- Using household surveys, rather than firm surveys (we are also interested in the unemployed and not only in those who have a job — classic case of sample selectivity that can give wrong signals to policy makers)

- Ensuring that there is a well-defined control group (and not just refer to open-ended "high" or "low" cost estimates, without reference to what is the standard by which highs and lows are being judged).

In particular regarding the earnings of graduates, these would have to be generated by more sophisticated methods than those used earlier. Thus one would have to be based on:

- Recent cohorts of graduates (say, those aged below 40), so as to compute a marginal, rather than historical/average rates of return
- Based on an as much unselected group of the population as possible, hence ruling out wage surveys in urban establishments
- Include those who engage in non-wage, informal sector activities in the economy.
- In social rate of return calculations, focus on those working in the competitive sector of the economy (however defined), in order to better approximate their unobserved productivity based on their observed earnings.

When one is interested in a particular set of graduates, say those of a new type of school, a tracer study, following up the graduates for at least two years into the future, is the proper evaluation instrument.

Similarly, the costs of education should be assessed at the margin, i.e., relating to future expansion of the system, rather than being based on obsolete historical estimates. The latter might have been influenced by recent heavy investments in buildings and equipment, and thus contain a high fixed cost component.

IV. What About Fancier Analysis?

If I sounded too conservative in my fundamental short list for analysis in the economics of education, let me address a few of the most popular issues of contemporary analysis in this field.

From Screening to Productivity Measurements. One of the most fascinating hypotheses in the economics of education literature is the so-called screening hypothesis (or its many variants). One of the main appeals of this hypothesis lies in the difficulty of testing it empirically.

My feeling is that we have reached the limits of such analysis. Instead of asking whether the wine bottle is half empty (the screening hypothesis), I would prefer to see more analysis on the extent to which the wine bottle is nearly full. This line of analysis corresponds to documenting the productive value of education. In my opinion, testing for the productive value of education is the only valid way of testing the screening hypothesis. Thus work on aggregate

production functions (of the Jamison and Lau type) are bound to illuminate more policy making in this area than another fancy formulation and testing of the screening hypothesis.

Education Externalities. This is the contemporary holy grail of analysis in this field, stimulated by the recent growth literature that accommodates endogenous technical change and increasing returns to scale. However, I am concerned by the fact such tests take place by using cross-country data. Beyond the quality of such data, countries differ in many other respects than the general level of education of their labor force or population for the desired effect to be credibly picked up in such analysis (see Azariadis and Drazen 1990, Barro 1991). Thus, the externality in question might just be another name for our ignorance on what really determines economic growth.

Externalities have always intrigued the economics profession and may remain *deus ex machina* in order to explain an observed phenomenon. For example, it might be said that although higher education has a lower monetary rate of return relative to primary education, it might have a higher social rate of return because it confers benefits to society at large. But such statement implies that one can weigh two very elusive items: (a) the positive externalities associated with a university graduate discovering a new vaccine; and (b) the negative externalities associated with 30 percent of the population being illiterate for their entire lifetimes. Pending evidence on the subject, and attaching likely probabilities to events (a) and (b) above, I contend that expansion of primary education would win the case.

Ability Corrections. Closely related to the screening hypothesis are the adjustments to earnings differentials to allegedly correct for ability differences between the more and the less educated. (see the early literature in the field on the so-called "alpha coefficient").

Of course it is a truism to say that further education or higher earnings are positively correlated with a person's inherent "ability." They must be. The real question for educational policy purposes is how much difference does superior ability make to a social rate of return calculation. Several studies, starting with that of Griliches (1970), to recent natural experiments (see Angrist and Krueger 1991), have found that such corrections are not empirically validated.

Also, conceptually, when one provides for educational expansion in the country as a whole, schools are bound to receive both very able and less able students, and the labor market more able and less able graduates. Hence, the average (i.e., ability-uncorrected) earnings differentials might be the right signals to use, rather than trying to simulate a non-representative population.

Education Quality. Similar arguments apply to attempts to correct earnings differentials for educational quality. Quantitative measures of schooling (the famous S in the Mincerian earnings function), embodies a certain level of educational quality, since years of schooling (S) are provided by both bad and good schools. Thus, in expanding S in the country as a whole, one most likely will expand it along the same quality lines, hence quality-uncorrected earnings

differentials should be used as signals for policy, because these are likely to apply to schools at large.

This is not to say that separate studies are not needed to measure school quality and assess the cost-effectiveness of the different educational inputs that contribute to it, as described above.

Labor Market Segmentation. This is another extremely popular theme in the economics of education, on which I feel we have reached diminishing returns. To say that a labor market contains good and bad jobs, or higher paid and less paid workers, is again a descriptive truism, and I need not go beyond the devastating critique of Cain (1976) on the labor market segmentation concept. In my opinion, the only true test of labor market segmentation, is the identification of mobility barriers between the bad and good jobs, or the lower and higher income categories. The reason is that identification of such barriers has concrete policy implications, being the need to try to remove them.

But how many empirical labor market segmentation studies use longitudinal data, by means of which mobility can be recorded and barriers identified? Alas, not many.

V. Epilogue

Unfortunately, educational decisions in the world today are not always based on prior analysis. Too many policy reforms are based on what the legislator thinks is appropriate in a particular country. In the field of education, perhaps more than in any other sector of the economy, politics are substituted for analysis.

But work along the lines suggested above can help swing the pendulum away from popular fallacies on how things work in education, equivalent to "the sun is moving around the earth." The more evidence that is produced to illuminate such fallacies, the better educational systems would be designed to serve those whom they are supposed to serve.

REFERENCES

- Angrist, J.D. and A.B. Krueger. 1991. "Does Compulsory School Attendance Affect Schooling and Earnings?" *The Quarterly Journal of Economics* CVI(4).
- Arrow, K.J. 1973. "Higher education as a filter." *Journal of Public Economics* 2:193-216.
- Azariadis, C. and A. Drazen. 1990. "Threshold Externalities in Economic Development." *Quarterly Journal of Economics* 105:501-526.
- Barro, R.J. 1991. "Economic Growth in a Cross Section of Countries." *Quarterly Journal of Economics* 106:407-443.
- Becker, G.S. 1960. "Underinvestment in college education." *American Economic Review* 50:346-354.
- Blaug, M. 1966. *Economics of Education: A Selected Annotated Bibliography*. 1st ed. Oxford: Pergamon Press.
- Blaug, M. 1970. *Economics of Education: A Selected Annotated Bibliography*. 2nd ed. Oxford: Pergamon Press.
- Cain, G.G. 1976. "The Challenge of Segmented Labor Management Theories to Orthodox Theory: A Survey." *Journal of Economic Literature* 14:1215-57.
- Griliches, Z. 1970. "Notes on the Role of Education in Production Functions and Growth Accounting." In W. L. Hansen, ed., *Education, Income and Human Capital*, New York: National Bureau of Economic Research.
- Jamison, D.T. and L.J. Lau. 1982. *Farmer Education and Farm Efficiency*. Baltimore: Johns Hopkins University Press.
- Lucas, R.E., Jr. 1988. "On the Mechanics of Development." *Journal of Monetary Economics* 22:3-42.
- Hansen W.L., and B.A. Weisbrod. 1969. *Benefits, Costs and Finance of Public Higher Education*. Chicago, Illinois: Markham.
- Harbison, R. and E. Hanushek. 1992. *Educational Performance of the Poor: Lessons from Rural Northeast Brazil*. New York: Oxford University Press.
- Psacharopoulos, G. 1987. *Economics of Education: Research and Studies*. Oxford: Pergamon Press.

- _____. 1993. *Returns to Investment in Education: A Global Update*. Policy Research Working Paper 1067. Washington, D.C.: The World Bank.
- Psacharopoulos, G. and C.N. Ying. 1994. "Earnings and Education in Latin America: Assessing Priorities for Schooling Investments." *Education Economics* 2 (in press).
- Romer, P.M. 1990. "Endogenous Technical Change." *Journal of Political Economy* 98:S71-S102.

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